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Final dissertation

The relationship between positive body image and performance in female athletes practicing artistic gymnastics

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INTRODUCTION

Artistic gymnastics is a competitive sport associated with increased physical activity, and therefore provides both health and fitness benefits (Poudevigne et al., 2003). Some benefits may include body flexibility, increased muscle strength, increased blood flow, body, muscle-mind connection, and so on (Đorđević et al., 2022). However, female gymnasts often develop a body image dissatisfaction that results from the pressure that comes from the sport itself (Poudevigne et al., 2003). However, poor body image in gymnastics oftentimes leads to an unhealthy relationship with the sport, increase of eating disorders, decreased muscles and strength building up to issues in performing the sport itself. For this reason, there is a necessity to investigate why gymnasts tend to develop a negative body image of themselves and demonstrate how having a positive body image can instead improve the gymnasts' performances.

The first chapter includes the general frameworks of body image and body dissatisfaction, the difference between positive and negative body image and the development of body dissatisfaction in aesthetic sports.

The second chapter explores the relationship between body image and gymnastics in particular, the struggles within the sport and the impact of positive body image on gymnasts' performances.

Finally, the third and final chapter contains the aim and the description of the research regarding body image in gymnastics, the methods used and the results obtained.

CHAPTER 1: BODY IMAGE

1.1 BODY IMAGE AND ITS DEFINITION

1.1.1 *Definition of body image*

Body image is defined as an individual's perceptions, thoughts, emotions, and behaviors about their body, which comprises concepts related to body shape and size, body attractiveness, and emotions (Cash, 2004, Grogan, 2006). Body image is a multidimensional construct that is associated with different characteristics, such as physical appearance, sexuality, health, and abilities (Neagu, 2015).

Historically, the concept of body image appeared in the 20th century during the clinical research of neuropathologies related to bodily experiences and some of these include "*phantom leg syndrome*", "*autotopagnosia*", "*hemiasomatognosia*", and "*anosognosia*" (Cash, 2004). Body image and body schema are two concepts that in the past were used without any clear definition and distinction: body image was defined as "*the picture of our own body which we form in our mind*" (Schilder, 1935), while body schema was defined as "*the postural model of ourselves*" (Head & Holmes, 1911; Tiemersma, 1989). To explain the necessity of the distinction between the two concepts mentioned, Gallagher (1986) posits the problem of a conceptual confusion of body image and body schema in previous research; he states that past theorists recognized the ambiguity of the two concepts, however, there was no agreement regarding a final definition. To reach a clear distinction between body image and body schema, Gallagher explains how body image is influenced by conscious awareness, feelings towards the body, and a conceptual form; thus, suggesting that body image is defined according to three aspects: perception, emotion, and cognition (Gallagher,1986). Research regarding body image and its disturbances has been increasing during the past three decades and the majority of the work involves the experience of young girls and women that live in a society filled with certain beauty standards, to which females feel obligated to adhere (Cash, 2005; Grogan, 2006).

Body image is defined as a multidimensional construct because it is associated with

different factors and it incorporates concepts beyond those regarding weight and physical appearance (Cash & Grasso, 2005; Grogan, 2006). For example, body image may be influenced by sociocultural factors, which mainly involve the creation of beauty ideals within different cultures (Neagu, 2015). These ideals, regarding specific physical characteristics, sizes, and shapes, are consequently spread across people through different channels, such as magazines, television, social media, and daily discourse (Schwartz & Brownell, 2004). The importance of an individual's physical appearance may come from the discrepancy there is between the functional purpose of the human body and its sociocultural role within society: from a biological point of view, the human body has many functions that allows each and every one of us to live, eat, breath and move; however, from a sociocultural perspective, the body has a visible function to express one's identity (Neagu, 2015). [CS2] Furthermore, the internalization of beauty ideals may lead to body satisfaction or dissatisfaction, and this depends on how an individual interprets these messages (Neagu, 2015). In particular, there is evidence that suggests an anti-fat bias that developed from negative messages and spread across the channels mentioned above; this bias is relevant because it created a stigma and discrimination for those who feel or are overweight, leading to some disadvantages in education, employment, and social gatherings (Neagu, 2015; Schwartz & Brownell, 2004).

Another important factor with which body image is associated is the psychological aspect. For example, perfectionism and Body Image Disorders (BID)[CS3] (e.g., Eating Disorders and Body Dysmorphic Disorder) are linked by self and socially demanding perfectionism and worry and doubts about one's mistakes and actions (Sherry et al., 2009). Furthermore, the impulse towards hiding bodily imperfections from others is associated with BID, which is driven by the fear of being rejected from and judged by those who are around and the constant need for reassurance (Reas & Grillo, 2004). The strong link between BID and perfectionism is therefore a cause for the development of body dissatisfaction, which later on will be explained in more detail (Penkal & Kurdek, 2007; Sherry et al., 2009). Another psychological factor that is related to body image is self-esteem and, in particular, low self-esteem and depression (McCaulay et al., 1988). Moreover, it has been thought that mainly women were affected by BID, however, this

is not entirely true since further evidence found that also men are affected by body image distortions (McCaulay et al., 1988). Nevertheless, women and men present some differences concerning the reason for developing BID: women are constantly influenced by culture to obtain and sustain a certain beauty standard and therefore view themselves as being bigger or heavier than they actually are; men, on the other hand, suffer bodily distortions due to the cultural tendency of being muscular, large and tall, leading them to perceive themselves as being thinner and smaller (Garner & Garfinkel, 1980; McCaulay et al., 1988; Neagu, 2015). Given these aspects, evidence suggests that body image is positively correlated with higher self-esteem and negatively correlated with depression-proneness: as mentioned above, women tend to develop lower self-esteem due to their distorted perception of their own body, while men are more prone to develop depression due to their body dissatisfaction (McCaulay et al., 1988; Mintz & Betz, 1986).

1.1.2 *Positive vs. negative body image*

Research regarding body image has evolved over the years, however, it mainly focused on the effects and reasons for *negative body image*; thus, the analysis of *positive body image* was introduced during the last decade. (Cash & Smolak, 2011; Tylka, 2011). This led to the focus on how to prevent or how to reduce the symptoms of negative body image, instead of enhancing and diffusing positive body image (Cash and Smolak, 2011). As the terms show, positive and negative body image have two opposite meanings and effects, yet they derive from the broader concept of body image. Nonetheless, it is important to note that if an individual's negative body image is low, this does not automatically mean that their positive body image is high since there are many factors involved in positive body image (Tylka & Wood-Barcalow, 2015).

Negative body image involves a degree of body dissatisfaction or shame, which in turn disrupts an individual's everyday life, as it is associated with different psychological disorders, such as depression and eating disorders (Gattario & Frisén, 2019). Negative body image is influenced by the following aspects. First, a social comparison among women, but also for men, about their appearance and what society and the media show, gives space to them to develop bodily ideals; thus, leading to an unrealistic body image (Strahan et al., 2006). These appearance-based comparisons can damage an individual's

self-image and self-esteem, which in turn can lead to other psychological problems, for example, eating disorders and Body Dysmorphic Disorder (BDD) (Myres et al., 2012). Second, when an individual develops a negative body image during adolescence, it can be due to a few factors: the comparison with other peers can lead to thinking that one is chubbier, thinner, shorter, or taller than others; also, bullying or teasing from peers for their physical appearance can cause the development of negative thoughts about one's body (Gattario & Frisén, 2019; Lev-Ari et al., 2014; Neagu, 2015). Third and lastly, negative body image is associated with general life discontent, which consequently leads to the development of low self-esteem and depression; however, this is not a risk factor for negative body image, since, for example, depression can be the cause of one's negative body image, and the same concept stands for low self-esteem (Davison & McCabe, 2006; Gattario & Frisén, 2019).

Positive body image, on the other hand, is defined as the love and respect for one's body, which is associated with the appreciation of its beauty, uniqueness, and functionality (Tylka & Wood-Barcalow, 2015). Thus, having a positive body image also involves the acceptance of both its strengths and flaws, beyond what circulates within the cultural ideals. Positive body image is important because it helps those who suffer from BIDs to highlight the positive aspects of their body, such as respecting, celebrating, honoring, and appreciating it (Tylka & Wood-Barcalow, 2015; Wood-Barcalow et al., 2010). The understanding of the construct of positive body image was an enormous advance in the field of research on body image, allowing the creation of new scales to measure this construct. The development of a complete and more thorough framework of positive body image led to further examination of multiple dimensions of the construct, such as body satisfaction, body appreciation, body evaluation, and so on (Grogan, 2021).

Body appreciation is an important aspect of positive body image and it suggests, not only the appreciation of one's appearance but also the appreciation of its functionality, health and uniqueness; thus, the human body needs to be accepted and celebrated for what it can do and how it makes us feel both pleasant and unpleasant events (Tylka & Wood-Barcalow, 2015). The construct of positive body image, and, in particular, the

love and beauty of one's body, allows individuals to perceive the different representations of the human body and the different ways beauty can be expressed. To obtain and maintain a positive body image, evidence suggests that people engage in a few different routines or actions. Some examples are grooming behaviors and self-care routines: these involve actions, even small and daily, that help to understand one's body and sense of self, allowing one to develop an appearance investment (Cook-Cottone, 2015; Tylka & Wood-Barcalow, 2015). Another tool, useful in the maintenance of positive body image, is inner positivity. Inner positivity is defined as the relationship between positive feelings, thoughts, behaviors (e.g., happiness, confidence, self-care, physical activity), and positive body image and it can be practiced as simply smiling, confirmation, and confidence, without giving the idea of narcissism or egocentrism (Tylka, 2011; Tylka & Wood-Barcalow, 2015). An important detail of those who possess a positive body image involves the fact that they surround themselves with people who too have a healthy relationship with their body; this prevents any kind of negative and toxic talks and behaviors regarding the human body. For example, eating disorders or constant body checking practiced by others, may arise doubts about one's body and, consequently, lead to the development of a poor body image (Tylka & Wood-Barcalow, 2015; Wood-Barcalow et al., 2010). For this reason, it is necessary to highlight that an individual's positive body image is influenced by the love of those who surround them, suggesting a general acceptance and reminder that bodily functions and feelings are what is important in life (Tylka & Wood-Barcalow, 2015).

1.2 BODY DISSATISFACTION

1.2.1 *Definition of body dissatisfaction*

Body dissatisfaction is defined as the negative feelings and thoughts an individual may have about his/her body (Grogan, 2021). In particular, body dissatisfaction involves the disparity that may develop from a person's view of his/her own body and that of his/her ideal body, suggesting a negative evaluation of his/her physical appearance and its characteristics; for example, its shape, muscle tone, size, and so on (Grogan, 2021). Furthermore, body dissatisfaction, when speaking from a female's point of view, concerns the distorted perception of a particular body part, which usually are the buttocks, hips, legs, and/or stomach (Myers & Crowther, 2007).

Body dissatisfaction is influenced by different theoretical frameworks. First, the sociocultural theories involve, as mentioned above during the examination of the body image construct, the way societies and/or cultures represent specific physical appearance ideals, which are spread through different channels (e.g., the media, family, and peers) and internalized by those who are more susceptible to these kinds of contents; thus, leading to the development of body dissatisfaction (Grogan, 2021; Tiggemann, 2011). An example of a sociocultural theoretical framework is the Tripartite Influence Model (Thompson et al., 2005), which states that three elements are the main mediators for the channeling of body ideals, and these are the media, family, and peers. This model tends to highlight the ideals that may result in body dissatisfaction and related disorders, for example, the drive to thinness and the desirability for muscularity; consequently, these body-related ideals lead to unrealistic physical appearance goals and attractiveness perceptions (Grogan, 2021; Van den Berg et al., 2002). Evidence related to the Tripartite Influence Model suggests that it is a valid theory for the understanding of body dissatisfaction and BIDs in both men and women (Grogan, 2021; Hazzard et al., 2019; Schaefer et al., 2021).

Second, cognitive-behavioral theories regarding body image have been proposed during the last two decades (Grogan, 2021; Van den Berg et al., 2007). Thomas Cash is one of the fathers of the development of these theoretical frameworks: he proposed a model in which he describes the relationship between body image and environmental factors, intrapersonal factors, cognitive, physical, and behavioral processes, and these affect each other and determine two outcomes (Cash, 2002). The first outcome involves body image evaluation, which comprises body satisfaction or dissatisfaction, and body image investment, which comprehends the behavioral, cognitive, and physical aspects of body image (Cash, 2002; Grogan, 2021). Thanks to Cash's interventions and evidence, further research was achieved to better understand what processes affect and are affected by body image and to develop new inventories to assess those affected by BIDs (Cash & Smolak, 2011; Grogan, 2021).

Third and lastly, body dissatisfaction, especially when referring to women, may be caused by the objectification of an individual's body (Grogan, 2021). The

Objectification Theory (Fredrickson & Roberts, 1997) proposes that a woman's body is objectified by sociocultural factors and it explains both the state and the trait of self-objectification. Furthermore, the self-objectification process is defined as the internalization from women of the idea of being an object according to the media and society (Fredrickson & Roberts, 1997). This phenomenon leads to women thinking that they are only appreciated for their bodies and their sexualization, which in turn generates insecurities, doubts, and negative feelings towards their bodies (Myres & Crowther, 2007). The perspectives and theories explained above were all useful in the better understanding of body image, body dissatisfaction, and BIDs, which for decades were neglected. These findings are crucial in developing methods of assessment and intervention for those who suffer from any kind of body image disturbance (Myres & Crowther, 2007). Also, it is necessary to understand the relationship that stands between body image and body dissatisfaction and other factors, such as cultural, social, psychological, environmental, and cognitive influences (Grogan, 2021).

1.2.2 *Body dissatisfaction in aesthetics sports*

Aesthetic sports comprehend those disciplines that give an important relevance to the aesthetic component and involve performances in front of judges and an audience. The most common aesthetic sports are artistic gymnastics, rhythmic gymnastics, figure skating, synchronized swimming, and dance. Although these sports are different from each other and require various abilities, predispositions, and time, they are all at high risk for body dissatisfaction; and BIDs (Francisco et al., 2021). Elite athletes of aesthetic sports feel a certain pressure from their coaches, teammates, and families to succeed and present themselves as strong and competitive athletes (Sundgot-Borgen, 1994). Even though female athletes are prone to suffer from eating disorders, these may not be caused by the body dissatisfaction that is assumed to be present; indeed, evidence suggests that body dissatisfaction is lower in elite athletes of aesthetic sports compared to those from other sports (Hausenblas & Downs, 2001; Smolak et al., 2000). However, there is another type of body dissatisfaction to consider when examining aesthetic sports: amongst elite athletes, body dissatisfaction varies depending on the specific sport and usually follows the *ideal body* represented in that type of sport (Krentz & Warschburger, 2011).

Female athletes who practice aesthetic sports, as mentioned above, are thought to be represented with a *perfect body*, especially in the eyes of the audience, judges, and sometimes coaches. Furthermore, the ideal body type for gymnastics, figure skating and ballet, for example, is thin, light, and toned, however not too much as it impacts the performance. This is because: there are various jumps and tricks in these kinds of sports that require the ability to perform them as neatly and effortlessly as possible (Pickard, 2013). Thus, gymnasts, figure skaters, and ballerinas are constantly reminded of this fundamental aspect of their sport, especially at an advanced and professional level, making it almost a requirement in order to succeed and be considered "*the best*".

For example, in the world of professional ballet, many female dancers suffer from disordered eating (e.g., anorexia, bulimia, binge eating) and are surrounded by the idea that being thin is the only way a dancer can succeed and be selected by professional ballet companies (Bordo, 1993; Pickard, 2013). Furthermore, professional ballerinas, from the start of their careers, are persuaded to think that being "thin" equals perfect and beautiful, while being "fat" or "curvy" is seen as weak and ugly (Brazel & Lebesnok, 2001; Garrett, 2004). At this point the idea of being thin is considered a normality and an expectation within the world of both professional and nonprofessional ballet; however, one should not assume that every ballerina suffers from an eating disorder, since there are dancers that have testified of having a balanced diet and eating plenty to keep up with the amount of training they do (Pickard, 2013). In fact, in the last decade, there have been various ballet schools and companies working to improve and maintain the ideal of the *healthy ballerina* through simple actions, such as speaking highly of the importance of sleep, hydration, mental health, and a balanced diet; although, the idea of "*thin is better*" remains amongst teachers (Pickard, 2013).

Rhythmic gymnastics, like ballet, is another aesthetic sport that may include athletes who suffer from body dissatisfaction or disordered eating. In particular, professional rhythmic gymnastics is strongly based on physical appearance: gymnasts' success is determined by the abilities the sport requires, which combines their bodies' flexibility and strength, music, equipment (e.g., ball, ribbon, hoop, rope, and clubs) and intense training, which in turn may lead to the fixation on one's appearance and diet (Zaccagni

et al., 2019). The obsession of rhythmic female athletes regarding thinness can, consequently, cause body dissatisfaction, since there is a continuous discrepancy between their body, what they see as the ideal body, and what would increase their performance (LePage & Crowther, 2010; Zaccagni et al., 2019).

Aesthetic sports are fragile disciplines when speaking about the topics of body image, body dissatisfaction, and eating disorders; however, female athletes who practice these kinds of sports are strong, competitive, and hardworking and they push themselves to be better, knowing their limits (Zaccagni et al., 2019). It is important to consider that there is evidence that suggests a high prevalence of body dissatisfaction and disordered eating; however, not every gymnast, dancer, or figure skater faces these kinds of problems, so it is necessary to highlight that practicing an aesthetic sport does not equal having body dissatisfaction or an eating disorder. These topics are fragile and, although dangerous, should not be stigmatized and made into a stereotype when put into perspective with female gymnasts, dancers, and figure skaters (Thompson & Sherman, 1999).

CHAPTER 2: BODY IMAGE CONCERNING GYMNASTICS

2.1 ARTISTIC GYMNASTICS

2.1.1 Description of the sport

Gymnastics comprehends various disciplines, such as women's and men's artistic gymnastics, rhythmic gymnastics, trampolining, parkour, aerobics, acrobatics, and tumbling. These disciplines fall all under gymnastics because of the overlaps between them: the basics for each discipline are relatively similar and the fundamental characteristics in common involve flexibility, tumbling, and strength training; the differences between the disciplines are evident in the competition requirements and specific skills (Kilijanek & Sanchez, 2020). Artistic gymnastics, both men's and women's, is one of the most followed disciplines in the world nowadays, however, at first, it was not a well known sport, even if it has been existing for centuries; it started to become a popular sport after the Olympics of 1972 when Olga Korbut amazed the audience with her performances (Kilijanek & Sanchez, 2020).

Of the eight disciplines of gymnastics listed above, artistic gymnastics is the most popular and followed discipline among them all. Men's and women's artistic gymnastics include various events, some in common and others different: women's events include vault, floor, balance beam, and uneven parallel bars; while men's events involve vault, floor, still rings, high bar, pommel horse, and parallel bars (Kilijanek & Sanchez, 2020). The women's events require various skills and strengths that can be different for each of them. The balance beam entails a performance of leaps, jumps, aerials, choreography, turns, an entrance, and a dismount, which all require great control and precision. The uneven parallel bars involve a performance that relies on arm, back, and shoulder strength, hand grip, and body composition to perform various handstands, swings, releases, and a dismount. Floor necessitates great dynamics, limb strength, explosivity, elegance, and resistance, which entail different tumbling, leaps, turns, and musical choreography. Vault requires, like floor, great limb strength, and explosivity, but it also calls for speed and control to control the landing from the springboard (Kilijanek & Sanchez, 2020).

2.1.2 Professional gymnastics

Artistic gymnastics is an intense sport that requires many hours of training and dedication to achieve certain goals. There are different levels in which to compete and the highest levels are those that require the most dedication; once gymnasts decide to continue to compete at both a national and international level, they become professional athletes (Bradshaw & Hume, 2012; Kilijanek & Sanchez, 2020).

2.1.2.1 Weight and performance pressure

Women's artistic gymnastics at a professional level, as mentioned above, requires great dedication and sacrifice, thus, leading gymnasts to develop a rigid mindset to accomplish the goals, both implemented by their coaches and by themselves (Francisco et al., 2012). To achieve strong and clean performances during competition, female athletes necessarily need to maintain a specific body type capable of doing the various movements and tricks that the sport requires, especially at an elite level (Shaack, 2011). Usually, this body type corresponds to muscular and lean, which allows the athletes to maintain high-intensity training during their sports career; also, the majority of professional gymnasts result in shorter and more petite than the average female due to the intense training hours, which in turn may lead to delayed maturity and slower growth (Shaack, 2011).

Like other professional sports, athletes usually follow a balanced and healthy diet to keep up with the numbers of hours of training; however, some gymnasts may feel a significant pressure to maintain a thin and petite body, which in turn may be pushed to be kept by their coaches and family members to achieve tricks and jumps more easily and effortlessly in their performances (Shaack, 2011). The demand of female gymnasts to present themselves as slender and petite, but at the same time strong and powerful, can cause some of these athletes to fixate too much on their bodies, consequently resulting in disordered eating and body dissatisfaction (Francisco et al., 2012; Sundgot-Borgen, 1994).

As mentioned earlier, some elite gymnasts feel obligated to obtain and keep a slender physique, however, this demand can be caused by different reasons (Francisco et al., 2012). For example, gymnasts may feel the pressure during competitions and how they

present themselves in front of the judges, which are supposed to be there to judge the performances and not any kind of physical aspect or characteristic; nonetheless, sometimes the athletes feel that the judges prefer the more petite and elegant gymnasts (Francisco et al., 2012). This confusion may come from the fact that judges must evaluate the gymnasts' performances, which entails the execution of the acrobatic and artistic elements, as well as the aesthetic structure and choreography (e.g., elegance that comes from the movements, rhythm with the floor music, and chorographical fluidity) to accentuate both the aesthetic part and powerful part of the sport (Donti et al., 2014). Choreography is an important part of artistic gymnastics because it allows the athletes to express themselves and to show, not only their strength but also their sophistication through music and dance moves, which usually come from ballet (Donti et al., 2014).

During training and competitions, the athletes feel an amount of pressure to succeed and show what they are capable of doing, and to help them achieve their full potential, their coaches train and push them (Francisco et al., 2012); this may represent a risk factor for the development of disordered eating and eating disorders. Indeed, some gymnasts feel too much pressure from their coaches because some of them may force the athletes to present themselves as the ideal gymnasts, which involves both a difficult performance and a lean and aesthetically pleasing body (Francisco et al., 2012). Thus, female athletes may endure their coaches' behaviors that make them question their physical appearances, such as negative comments about being too big and heavy, weight, and food portion control to assure they stay leaner (Francisco et al., 2012). The influence that results from these behaviors may cause the gymnasts to obsess over food and their body (e.g., feeling uncomfortable in a leotard, constantly weighing themselves and food, fearing comments or looks from coaches or teammates), which in more severe cases leads to developing eating disorders and intense training without the proper amount of nutrients (Francisco et al., 2012). It is important to note that the relationship between female gymnasts and their coaches is not always based on a negative or fearful interaction, since many athletes look up to their coaches, trust them fully, and are grateful for their help (White & Bennie, 2015).

Trauma may be a triggering event that, consequently, may lead to the development of an eating disorder, such as Anorexia Nervosa, Bulimia Nervosa, or Binge Eating Disorder (Sundgot-Borgen, 1994). Some examples of traumatic events for an elite athlete may be a serious injury, an illness, or a loss of a coach, which in turn have a significant impact on a gymnast and her career (Bassøe, 1990; Sundgot-Borgen, 1994). Furthermore, a serious injury or an illness can be triggering for an athlete because they put a stop to their training and a significant pause to their career; thus, gymnasts feel helpless and powerless since they cannot do anything about their situation, leading to a shift in their focus, which can be on their weight and/or nutrition (Bassøe, 1990). From these findings, we can confirm that eating disorders are highly prevalent among female gymnasts for different reasons and this matter should be taken seriously by the sporting community, which includes coaches, teammates, and family members; further research is being developed to find prevention and treatment methods that fit best into the world of a professional female gymnast (Sundgot-Borgen, 1994).

2.1.2.2 Struggles within professional gymnastics

Professional artistic gymnastics is an intense sport that requires many hours of training and sacrifices (Kilijanek & Sanchez, 2020). Elite gymnastics coaches choose their future athletes at a very young age, usually between five and seven years of age, and these young gymnasts start training between four and six hours a day for six days a week (Zurc, 2017). Many female athletes dream of competing in international competitions, especially in the Olympic Games, however, there are a few gymnasts that get to compete in these competitions for various reasons: first, the sport requires an immense amount of strength, resilience, and perseverance to keep up with the hours of training; second, gymnastics calls for different sacrifices (e.g., social events and gathering, resting and leisure, and distance from family and home); third and lastly, the sport involves various skills that may cause injuries if not done properly (Zurc, 2017).

As briefly mentioned above, gymnasts dedicate long hours of training, suggesting they have a high risk of encountering injuries, which can be different and can happen due to various events (Bradshaw & Hume, 2012). The most common injuries among female gymnasts are sprains and fractures to the lower extremities (e.g., foot, ankle, and knee), upper extremities (e.g., hand, wrist, and elbow), and spine, which cause chronic lower

back pain (Kilijanek & Sanchez, 2020; Kruse & Lemmen, 2009). Furthermore, injuries may have adverse effects on the athletes: injuries may lead to temporary or permanent disability due to their severity, require expensive surgeries, treatments, and rehabilitation, and put the gymnast at risk for muscular-skeletal problems later in life (e.g., chronic back pain and weak ankles and knees), and temporary periods of rest and softer training, which can keep back a gymnast from competing and advancing in her career (Bradshaw & Hume, 2012; Kruse & Lemmen, 2009). Injuries in gymnastics can be somewhat prevented as much as possible with careful attention and concentration while training and performing, strength, and mobility training, stretching and gradually progressing from simple elements to more complex ones (Bradshaw & Hume, 2012). Artistic gymnastics at an elite level possess different struggles, as described above, and some of these can be physical, such as injuries or illnesses, or psychological (Zurc, 2017). Some elite gymnasts may have to give up daily schooling due to morning and afternoon training and start homeschooling; this may have an impact on the athletes' social life, school achievements, and lack of choice in career opportunities, other than gymnastics, which usually ends during the early twenties (Zurc, 2017).

Other psychological consequences that a gymnast may encounter result from the relationship with their coaches: evidence reported that female gymnasts may endure some psychological abuse from their coaches, which could involve verbal abuse and/or punishment behaviors (Zurc, 2017). In these circumstances, the athletes' parents play an important role in helping their daughters make sense of their coaches' behaviors, since they fully trust the coaches' methods to shape their daughters into the best competitive gymnast (Zurc, 2017). However, if the parents may instead question their daughter's coaches and their behaviors, this could cause the gymnasts to feel tension and confusion, leading them to further stress (Zurc, 2017). As mentioned above, it is important to consider that various coaches practice different methods when training their gymnasts, therefore, not every coach exhibits any kind of abuse on the athletes; some gymnasts may feel stressed even if their parents support them during their entire career (Zurc, 2017).

2.2 RELATIONSHIP BETWEEN BODY IMAGE AND GYMNASTICS

2.2.1 The idea of body image in gymnastics

In artistic gymnastics, as mentioned multiple times above, there is a specific body type that allows the athlete to accomplish tricks, jumps, and leaps effortlessly; furthermore, physical appearance is considered to be an important factor in aesthetic sports, such as gymnastics (Zaccagni & Gualdi-Russo, 2023). Indeed, evidence showed a risk factor for body dissatisfaction and Body Image Disorders (BIDs) in female artistic gymnastics: during competition or training, gymnasts feel a certain amount of pressure to impress judges, coaches, the audience, and other gymnasts and to represent themselves as toned, lean, strong and powerful athletes (Zaccagni & Gualdi-Russo, 2023).

Body image plays a key role in sports performance and evidence demonstrates that athletes usually have a lower risk for developing body dissatisfaction; however, there are specific sports in which body image has significant importance since it is part of the sport itself (Zaccagni & Gualdi-Russo, 2023). Some of these sports are aesthetic sports, which, again, are artistic gymnastics, rhythmic gymnastics, and figure skating, and female athletes seem to have a higher risk for developing BIDs: the reason for this involves the aspect of aesthetic sports being weight-sensitive sports, suggesting that physical appearance and weight are important for succeeding and improving performance (Abbott & Barber, 2011; Zaccagni & Gualdi-Russo, 2023). Another relevant cause for developing body dissatisfaction in aesthetic sports may be the uniform: during competitions, and sometimes during training, gymnasts have to wear a leotard to perform, a tight-fitting outfit with a v-cut that reveals legs, thighs, and part of the buttocks (Σκούρα, 2016; Lord & Stewart, 2020). Leotards are an important aspect of gymnastics because they help judges see any defects, such as bent legs and/or arms; however, some female gymnasts may feel uncomfortable wearing them, for example, an athlete revealed that she feels exposed to everyone and it doesn't help her concentrate during her routines (Lord & Stewart, 2020; Young et al., 2022). Gymnastics' uniforms have been neglected when it comes to the investigation of body dissatisfaction that may develop in gymnastics: as evidence suggests, some female athletes feel self-conscious while performing in a leotard, and for this reason researchers should explore this problem further, finding ways to help and solutions for the gymnasts (Lord & Stewart, 2020).

The concept of body image in artistic gymnastics and other aesthetic sports is different from that considered within the social and cultural contexts (Zaccagni & Gualdi-Russo, 2023). The ideal body image may be similar in that of being slender, lean and toned, however, in sociocultural contexts the perfect body is considered to be beautiful and attractive; while in gymnastics, achieving the ultimate body type corresponds to the best winning gymnast (Zaccagni & Gualdi-Russo, 2023). The discrepancy between the idea of the perfect body in sociocultural contexts and gymnastics leads to different levels of BIDs risk: female gymnasts usually do not have problems with their bodies when it comes to social events (e.g., birthday parties, family or peer gatherings), they may develop body dissatisfaction during training and/or competition since it means being exposed and judged based on both their skills and physical appearance (Zaccagni & Gualdi-Russo, 2023).

2.2.2 The impact of positive body image in gymnastics

Artistic gymnastics has an implemented ideal body type, which coincides with a slim and toned physique; however, this body type may correspond to a prepubescent athletic body, a body that has not yet undergone the physical changes that occur during puberty (e.g., development of secondary sexual characteristics and body hair, menstruation, widening of hips and thighs) (Kerr et al., 2015). Evidence showed that gymnasts preferred the slender and petite body of a younger gymnast rather than the more muscular of an older athlete: the female athletes highlight that the slimmer gymnast is favored because it fits the standards for the feminine, elegant and graceful gymnast (Cohen, 2013; Kerr, 2015). Nonetheless, Kerr et al. (2015) underlined that the female athletes did not criticize the muscular body type, in fact, some said that she seems stronger and more powerful than the other one and this would allow her to accomplish the more difficult skills; yet, it seems that gymnasts still would prefer her body to be more petite and not as muscular. The evidence found by Kerr et al. (2015) may show opposite results in the sense that gymnasts accept and do not see anything negative with a gymnast having larger muscles, however, they would rather have a slender and toned body, since being smaller and lighter helps to accomplish various skills helpful to achieve the peak performance. To solve the contradiction, judges and coaches were asked to analyze whether one body type or the other is preferred during competitions:

responses suggested that both body types are effective in performing gymnastics routines in the sense that the two have different strengths and weaknesses, suggesting that there is no ideal body type in gymnastics (Kerr et al., 2015).

Artistic gymnastics is a complex aesthetic sport that requires many sacrifices, hours of dedication, and resilience, and for this reason, it is important to support the gymnasts during their careers and throughout any obstacle they may encounter (Zurc, 2017). The athletes may feel an immense amount of pressure to accomplish what they are trained to do their entire careers: gymnasts may be perfectionists and put all of their efforts into what they love doing; thus, it is important to support them, both physically and psychologically (Krasnow et al., 1999). Evidence suggests that elite gymnasts have a more positive body image than non-elite gymnasts, however, they are still at a higher risk for dieting and weight control for the reasons mentioned above (Abbott & Barber, 2011; De Bruin et al., 2007). Furthermore, preventive measures and interventions exist to help coaches, parents, and especially athletes implement a positive body image within gymnastics: the BodySense program consists of various preventive interventions involving eating attitudes, dieting pressure, and body health (Buchholz et al., 2008). The BodySense project was created to educate, not only female athletes, but also parents and coaches, in the areas mentioned before; these involve promoting healthy eating habits, highlighting exercise's both physical and psychological benefits, body positivity by celebrating the different shapes and sizes, the balance between sport at an elite level and social life, and behaviors to manage and/or alleviate stress (Buchholz et al., 2008). The BodySense project's goals are mainly two: the first one is the promotion of a positive body image within the world of gymnastics, and the second is the prevention and early detection of any kind of disordered eating (Buchholz et al., 2008). To accomplish these goals, researchers made available brochures and guides for the athletes, coaches and parents to help reduce the pressure for thinness that developed in gymnastics (Buchholz et al., 2008).

Positive body image in gymnastics, and other aesthetic sports, is not as diffused as it should be, suggesting still the presence of unhealthy behaviors and loads of pressure to achieve the thin and toned ideal body (Abbott & Barber, 2011). Further research is

needed to examine in more depth and detail the reasons for this and the development of various strategies is necessary to reduce the risk of body dissatisfaction and disordered eating (Abbott & Barber, 2011).

A study conducted by Soulliard et al. (2019) investigated the relationship between positive body image and performance within different sports and from this the existence of a relationship between positive body image and sport-related variables was found. Furthermore, researchers stated that athletes tend to experience a more positive body image than non-athletes: the Developmental Theory of Embodiment, which suggests a profound relationship between positive body connection and functionality, has been proposed to justify the difference between athletes and non-athletes (Soulliard et al., 2019). There are some sports that require more embodying actions than others and these create an increasing awareness and closer relationship with the body: positive body image seems to be related to both confidence and flow that comes with certain sports, for example aesthetic sport and, in particular, artistic gymnastics (Soulliard et al., 2019).

CHAPTER 3: THE RESEARCH

3.1 AIM AND HYPOTHESIS

Body image is a multidimensional construct that has been investigated only during the last few decades and, for this reason, a lot of information is still missing or left superficial. Body image, as mentioned in the previous chapters, influence different aspects of life, including self-esteem, body dissatisfaction, eating behavior, and mental health in general (Cash & Grasso, 2005; Grogan, 2006; Neagu, 2015). Furthermore, there are many sports that are affected by body dissatisfaction and body image: aesthetic sports are maybe the most affected category of sports since they are judged both on skills and physical appearance (e.g., elegance, presentation, musical fluidity; Francisco et al., 2021). In particular, the world of artistic gymnastics suffered and still suffers from BIDs: evidence suggests that there are some elite gymnasts that encountered body dissatisfaction and/or disordered eating, which were caused by pressure to succeed, competition performance, and other aspects that were described in depth in the previous chapters (Krentz & Warschburger, 2011; Sundgot-Borgen, 1994). In the last decade, a series of projects were proposed and tested to limit the drive for thinness within aesthetic sports and, in this case, gymnastics; for example, the spread of the idea of positive body image could lead to a better performance overall. In fact, to better understand the relationship between positive body image and artistic gymnastics, a structured research was conducted. From the research, the results demonstrated that the less body dissatisfaction there is and the more body appreciation there is, and therefore a positive body image, the better the performance will be (Abbott & Barber, 2011; Soulliard et al., 2019).

On the basis of these premises, the aim of the research was to investigate whether having a positive body image could improve gymnastics overall performance, both during training and competition. In doing this, anxiety was taken into consideration since it plays a relevant role in the sport context (Donti et al., 2021). At the same time, also the risk for developing an ED was taken into account, given the high prevalence of disordered eating in aesthetic sports (Francisco et al., 2012). The study proposed the following hypothesis: positive body image could improve overall performance in aesthetic sports (Abbott & Barber, 2011).

3.2 METHODS

3.2.1 Participants

14 elite gymnasts between the ages of 11 and 21 (M = 17; SD = 2.83), who train all 6 hours a day (with a total of 36 hours per week) and have been practicing gymnastics from 7 to 17 years (M = 12.07; SD = 2.84), took part in the study. The participants were chosen carefully based on some criteria necessary to fit the research. Indeed, the gymnasts should:

1. Be at a professional or elite level, meaning that they train at least 3 hours/day
2. Compete in at least one event (e.g., balance beam, floor exercise, vault, uneven bars)
3. Be at least 11 years old to fully understand the statements from the questionnaires.

The complete description of study participants is reported in Table 1.

Table 1: Descriptive statistics related to age, seniority in the sport, and BMI.

	N	Minimum	Maximum	Mean	Standard deviation
Age	14	13	21	17,00	2,83
Seniority in the sport	14	7	17	12,07	2,84
BMI	14	17,44	22,14	19,95	1,56

3.2.2 Material

The material of the research comprehended the informed consent forms, the personal data sheets, a set of tables for performance evaluation, and five self-report questionnaires.

The personal data sheets allowed the participants to provide some useful information for the research, such as general information (e.g., gender, age, height, weight, occupation, school status), sport practiced, amount of training hours, number of years of practicing the sport, up to three titles obtained during their career. The weight and height were necessary data to calculate the *Body Mass Index* (BMI).

A set of tables was developed to evaluate the gymnasts' performances, each of which contains different parameters for each event. More specifically, four tables were created, one for each event that, again, are balance beam (BB), floor exercise (FX), vault (VT), and uneven bars (UB).

The following questionnaires were used during the research.

Body Appreciation Scale-2 **(BAS-2; Tylka & Wood-Barcalow, 2015; Italian version curated by Casale, Prostamo, Giovannetti, & Fioravanti, 2021)**

The BAS-2 is the body appreciation scale advanced to better understand positive body image. (Behrend & Warschburger, 2022). The scale is composed of 10 items with a *Likert* point response-scale from 1 ("never") to 5 ("always") and some examples of the statements are "*I respect my body*" and "*I am attentive to my body's needs*" (Behrend & Warschburger, 2022).

Functionality Appreciation Scale **(FAS; Alleva et al., 2017; Italina version curated by Cerea, Todd, Ghisi, Mancin, & Swami, 2021)**

The FAS is a self-report scale used to assess positive body image and appreciation for one's body and its functionality (Alleva et al., 2017). It is composed of 7 items ranking on a *Likert* scale from 1 ("strongly disagree") to 5 ("strongly agree") and such items express statements such as "*I appreciate my body for what it is capable of doing*" and "*I feel that my body does so much for me*" (Alleva et al., 2017).

Objectified Body Consciousness Scale **(OBCS; McKinley & Hyde, 1996; Italina version curated by Dakanalis, Timko, Clerici, Riva, & Carrà, 2016)**

The OBCS is a self-report questionnaire widely used to assess body image problems (Morandi & Varnes, 2017). In particular, the scale was developed to investigate three main constructs: body shame, body surveillance and control beliefs. The OBCS involves a total of 24 items with a *Likert* scale from 1 ("strongly disagree") to 7 ("strongly agree"); the items are divided into three 8-item subscales, which are, as mentioned above, Body Shame, Body Surveillance and Control Beliefs. In this

particular research the subscale used was the Body Surveillance (BSV) and some example statements are "*I rarely think about how I look*" and "*I think more about how my body feels than how my body looks*" (Morandi & Varnes, 2017).

Eating Disorder Inventory-3 **(EDI-3; Garner, 2004; Italian version curated by Giannini, Pannocchia, Dalla Grave, Muratori, & Viglione, 2008)**

The EDI-3 is a self-report questionnaire composed of 91 items measured on a *Likert* scale from 1 ("never") to 6 ("always") investigating disordered eating and related features; however, in this particular research the items were selected and not all 91 items were present in the questionnaires handed to the gymnasts. The items selected pertains to the three subscales most relevant in EDs, named *Drive for Thinness* (DT), *Bulimia* (B), and *Body Dissatisfaction* (BD) (Clausen et al., 2011). For example, in this research the EDI-DT contains 7 items like "*I think about dieting*" and "*I am terrified of gaining weight*"; while, the EDI-B is made up of 8 statements, such as "*I stuff myself with food*" and "*I thought of trying to vomit*"; lastly, the EDI-BD contains the following 10 items: "*I think my stomach is too big*" and "*My stomach is the right size*". Furthermore, the EDI-3 yields composite scores: one focuses more on EDs, while the other five are concerned with related psychological concepts (Garner, 2004). For this research particularly, the *Eating Disorder Risk Composite* (EDRC) score was used, which aims at evaluating the presence of disordered eating and other aspects related to these kinds of behaviors (Garner, 2004). The EDRC score involves the sum of the three subscales of the questionnaire (*Drive for Thinness, Bulimia, and Body Dissatisfaction*) and it evaluates behaviors and attitudes towards food and diet through a process of screening (Garner, 2004).

Competitive State Anxiety Inventory-2 **(CSAI-2; Cox, Martens, & Russell, 2003; Italina version curated by Martinengo, Bobbio, & Marino, 2012)**

The CSAI-2 is a competitive state anxiety inventory used to assess the presence of competitive anxiety symptoms in athletes; it is composed of three subscales, which are self-confidence, cognitive anxiety and somatic anxiety (Yoshi et al., 2009). This scale has been widely used in various studies that needed to assess the relationship between anxiety and sport performance (Yoshi et al., 2009). Furthermore, evidence suggests that

the CSAI-2 measures anxiety rather precisely in that it takes in account two types of anxiety states (e.g., cognitive anxiety and somatic anxiety) since they can affect performance in different ways (Yoshi et al., 2009). The questionnaire contains 17 items and the *Likert* scale goes from 1 ("not at all") to 4 ("very much") (Lundqvist & Hassmén, 2005). Some examples of the statements are "*My body feels tense*", "*I am concerned about losing*", and "*I feel nervous*".

3.2.3 Procedure

The research began with contacting a gymnastics coach and asking permission to conduct it in that gym. Before starting the study, the participants were invited to read with caution and sign the informed consent form. The form provided information about the research, its aim, the study's methodology, a list of the material that would be used, the place and length of the research, contact information of the coordinators of the study, and the participation and the use of personal data consent; the participation of the gymnasts under 18 years of age required the parents' signatures.

After the consent forms were signed and collected, the set of questionnaires and the personal data sheet were handed out to the athletes and they were advised to fill them out in the following few weeks. When the questionnaires and personal data sheets were gathered, the performance evaluations started; unfortunately, a participant did not follow the instructions given to her, so she was not included in this study.

Before the research officially started, a set of tables for each gymnastics' event was developed. As mentioned briefly above, the tables were created based on different parameters for the specific event taken into account; more specifically, four tables were finalized to evaluate as objectively as possible the gymnasts' performances. routines. The uneven bars' (UB) table contains parameters such as strength and capacity of the arms, fluidity in the routine, and body tension; the balance beam's (BB) table involves items such as body shape and elevation of leaps/jumps, body shape of acrobatic skills, choreographic fluidity, and difficulty of the overall skills; the floor exercise's table contains similar parameters to the BB except for explosivity and dynamism; lastly, the vault's (VT) table contains items including explosivity and dynamism, body tension, and flight phase amplitude. All of the four tables also include two parameters in

common, which are general execution of the routine and dismount neatness and execution.

The second step of the research involved the evaluations of the gymnasts' performances, one during training and the other during competition. The first set of evaluations involved those during training in the gym where they usually do the most trainings; the evaluations were obtained during different days in the course of a week since some gymnasts were absent due to school commitments or competitions. The evaluations involved the following steps: first, observing each gymnast perform their routine on all events; second, assess the overall performance using the tables developed by estimating an evaluation from 1, being "not good", to 5, meaning "really good". However, it is important to note that some of the participants did not perform in every event because of a current or past injury or a chronic pain; for example, one of the gymnasts has chronic back pain, so she just performed on the balance beam and on the uneven bars. Therefore, a few athletes only have two evaluations for training and two for competition due to the causes mentioned above. The evaluations were executed on each of the events (BB, UB, FX, and VT).

Once the first set of evaluations was completed, the second set began and involved the evaluations of the same performances during the competitions the gymnasts had over the next two weeks. This set of evaluations was acquired, again, by observing the athletes and was distributed according to each gymnast' competition; since the participants were at different ages and steps in their careers, some athletes competed in the same competition, while the other gymnasts in different ones. Also, a few competitions were at international level abroad, so the evaluations were obtained by following the live streams of the competitions. the research included 14 participants.

Lastly, the data obtained from the questionnaires, personal data sheets, and tables was reported onto a database that would be later on used to complete the data analysis.

3.2.4 Data analysis

The analysis of the data was conducted with the *Statistical Package for Social Science* software (SPSS). To start the analysis, the descriptive statistics were done, which lead to the calculation of the minimum, maximum, mean and standard deviation of the age, seniority in the sport, and BMI. Furthermore, correlations were carried out with *Pearson's r* test on the basis of three indexes, which were each divided into two subindixes, and these are *Floor Exercise* (FX) during both training and competition, *Event* (E) during both training and competition, and *General Execution* (GE) during both training and competition. Consequently, on account of the correlations, regression analyses were executed by taking into consideration the performance during competition as dependent variables and a set of predictors based on correlations (i.e., age, body appreciation and functionality appreciation, and body dissatisfaction) as independent variables.

3.3 RESULTS

3.3.1 Results

Correlations between FX, E, GE and personal data during training

Regarding the index *Floor Exercise during training*, results showed a significant positive correlation between Floor Exercise performance during training and age (r = 0,83; $p < .001$), and seniority in the sport (r = .76, $p = .002$), and a positive correlation between Floor Exercise performance during training and BMI (r = 0.65, $p = .017$). Referring to *Event during training* index, results suggested a significant positive correlation between Event performance during training and age (r = .94, $p < .001$) and seniority in the sport (r = .74, $p = .014$). The index *General Execution during training* revealed a significant positive correlation between General Execution performance during training and age (r = .92, $p < .001$) and seniority in the sport (r = .67, $p = .035$). Results are shown in Table 2.

Correlations between FX, E, G and personal data during competition

The indexes *Floor Exercise during competition* and *General Execution during competition* did not reveal any statistically significant correlation with the personal data

(all *ps* > .05). Regarding the index *Event during competition*, results revealed a positive correlation between Event performance during competition and age (r = .66, *p* = .041). Results are shown in Table 2.

Table 2: Correlation coefficients between the personal data and the macro categories (floor exercise, events, and general execution during both training and competition).

	Age	**Seniority in the sport**	**BMI**	**Hours of training**
Floor Exercise training	.83**	.76**	.65*	.34
Events training	.94**	.74*	.59	.43
General Execution training	.92**	67*	.57	.48
Floor Exercise competition	.49	.30	.43	.00
Events competition	.66*	.49	.39	.40
General Execution competition	.42	.44	.56	.45

****.** The correlation is significant at 0,01 level (two-tailed)

*. The correlation is significant at 0,05 level (two-tailed)

Correlations between FX, E, G and psychological data during training

The index *Event during training* revealed a significant negative correlation between Event and somatic anxiety (r = -.67, *p* = .036). The index *General Execution during training* revealed a negative correlation between General Execution performance during training and somatic anxiety (r = -.64, *p* = .047). These were the only two correlations that emerged as statistically significant when referring to the parameters during training. Results are shown in Table 3.

Correlations between FX, E, G and psychological data during competition

The index *Floor Exercise during competition* highlighted a negative correlation between Floor Exercise performance during competition and body dissatisfaction (r = -.63, *p* = .021. Regarding the index *Event during competition*, results suggest a significant positive correlation between Event performance during competition and the BAS-2 total score (r = .79, *p* = .006) and a positive correlation between Event performance during competition and the FAS total score (r = .65, *p* = .038). The index *General Execution during competition* revealed a significant positive correlation between General Execution during competition and the BAS-2 total score (r = .81. *p* = .005) and a positive correlation between General Execution during competition and the FAS total score (r = .65, p = .040). Results are shown in Table 3.

Table 3: Correlation coefficients between the psychological data obtained from the questionnaires and the macro categories (floor exercise, events, and general execution during both training and competition).

	FAS	**BAS2**	**OBCS**	**COGNITIVE ANXIETY**	**SOMATIC ANXIETY**	**SELF CONFIDENCE**	**ED RISK**	**BODY DISSATISFACTION**
Floor Exercise training	-.11	-.32	.46	-.31	-.46	.03	-.38	-.52
Events training	.44	.30	.12	-.58	-.67*	.22	.01	-.10
General Execution training	.34	.29	.17	-.54	-.64*	.96	-.05	-.17
Floor Exercise	-.10	-.20	.52	-.18	-.29	-.21	-.53	-.63*

competition								
Events competition	.65*	.79*	-.20	-.49	-.43	.01	.11	.00
General Execution competition	.65*	.81**	-.31	-.22	-.21	-.25	.17	.04

**. The correlation is significant at 0,01 level (two-tailed)

*. The correlation is significant at 0,05 level (two-tailed)

On the basis of the correlations, three models of regression were carried out, one hierarchical regression and two linear regressions. The first model of regression involves *performance competition* as the dependent variable and two blocks, which include the following predictors: Block 1 only has Age as a predictor, while Block 2 contains Age, FAS total score, and BAS-2 total score as predictors. This regression model explains the 72% of the variance of the performance during competition. BAS-2 emerged as the only significant predictor for performance competition (p = .035). Results are reported in table 5.

Table 5: Hierarchical regression model with predictors age, body appreciation, and functionality appreciation.

Predictors	**B**	**ES**	**β**	**t**	***p***	**r²**	**F**	**df**
Block 1					**< .001**	.36	6.13	1
Constant	48.87	8.68		5.63	**<.001**			
Age	1.20	.48	.66	2.48	**.038**			
Block 2					**.014**	.72	8.58	2
Constant	-17.45	20.25		-.86	**.42**			
Age	.641	.37	.35	1.71	**.137**			
FAS tot	3.12	3.33	.21	.94	**.385**			

BAS-2 tot	15.80	5.83	.56	2.71	**.035**

BAS-2 = Body Appreciation Scale-2; FAS = Functionality Appreciation Scale

The first of the two linear regressions holds as predictors the FAS and the BAS-2 and as the dependent variable the *General Execution during competition*. The regression showed a 66% of the variance of the performance during competition. BAS-2 emerged as the only significant predictor for *General Execution during competition* (p = .024). Results are reported in Table 6.

Table 6: Linear regression model with predictors body appreciation and functionality appreciation.

Predictors	**B**	**ES**	**β**	**t**	***p***	**r²**	**F**	**df**
Constant	-6.22	5.36		-1.16	**.009**	.66	9.74	2
FAS tot	1.25	.82	.34	1.52	.173			
BAS-2 tot	4.39	1.54	.64	2.86	.024			

The second and last linear regression includes Body Dissatisfaction as the predictor and *Floor Exercise during competition* as the dependent variable. The regression explains a 34% of the variance of the *Floor Exercise during competition*; more specifically, 34% of the Floor Exercise competition score is explained by Body Dissatisfaction (p = .021). Results are reported in Table 7.

Table 7 Linear regression model with predictor body dissatisfaction.

Predictors	**B**	**ES**	**β**	**t**	***p***	**r²**	**F**	**df**
Constant	40.73	4.26		9.56	**<.001**			
Body dissatisfaction	-.38	.14	-.63	-2.68	**.021**	.34	7.19	1

3.4 DISCUSSION

Positive body image is a multidimensional construct that includes different facets, such as body appreciation, respect for the body, healthy and positive relationship with the body, and a wide range of the meaning of beauty (Halliwell, 2015). Nowadays, the need to spread the idea of positive body image may be useful because of the diffusion of certain beauty ideals: these may include a slim and toned physique for women and a muscular one for men, which continuously and more often navigate through social media and cultural everyday environments (Tylka & Wood-Barcalow, 2015). Research regarding positive image and its multiple dimensions has been developing over the last two to three decades and such findings have a relevant importance when it comes to the general concept of body image: previous studies focused mainly on the disorders and negative body image, while broadening the concept to positive body image led to a shift in the view of such domain (Halliwell, 2015). In addition, clinicians have been focusing on the alleviation and removal of negative body image, however, without promoting the positive side of the body which include body appreciation, body functionality, and honor and respect towards the body (Cash & Smolak, 2011; Tylka & Wood-Barcalow, 2015). Negative body image and body image disorders (BIDs) can also lead to the development of disordered eating and Eating Disorders (EDs), which, consequently, may result in an unhealthy relationship with food and dieting to achieve faster the "ideal body" (Gattario & Frisén, 2019). For this reason, it is important to expand the field of research of positive body image, developing new treatments to help those who suffer from body dissatisfaction, BID, and EDs.

Body image is an important aspect of some sports, such as aesthetic sports (e.g., synchronized swimming, figure skating, ballet, artistic and rhythmic gymnastics) (De Bruin et al., 2007). Furthermore, there is evidence that shows a need to improve body image and eating behaviors within the world of aesthetic sports and, in particular, female artistic gymnastics: female elite athletes feel an amount of pressure to withhold a specific body type, which can differentiate between the specific aesthetic sport (De Bruin et al., 2007). Women's artistic gymnastics in an Olympic sport followed by millions of people around the world that requires strength, flexibility, explosivity, and

elegance. The sport includes four different events, each of which calls for different skills and routines, and require many hours of training and dedication to achieve a professional level (Kilijanek & Sanchez, 2020). The stereotypical body type in female gymnastics is slender, toned and petite and it has been implemented in different gym clubs: there are testimonies of female gymnasts that suffered from body dissatisfaction and EDs because of the standards they feel the need to keep up (Zaccagni & Russo, 2023). The reason behind this may come from the fact that elite gymnasts compete in front of a set of judges for each event and they must wear a leotard, a V-shaped tight bodysuit that exposes the legs and part buttocks, known within the world of aesthetic sports and ballet (Σκούρα, 2016; Lord & Stewart, 2020). Even if there is little research on artistic gymnastics and body image, evidence suggests that most female athletes feel uncomfortable while wearing a leotard because of how exposed it makes them feel and it does help them focus on performing their routines (Lord & Stewart, 2020; Young et al., 2022). Consequently, some athletes may develop a BID and/or and ED, which could be dangerous for the number of hours they train, suggesting they may risk both physical and psychological problems (e.g., physical injury, fragile bones and muscles, chronic pain, depression, anxiety) (Zurk, 2017).

The investigation of the relationship between positive body image and artistic gymnastics is a rather new field of research, meaning there are few studies that explore the effects and the outcomes that positive body image could have on gymnastics' performances. The current study aims at exploring the relationship between positive body image and performance in artistic gymnastics.

Results of the study showed the presence of correlations among demographic information (i.e., age, seniority in the sport, and BMI) and performance outcomes (i.e., Floor Exercise, Event, and General execution) during training. First, all three of the indexes positively correlated with both age and seniority in the sport, suggesting that at the increasing of age, in turn performance increases as well, as explained in a study conducted by Barker-Ruchti et al., 2017. Moreover, the more a gymnast trains throughout her career, the better she may improve her performance (Barker-Ruchti et al., 2017). Second, when referring to the BMI, the only correlation found was with the

Floor Exercise index, which implies the importance of a healthy and strong body to perform at best; Sherman et al., 1996 found evidence that a low BMI could improve performance, however, if the BMI was too and/or dangerously low, this, in turn, affected negatively the gymnasts' performance. Regarding the correlations that emerged between the demographic information and *Floor Exercise, Event, and General Execution during competition*, the only statistically significant one was between Floor Exercise performance during competition and age. This relationship indicates that experience during competition related to age can help to improve performance (Barker-Ruchti et al., 2017).

According to the results obtained, the psychological data revealed some correlations, suggesting a relationship between the following items, body image, and artistic gymnastics.

First, the correlations between *Event and General Execution during training* and the psychological data, which in this case involves somatic anxiety revealed an inverse association. In particular, a gymnast' performance tends to worsen when the symptoms related to somatic anxiety (e.g., sweating of palms, increasing heart rate, and hyperventilation) increase; also, somatic anxiety can interfere with both the general execution and the events because the physiological outcomes can lead to mistakes during the performance (Morris & Liebert, 1969).

Referring to the correlations between *Floor Exercise, Event, and General Execution during competition* and the psychological data revealed a set of correlations. In particular a statistically significant negative correlation was found between body dissatisfaction and Floor performance during competition, which suggest an important finding for the study. It seems that body dissatisfaction increases when competing on event Floor Exercise, indicating in turn that the aspects of competing play a role and these might be wearing a V-shaped tight leotard, being judge by a set of specialized judges, performing in front of an audience, and feeling pressure from both the coaches and the team members (Lord & Stewart, 2020; Young et al., 2022). Thus, as Lord & Stewart, 2020 mention in their study, the inverse relationship between body dissatisfaction and Floor Exercise argues the influence that negative body image may

have in artistic gymnastics and, in this case, during competition; if body dissatisfaction would to decrease, then, in turn, performance on Floor Exercise would improve, and vice versa. Furthermore, the correlations that emerged between the BAS-2 and FAS total scores and the three indexes *during competition* (*FX*, *E*, and *GE*) suggest a relationship between the parameters of body appreciation and functionality appreciation and performance; thus, meaning that performance might refine if the relationship with the body (and vice versa). As Zaccagni & Gualdi-Russo, 2023 state in their research, body image plays an important role in aesthetic sports, such as artistic gymnastics, revealing a relationship between body image and performance and how improving one, the other one improves as well. To achieve the relation between positive body image and gymnastics' performance, projects and methods should be created and implemented in gym clubs to spread awareness of the risks that competitive gymnastics could lead to and to build both healthy psychological and physical conditions for the female athletes (Zaccagni & Gualdi-Russo, 2023).

On the basis of the previous correlations three regressions were carried out. The first regression reported a 72% of variance, explaining how body and functionality appreciation influence the index *Event during competition*. This explains the importance of a body understanding, appreciation, and perception and a healthy relationship with the body for an elite athlete while competing in all or at least one of the four events.

The second regression explained 66% of the variance, which, in other words, suggests that body appreciation influence the *General Execution during competition* index. Furthermore, it suggests that the more a gymnast appreciates her body, then it may improve performance overall. The third regression explained 34% of the variance when it comes to Body Dissatisfaction in respect to *Floor Exercise during competition*. The reason behind this elevated percentage found during competition may be the fact that, when competing, a gymnast feels much more exposed and judged by different people (e.g., coaches, judges, audience, family, and teammates), so to improve performance during competition it may be useful to reduce body dissatisfaction among gymnasts.

The limits of the current study concerned the size of the sample and the use of the self-report questionnaires to investigate positive body image. The research was conducted on a small sample, that is of 14 elite gymnasts, which could report findings, however, it is necessary to conduct a similar research on a more substantial sample. Also, besides the size of the sample, different levels of gymnastics could be taken into consideration to understand the differences between professional and amateur gymnasts. Another limit of the study relied on the fact that self-report questionnaires were administered to the participants to investigate the relationship they have with their bodies (i.e., positive body image) and no other methods were used. Self-report questionnaires could be influenced by different external aspects, such as mood, tiredness, and self-consciousness about the answers. Future research could rely on face-to-face interviews with the gymnasts to better understand their body image.

In conclusion, the present research revealed promising results when it comes to the investigation of the relationship between positive body image and performance in artistic gymnastics. Moreover, the findings suggest that promoting positive body image and healthy relationship with food could improve performance during competition (Abbott & Barber, 2011; Soulliard et al., 2019). The implementation and diffusion of psychological interventions aimed at informing the elite gymnasts, the coaches, and the family about the effects of positive body image on performance and the dangers of Body Image Disorders (BIDs) and Eating Disorders (EDs) could enhance the quality of the sport routines (Buchholz et al., 2008). Therefore, it is important to accomplish further research on the relationship between positive image and, not only artistic gymnastics, but also other aesthetic sports, leading to the development of methods and techniques to decrease body dissatisfaction that may evolve among female elite gymnasts.

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