



The Determinants of Social Anxiety in Lower Secondary Education Student Athletes: A Case of Competitive Swimming Environment

Funda Coşkun Özyol¹

¹Van Yüzüncü Yıl University, The School of Physical Education and Sports

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ABSTRACT

Social anxiety disorder is a common psychological problem that may negatively impact the cognitive and social development of children. Its severity may, however, be reduced through regular participation in sports or other physical activity. This study aimed to determine the relationship between competitive student-athlete swimmers' social anxiety levels and anthropometric measurements (height, weight, and BMI), body composition (body fat and lean body mass), and body type (ectomorph, endomorph, or mesomorph). The participants were pre-adolescent female and male lower secondary education student-athlete swimmers. The Social Anxiety Scale was used to evaluate their social anxiety levels, while the anthropometric parameters included height and weight, from which BMI was calculated. Body composition involved determining the percentage of body fat and lean body mass; ectomorphic, endomorphic, and mesomorphic values were then calculated. We found that the social anxiety levels of both female and male student-athlete swimmers were low. There was no statistically significant relationship between the social anxiety levels of the male and female student-athlete swimmers with BMI, lean body mass, or ectomorphy. For the female swimmers, social anxiety levels were not associated with body fat, endomorphy, or mesomorphy, nor were those of the male student-athlete swimmers. These findings suggest that participation in competitive swimming during adolescence is effective in controlling social anxiety. Furthermore, this study revealed that social anxiety is not associated with lower secondary education student-athlete swimmers' anthropometric measurements, body composition, or body type.

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Keywords:

Lower secondary education, student-athlete swimmers, adolescent athlete, swimming training, social anxiety, body composition, adolescent athlete

1. Introduction

Social anxiety is one of the most frequently encountered psychological problems that are common all over the world. Social anxiety disorder (SAD), also known as social phobia, was first described in the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association [APA]) in 1980 and is an ongoing disorder in children, adolescents, and adults. Following its initial appearance which typically occurs during childhood, SAD frequently persists throughout adulthood, with patients often going undiagnosed or having only limited access to treatment (Creswell, Waite, & Cooper, 2014; Khalid-Khan, Santibanez, McMicken, & Rynn, 2007). SAD is characterized by a "marked fear or anxiety about one or more social situations in which the individual is exposed to possible scrutiny by others" (APA, 2013, p. 202). People with SAD worry about the possibility of being embarrassed or judged by others and hence take pains to avoid such environments.

¹ Corresponding author's address: Van Yüzüncü Yıl University, The School of Physical Education and Sports, 65080, Campus/Van

Telephone: +90 432 2251010

Fax: +90 432 2251344

e-mail: fcoskun@vyu.edu.tr

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These individuals experience intense anxiety, which may cause significant discomfort and even disrupt their functioning (Antony & Rowa, 2008).

Since SAD is not exclusive to adults, it is also found in social environments in which children are present (APA, 2013; Crozier, Gillihan, & Powers, 2011). Fear or anxiety in children may manifest as crying, seizures, freezing up, clinging, shrinking away, or not speaking in social settings (APA, 2013). According to APA (2013) data, the prevalence of SAD in adults was 7% over a 12-month period, with similar values reported for children and adolescents. In a study involving approximately 10,000 individuals over the age of 18, researchers found that SAD was the fourth most common psychological disorder, with 12.1% having experienced it at some point in their lives and 6.8% reporting symptoms within the previous year (Kessler, Berglund, Demler, Jin, Merikangas, & Walters, 2005; Kessler, Chiu, Demler, Merikangas, & Walters, 2005). In a large-scale study conducted in the U.S., anxiety and depression rates in children and adolescents aged 6-17 were examined by comparing data from the years 2003 (n = 102.353), 2007 (n = 91.642), and 2011-2012 (n = 95.677). The results showed an increase in prevalence from 5.4% in 2003 to 8.4% in 2011-2012 (Bitsko et al., 2018).

The causes of social anxiety are also among the important investigated topics such as the prevalence of social anxiety. As with many types of psychological disorders, research on the causes of SAD, which is multifactorial, incorporates both genetic factors and life experiences, including those occurring within the family environment (Beidel, Turner, & APA, 2007; Essau & Ollendick, 2013; Hope, Heimberg, & Turk, 2010). Studies indicate that individuals with SAD are 2-3 times more likely to have family members with SAD as a result of children learning to be socially anxious by observing family members (Antony & Swinson, 2008). Numerous studies have revealed the positive effects of physical activity and sports on social and psychological health. In children and especially adolescents, physical activity has been associated with an increase in self-confidence and social interaction (particularly in connection with sports participation) and a decrease in depressive symptoms (Eime, Young, Harvey, Charity, & Payne, 2013). In one study examining the relationship between high school students' participation in sports and anxiety symptoms, the findings revealed that social phobia levels decreased during the period that the participants were involved in sports (Ashdown-Franks, Sabiston, Solomon-Krakus, & O'Loughlin, 2017). Jewett, Sabiston, Brunet, O'Loughlin, Scarapicchia and O'Loughlin (2014) found that participation in sports during adolescence played an important and positive role in the mental health of individuals in early adulthood. In a study conducted with primary school children aged 7-8 years, Dimech and Seiler (2010) reported that the children who participated in team sports exhibited reduced levels of social anxiety. Ashdown-Franks et al. (2017) found that individual sports also protect against the emergence of social phobia symptoms in high school students. Literature on this subject has emphasized that 60 minutes of regular, moderate to intense athletic activity on a daily basis will increase physical fitness, decrease body fat, strengthen bones, decrease or eliminate risks for certain diseases, and reduce depression and anxiety symptoms in children and adolescents aged 5-17 years (Physical Activity Guidelines Advisory Committee [PAGAC, 2008]).

The fact that physical inactivity status was presented as a factor that directly or indirectly increased social anxiety led to a focus on seeking a relationship between various variables related to inactivity and social anxiety. The relationship between social anxiety and BMI, body fat, and body mass has been examined in various studies, with some conflicting findings. Some studies have revealed that when these anthropometric parameters reflect a physique that is not to the individual's liking (fat or obese, for example), body dissatisfaction and, consequently, social anxiety result (Barry, Pietrzak, & Petry, 2008; Crisp & McGuiness, 1976; Kivimaki et al., 2009). Other studies, however, have found no relationship between these parameters and anxiety (Ejike, 2013; Lamertz, Jacobi, Yassouridis, Arnold, & Henkel, 2002; Roberts, Deleger, Strawbridge, & Kaplan, 2003). In one study of 50 obese children and adolescents aged 7-16.5 and 50 healthy peers, anxiety and depression were observed in all of the obese participants (Abdel-Aziz, Hamza, Youssef, & Mohammed, 2014). A study in which individuals aged 9-18 were observed at 4 different times reported a relationship between anxiety and obesity, finding obesity to be a predictor of anxiety, especially in young women (Anderson, Cohen, Naumova, & Must, 2006; Anderson, Cohen, Naumova, Jacques, & Must, 2007).

Although not directly linked to SAD, the relationship between personality and body type (somatotype) has been a topic of research for many decades (Cavala, Trninic, Jasic, & Tomljanovic, 2013; Kellett, Marzillier, & Lambert, 1981; Slaughter, 1970; Zeigler, 1948). The first to approach this topic was Sheldon (1942), who argued

that the relationship between human physique (body shape) and psychology could be classified according to the following body types: ectomorphic, endomorphic and mesomorphic. These body types were thought to be associated with certain personal and psychological characteristics, including social anxiety. According to Sheldon's classification (1942), endomorphs are physically round, with broad hips, narrow shoulders, and fat in the torso, arms, and legs. In terms of personality, they tend to be comfortable with themselves, tolerant, social, fun-loving, humorous, balanced, calm, and enjoy eating and socializing. Ectomorphs, on the other hand, possess physical characteristics quite the opposite those of endomorphic individuals, with a narrow chest, shoulders, and face, a lean body with thin arms and legs, and the ability to eat as much as endomorphs while remaining skinny. They are considered wise, withdrawn, thoughtful, silent, and private, with well-developed artistic tendencies, but exhibit high levels of social anxiety, are afraid to try new things, and generally inflexible. Mesomorphs, whose characteristics lie somewhere between those of endomorphs and ectomorphs, are portrayed as possessing an attractive, desirable body shape, with a slim waist and broad shoulders, and strong, muscular, lean arms, legs, and torso. Psychologically, they are adventurous, brave, ambitious individuals, unafraid of trying new things in the company of new people (Sheldon, 1942). In one of the few studies on Sheldon's somatotype classification and the attendant personality traits that pertain to athletics, Slaughter (1970) investigated the relationship between the somatotypes and personality traits of students in the physical education department. His findings aligned with Sheldon's hypothesis that mesomorphic individuals have low anxiety levels. However, other studies have failed to find any relationship between somatotype and personality (Catell & Metzner, 1993; Deabler, Hartl, & Willis, 1973).

As in other sports, swimming not only allows individuals to be physically active, but also provides anthropometric fitness. In addition, the sport of swimming benefits children and adolescents both physically and psychologically. Besides simply being fun, swimming as a physical activity works the whole body, providing numerous health benefits, and at a competitive level requires intensive strength and endurance training in a systematic manner (Dassanayake, Rajarathna, & Rajarathna, 2016; Pharr, Irwin, Layne, & Irwin, 2018). Similar to other sports, swimming has been shown to increase flexibility, muscle strength, and cardiovascular fitness, reduce depression and improve mood (Chase, Sui, & Blair, 2008; Lee & Oh, 2013). Studies have found the mesomorphic somatotype to be prevalent among swimmers, although there are differences between the somatotypes of young female and male swimmers (Martinez, Pasquarelli, Romaguera, Arasa, Tauler, & Aguilo, 2011; Zuniga et al., 2011).

Currently, there is a gap in the literature on the relationship between social anxiety, body composition, and somatotypes, a gap that is especially conspicuous with respect to young swimmers. The present study will therefore be useful in revealing this relationship in a sample of preadolescent competitive swimmers. As there have been virtually no studies focusing on the physical and psychological characteristics of student-athlete swimmers of different age groups in Turkey, the current study, by examining the relationship between social anxiety level and anthropometric measurement, body composition and body type, will contribute to the literature (Ayan & Kavi, 2016; Bostancı, Ateş, Yılmaz, & Kabadayı, 2017). More specifically, this study aimed to determine the relationship between competitive student-athlete swimmers' social anxiety levels and anthropometric measurements (height, weight, and BMI), body composition (body fat and lean body mass), and body type (ectomorph, endomorph, or mesomorph).

2. Method

2.1. Research Design

The current study used a descriptive and correlational design, using a cross-sectional data. In a cross-sectional study, a predetermined group or events are examined at some point of time. Correlational research involves examining relationships between variables in a single group and often suggests the possibility of cause and effect (Fraenkel, Wallen, & Hyun, 2011).

2.2. Participants

This study included a conveniently selected 306 student-athlete swimmers (160 females and 146 males) competing in the Turkish National Swimming Championships who regularly train at least 3 days per week. All student-athletes were lower secondary education students. The mean age of the participants was $11.49 \pm$

.55 ($\bar{X}_{\text{female}} = 11.47$, $SD = 0.59$; $\bar{X}_{\text{male}} = 11.53$, $SD = 0.50$). Demographic data pertaining to the study participants is presented in Table 1.

Table1. Demographic data of the study participants

	Female ($n = 160$)		Male ($n = 146$)	
	\bar{X}	SD	\bar{X}	SD
Age	11.47	0.59	11.53	0.50
Experience (years)	5.36	1.86	5.34	1.92
Height (m)	1.53	0.07	1.52	0.07
Weight (kg)	44.50	8.67	42.58	7.25
BMI	18.86	2.59	18.43	2.18
Body fat percentage	16.61	3.99	15.60	4.89
Lean body mass	29.95	8.88	30.64	8.36
Ectomorphy	3.22	1.35	3.35	1.66
Endomorphy	3.11	0.95	2.83	0.91
Mesomorphy	2.79	1.36	3.32	1.64

2.3. Data Collection Instrument

The revised Turkish version of the Social Anxiety Scale was used to determine the social anxiety levels of the student-athlete swimmers participating in the study (Demir, Eralp-Demir, Türksöy, Özmen, & Uysal, 2000). As developed by La Greca, Dandes, Wick, Shaw, and Stone (1988), the scale originally consisted of 10 questions; it was later revised to 18 questions (La Greca & Stone, 1993). Using a five-point Likert-type scale (with the possible responses ranging from “not at all” to “always”), children are asked to indicate to what extent they agree with each statement. The scores generated by the scale, which includes items for evaluating social anxiety as well as the dimensions of distress/discomfort experienced in social settings, range from 18-90, with higher scores indicating elevated levels of social anxiety. The Cronbach’s alpha value for the present study was .86.

2.4. Ethics statement

Ethical approval to undertake this study was obtained from the Ethics Committee of the ...University, Turkey. The approval of the Turkish Swimming Federation was also obtained. The student-athleteswimmers were provided with a description of the study procedures and methods that would be implemented and written informed consent and parental permission were obtained for each participant prior to the start of the study.

2.5. Procedures

2.5.1. Anthropometric measurements

Anthropometric parameters included measurements of body mass (kg), height (cm), BMI, body fat, and lean body mass. Body mass measurements for each participant were taken on the same day, in the morning, using a scale of ± 100 grams, while height measurements were obtained using a Holtain brand sensitivity stadiometer (± 1 mm). The participants were barefoot for the height measurements and wore swimsuits for their weight measurements. The BMI was obtained for each participant by dividing body mass (kg) by the square of the height (m).

2.5.2. Body composition measurements

Skinfold, circumference, and diameter measurement techniques were used to determine the participants’ body fat percentage and lean body mass. Skinfold thickness measurements (biceps, triceps, subscapular, suprailliac regions, forearm, and thigh; in mm) were obtained using a Holtain brand skinfold caliper, while circumference measurements (biceps, forearm, thigh, and calf; in cm) were taken using a standard tape measure. A Holtain brand anthropometry set was used to measure the diameter of the femur and humerus in mm. All anthropometric measurements were conducted in the morning and in accordance with the techniques prescribed by the Anthropometric Standardization Reference Manual (ASRM) and the International Biological

Program (IBP) (Tanner, Hiernaux, & Jarman, 1969; Weiner & Lourie, 1969). The values obtained as a result of the measurements were incorporated into the Durnin and Womersley body fat percentage and Martin muscle mass formulas to yield body fat percentage and lean body mass, respectively (Durnin & Womersley, 1974; Martin, Spenst, Drinkwater, & Clarys, 1990).

Body Fat Percentage and Muscle Mass Calculation Formulas

Body fat percentage (%BF) was estimated by measuring four skinfold sites (triceps, biceps, subscapular and suprailiac), then entering the log of their sum into the Durnin and Womersley equations for males and females.

- D = predicted density of the body (g/ml),
- L = log of the total of the 4 skinfolds (mm).
- The density value can then be converted to body fat percentage (%BF) using the Siri Equation.
- Body density equations for males and females aged < 17 years based on the Siri Equation.

$$D(\text{males}) = 1.1533 - (0.0643 \times L)$$

$$D(\text{females}) = 1.1369 - (0.0598 \times L)$$

$$\%BF = (495 / \text{Density}) - 450.$$

Martin muscle mass = height \times $(0.0553 \times (\text{thigh circumference corrected for the front thigh skinfold})^2 + 0.0987 \times (\text{uncorrected forearm circumference})^2 + 0.0331 \times (\text{calf circumference corrected for the medial calf skinfold thickness})^2) - 2445$

2.5.3. Body type measurements

The Durnin and Womersley formula for body fat percentage (Durnin & Womersley, 1974) and Martin muscle mass formula for body muscle percentage (Martin, Spenst, Drinkwater, & Clarys, 1990) were used to determine somatotype values based on the method developed by Carter and Heath to identify somatotype characteristics (Carter & Heath, 1990).

Endomorphy, Mesomorphy, and Ectomorphy Calculation Formulas

- Endomorphy (height corrected) = $-0.7182 + 0.1451(X) - 0.00068(X^2) + 0.0000014(X^3)$
X = sum of triceps, subscapular and supraspinal skinfolds multiplied by 170.18/height in cm.
- Mesomorphy = $[(0.858 \times \text{humerus breadth}) + (0.601 \times \text{femur breadth}) + (0.188 \times \text{corrected arm girth}) + (0.161 \times \text{corrected calf girth})] - (\text{height} \times 0.131) + 4.50$
- Ectomorphy = height-weight ratio $\times 0.732 - 28.58$

2.6. Data Analysis

The Mann-Whitney U test was used to determine the existence of statistically significant differences between SAD scores, anthropometric measurements, and somatotype components by sex. Spearman's rank-order correlation analysis was used to identify statistically significant relationships (if present) between SAD levels, anthropometric measurements, and somatotypes.

3. Results

Using the Mann-Whitney U test, the data were analyzed to detect any significant differences between the young female and male student-athlete swimmers' social anxiety levels, years of athletic experience, heights, weights, BMI scores, body fat, and lean body mass levels, and ectomorphy, endomorphy, and mesomorphy. The results revealed no statistically significant differences between the female and male student-athlete swimmers with respect to social anxiety score ($Mdn_{\text{female}} = 35.00$, $Mdn_{\text{male}} = 34.00$), experience level ($Mdn_{\text{female}} = 5.00$, $Mdn_{\text{male}} = 5.00$), height ($Mdn_{\text{female}} = 1.53$, $Mdn_{\text{male}} = 1.51$), weight ($Mdn_{\text{female}} = 43.50$, $Mdn_{\text{male}} = 42.70$), BMI ($Mdn_{\text{female}} = 18.60$, $Mdn_{\text{male}} = 18.25$), lean body mass ($Mdn_{\text{female}} = 335.35$, $Mdn_{\text{male}} = 33.60$), or ectomorphy ($Mdn_{\text{female}} = 3.40$, $Mdn_{\text{male}} = 3.30$) ($p > .05$ for all) (Table 2). However, significant differences between the young female and male student-athlete swimmers were observed for body fat, endomorphy, and mesomorphy (Table 2). The female swimmer's body fat ($Mdn = 16.00$) and endomorphy ($Mdn = 2.90$) levels were higher than those of the male

student-athlete swimmers ($Mdn= 14.60$ and $Mdn= 2.70$, respectively), while their mesomorphy levels ($Mdn= 2.85$) were lower than those of the males ($Mdn= 3.50$) (Table 2).

Table2. The Mann-Whitney U test results showing differences in body type and somatotype parameters between female and male student-athlete swimmers

Variables	<i>U</i>	<i>Z</i>	<i>p</i>
SAD score	10996.50	-.89	.38
Experience	11423.50	-.23	.81
Height	10389.50	-1.68	.09
Weight	10281.00	-1.81	.07
BMI	10757.50	-1.19	.23
Body fat	9403.00	-2.95	.01
Lean body mass	11495.00	-.24	.81
Ectomorphy	11149.50	-.69	.49
Endomorphy	9585.00	-2.71	.01
Mesomorphy	8848.00	-3.66	.001

A series of Spearman rank-order correlations was conducted in order to determine the existence of any relationships between social anxiety level and anthropometric measures (height, weight, BMI), body composition (body fat percentage, lean body mass), and body type (ectomorph, endomorph, mesomorph) parameters of the student-athlete swimmers. Calculations to determine the relationship between body type and somatotype parameters, the latter exhibiting some variation according to sex, and social anxiety levels were performed separately for the young female and male student-athlete swimmers. The results of the analyses found no significant relationship between social anxiety level and BMI ($r_s(306) = -.01, p > .05$), body muscle ($r_s(306) = -.02, p > .05$), or ectomorphy ($r_s(306) = -.01, p > .05$). In addition, female social anxiety was not associated with body fat ($r_s(160) = .12, p > .05$), endomorphy ($r_s(160) = .07, p > .05$), or mesomorphy ($r_s(160) = .03, p > .05$), nor was male social anxiety with body fat ($r_s(160) = .01, p > .05$), endomorphy ($r_s(160) = .07, p > .05$), or mesomorphy ($r_s(160) = -.01, p > .05$) (Table 3).

Table 3. Correlations between social anxiety, lean body mass, BMI, body fat, and body type

	Spearman's correlation with SAD score
All participants	
BMI	-.002
Lean body mass	-.017
Ectomorphy	-.006
Female swimmers	
Body fat	.116
Endomorphy	.067
Mesomorphy	.032
Male swimmers	
Body fat	.005
Endomorphy	.065
Mesomorphy	-.001

4. Discussion

The present study was designed to investigate the relationship between social anxiety levels and anthropometric measurements and body types of young student-athlete swimmers aged 11-12. Our study found that the student-athlete swimmers had low social anxiety levels. Consistent with these findings, the participation of children and adolescents in sports has been found to have a positive effect on reducing anxiety (Eime et al., 2013; Kirkcaldy, Shephard, & Siefen, 2002). In particular, children and adolescents between the ages of 5-17 are advised to engage in moderate to vigorous levels of physical activity for 60 minutes per day. Maintaining this activity level, in addition to its positive effects on physical health (increased physical fitness, reduced body fat, etc.), helps reduce depression and anxiety (PAGAC, 2008). Since the children in this study train regularly as competitive student-athlete swimmers, we believe that this activity has a positive effect on their social anxiety levels, keeping them low. Studies have proposed various explanations for the low level of social anxiety experienced by physically active individuals. One such explanation is the endorphin hypothesis, also referred to as "runner's high," which suggests that endorphin secreted by exercise has a positive effect on the individual's mood, increasing the overall sense of well-being. While there are some studies supporting and others criticizing this hypothesis, researchers have agreed that an individual's sense of well-being of individuals tends to increase due to the psychological and physical effects of exercise (Craft & Perna, 2004; Dinas, Koutedakis, & Flouris, 2011; Weinberg & Gould, 1995). Another explanation for the relationship between athletic activity and anxiety is that regular participation in sports or other physical activity increases physical skill, overall physical fitness, and muscle density while reducing fat. As a result, a person experiences increased satisfaction with his/her body and receives more praise from others, thus contributing to a more positive emotional perception of him/her (Dimech & Seiler, 2010; Sonstroem, 1984; Sonstroem, 1998; Sonstroem & Potts, 1996). The positive effects of participation in sports on social development have been discussed in numerous studies emphasizing that individuals' perceptions of their ability to create the desired impressions in others are related to their levels of social anxiety, especially in connection with the perceived adequacy or inadequacy of their physical characteristics in terms of how they present themselves (Dimech & Seiler, 2010; Eime et al., 2013). This situation is also valid for the swimmers that comprise the sample population of this study, a situation believed to explain their low social anxiety levels.

Our findings indicated that the lower levels of social anxiety observed in our study participants did not significantly differ according to their gender, as social anxiety levels for both young female and male student-athlete swimmers were similar, consistent with the results of some other studies (Hashempour, Mansor, Juhari, Arshat, & Saidu, 2017; Lyneham, Street, Abbot, & Rapee, 2008). However, some studies have reported significant differences in social anxiety levels between young men and women (Asher, Asnaani, & Aderka, 2017; Essau, Conradt, & Petermann, 1999; MacKenzie & Fowler, 2013; Merikangas et al., 2010). As highlighted above, the fact that the student-athlete swimmers in this study engage in regular swimming training is thought to reduce their level of social anxiety regardless of gender.

Our results showed that the participants' body fat percentage, endomorphy, and mesomorphy values differed according to gender; however, this difference was not reflected in the relationship with their social anxiety levels. Although Sheldon (1942) stated that there is a relationship between endomorphic, ectomorphic, and mesomorphic traits and personality types, and hence, between body type and social anxiety, in the present study no association was found between body types and social anxiety scores for either the female or male participants. Deabler et al. (1973) investigated the relationship between the body types and personality traits of adult veterans and concluded that there was no significant association between the two variables. In a study conducted with young male participants aged 14-15, Fieldsend (1980) examined the relationship between numerous variables and failed to find any relationship between somatotype and personality. Similarly, Cavala et al. (2013) observed no significant relationship between the somatotypes and personality traits of handball players aged 15-31. However, other studies have found correlations between somatotype and personality traits. One such study was conducted by Slaughter (1970) to investigate the relationship between somatotype and personality traits in 157 young female college students pursuing coursework in the fundamentals of physical education. Sheldon, Dupertuis, and McDermott (1970) discovered a positive relationship between mesomorphy and low anxiety levels. In other words, an increase in muscularity or a more athletic-type body positively correlated with decreased anxiety levels in young college women. In the present study, we believe that because the participating student-athlete swimmers were competitive athletes, the body types identified were not the kind that would lead to social anxiety.

The research findings herein did not reveal any relationship between social anxiety levels and body fat, body mass, or BMI values for either the female or male student-athlete swimmers. Although a definite age range is not pinpointed in the literature, the importance of the period from early childhood to late adolescence in the development of social anxiety disorder has been emphasized (Essau et al., 1999; La Greca & Ranta, 2015; Rosellini, Rutter, Bourgeois, Emmert-Aronson, & Brown, 2013; Stein, Chavira, & Jang, 2001). It is during this period, with the onset of puberty, that significant changes in body shape, proportions, and functioning occur, and such factors as height, weight, and skin quality may lead to social anxiety for the adolescent (La Greca & Ranta, 2015). This is because the bodies of adolescents are (partially) exposed to others during the socialization process, and these individuals are concerned that they will be negatively judged by their peers or others during this process (Abdollahi, Abu Talib, Vakili Mobarakeh, Momtaz, & Kavian Mobarake, 2016; Smith, 2003). Although the 11-12 age group of the student-athlete swimmers in this study has been identified as an important age for the development of social anxiety, no association was observed between social anxiety levels and their physical characteristics, due to the latter not being of such a nature that would tend to cause feelings of anxiety or result in negative evaluations on the part of others. In other words, when body fat values are low, lean body mass values are high, and BMI values are in the normal range, there appears to be no relationship between physical characteristics and social anxiety levels (Smith, 2003). Although there are few studies directly investigating the relationship between social anxiety and body fat, lean body mass, and BMI levels, these variables are often included in the assertion of a relationship between the more frequently studied obesity and social anxiety (Garipey, Nitka, & Schmitz, 2010). In one such study, a statistically significant correlation between BMI and social anxiety was observed (Zhao, Ford, Dhingra, Strine, & Mokdad, 2009), while another study with young women found an association between BMI and mental disorders, with incidence of the latter increasing with BMI (Becker, Margraf, Türke, Soeder, & Neumer, 2001). In one study conducted with girls whose ages averaged 11-12 years, the researchers investigated the relationship between BMI and social anxiety in different ethnic groups, reporting that social anxiety increased with an increase in BMI. There have also been studies that found no relationship between BMI and anxiety (Guedes et al., 2013).

Among the objectives of the present study was the examination of the relationship between somatotype and personality (more specifically, SAD) in athletes, a topic that has undergone only limited investigation in past years and heretofore produced inconsistent results. Although recent studies on this topic exist (Cavala et al., 2013), the great majority were carried out approximately 40 or more years ago (Deabler et al., 1973; Eysenck, Nias, & Cox, 1982; Fieldsend, 1980; Sheldon et al., 1970). The investigation of this relationship in our study on young student-athlete swimmers aged 11-12, which found no association between somatotype and SAD, nonetheless constitutes a contribution to the literature. Our research findings yielded current data concerning the relationship between body types and personality in preadolescent student-athlete swimmers, a relationship that has been a topic of debate since Sheldon's study was published in 1942.

There are several limitations to consider in evaluating the findings of the present study. The first of these concerns the sample selected to determine the relationship between SAD and somatotype. Although there are some differences between males and females in terms of somatotype, there nonetheless exist those possessing similar somatotypes. The non-inclusion of athletes with different somatotypes and SAD levels is another limitation. In addition, our sample consisted only of preadolescent student-athlete swimmers aged 11-12, a potentially limiting factor for generalizing our findings to other populations.

Our research findings indicate that the low SAD values obtained in our sample of 11-12-year-old student-athlete swimmers support the wisdom of directing children toward participation in sports. We believe that encouraging children to participate in sports may offer a solution to decrease anxiety in children with social anxiety or to prevent its emergence altogether. Furthermore, we believe that these findings will have repercussions in the fields of both psychology and education. The current study presents important evidence in support of bolstering the position of athletics in education, and especially of emphasizing swimming in the athletic curriculum. As the literature has thus far been quite limited on the subject of the relationship between somatotype and social anxiety, our results constitute a meaningful contribution to the existing literature on this topic.

The findings of this study present a number of possibilities for future research. Firstly, further studies are needed to assess whether or not our findings are valid for other populations. Examination of the relationship

between SAD and body types using different sample populations, comparison of athletes with non-athletes, or, especially, focusing on sample groups with different body types, will all contribute to our knowledge in this field. Additionally, studies on whether individuals exhibit behaviors in relation to their body types should be conducted, employing both qualitative and mixed methods.

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