

CONCERNS ABOUT WEIGHT AND MENTAL HEALTH AMONG ADOLESCENT GYMNASTS: A PILOT STUDY

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Abstract

Weight concerns can have an effect on gymnasts' quality of life. We examined the association between concerns about weight with self-reported anxiety levels and other psychosocial and menstrual health characteristics among child and adolescent gymnasts. Gymnasts between 8- and 18-year-old completed an online questionnaire distributed by their gymnastics clubs. They also completed the Generalized Anxiety Disorder (GAD-7) questionnaire. Of the 73 gymnasts who completed the questionnaire, 15% reported worrying about their weight; they were significantly older and reported higher GAD-7 scores than those who did not worry about their weight. After adjusting for the independent effect of age, worrying about weight was no longer significantly associated with GAD-7 scores (adjusted odds ratio= 1.13, 95% CI=0.98, 1.30, $p=0.10$), beliefs about their body size (adjusted odds ratio=6.48, 95% CI=0.84, 50.1; $p=0.07$), or menarche (adjusted odds ratio=0.40, 95% CI=0.04, 4.14, $p=0.44$). We found an association between age, anxiety, and weight concerns in child and adolescent gymnasts. Healthcare providers should screen for weight concerns and increased anxiety in older gymnasts

Keywords: *Gymnastics, mental health, weight concerns, adolescence, anxiety.*

INTRODUCTION

Eating disorders, conditions characterized by disordered eating behaviors, and excessive preoccupation with weight and body size, are more prevalent among athletes relative to non-athletes.(Kong & Harris, 2015; Nicholls & Viner, 2005; J. Tan et al., 2014) This may be particularly evident in sports in which lower body weight or "thinness" is viewed as more favorable, such as gymnastics.(Kong & Harris, 2015; Nicholls

& Viner, 2005; J. Tan et al., 2014; J. O. A. Tan et al., 2016) Individuals with eating disorders or disordered eating habits tend to deny or not understand their symptoms, conceal their illness, and may be resistant to treatment.(Bonci et al., 2008; Kong & Harris, 2015; Meroño et al., 2019) This, in combination with the significant physiologic harm of pathological eating habits, makes eating disorders difficult to diagnose and treat, requiring

comprehensive physical and mental health care over a long period of time.(Bonci et al., 2008; *IOC Consensus Statement on the Female Athlete Triad*, 2005) In the past 20 years, numerous organizations (e.g., International Olympic Committee, National Athletic Trainers Association) have released position statements identifying the need for early detection and comprehensive treatment for athletes who are at risk for the development of eating disorders.(Bonci et al., 2008; *IOC Consensus Statement on the Female Athlete Triad*, 2005)

Past studies have examined the factors that predispose athletes to developing an eating disorder and/or ways to identify if an athlete has already begun to develop one of these conditions. (Bonci et al., 2008; Davison et al., 2003; *IOC Consensus Statement on the Female Athlete Triad*, 2005; Killen et al., 1996; Kong & Harris, 2015; Ohring et al., 2002) One such factor is whether an athlete is concerned about their weight.(Davison et al., 2003; Killen et al., 1996; Ohring et al., 2002) Existing studies document a significant association between weight concern and the risk of developing eating disorders later in life in both general and athlete populations. (Davison et al., 2003; Killen et al., 1996; Ohring et al., 2002) Gymnasts are especially at risk for disordered eating. (Kontele et al., 2022; Leonkiewicz & Wawrzyniak, 2022) While this evidence may help identify athletes at risk of developing an eating disorder, there is opportunity for exploration into how an individual's concern about their weight might relate to other facets of life, especially athletes who participate in gymnastics, a sport known for its emphasis on athlete's body shape and weight. (Kong & Harris, 2015; J. Tan et al., 2014; J. O. A. Tan et al., 2016) To further explore this

topic, we examined the association between concerns about weight with self-reported anxiety levels and other psychosocial and menstrual health characteristics among adolescent gymnasts.

METHODS

Following approval from the local Institutional Review Board, we contacted each gymnastics club in our geographic area using contact information obtained via a public database. We asked each club to send a questionnaire to the gymnasts who participated in their organized club activities. If they were willing to distribute the survey, the club then emailed the questionnaire to the parent or guardian for the athlete to complete.

Inclusion criteria included being 8-18 years of age and participating in USA Gymnastics Xcel or Junior Olympic (Developmental) programs. Gymnasts who participated in high school or other gymnastics programs were excluded, along with retired gymnasts, and those who were unable to read or write. After the guardians provided consent and the gymnasts provided assent, participants provided information about their demographics, basic health, and experience with anxiety. All questionnaires were completed via a REDCap electronic database.

We collected demographic information including participant age, sex, height, weight, and school grade. We calculated BMI based on reported height and weight (Table 1). We also asked participants to describe information about their gymnastics experience, competition group (Junior Olympic vs Xcel), current level, and their age when they started gymnastics. Participants then provided information about their weight perceptions, and whether

they had a history of disordered eating. The questions used in this survey were taken from the Female Athlete Triad Consensus Panel Screening Questions. (De Souza et al., 2014) These questions asked participants (1) “do you worry about your weight,” (2) “are you trying or has anyone recommended that you gain or lose weight,” (3) “are you on a special diet or do you avoid certain types of foods or food groups,” (4) and “have you ever had an eating disorder.”

We assessed bone health by asking participants to report any history of stress fracture or low bone density. We collected information about menstrual function by asking female participants (1) whether they have ever had a menstrual period, (2) how old they were when they had their first period, (3) how many periods they have had in the past 12 months, (4) whether they have experienced 3 or more months without menstruation, (5) if they are taking female hormones, or (6) if they view losing their period as a normal response to high-level athletic training. We assessed anxiety using the Generalized Anxiety Disorder (GAD-7) questionnaire, a 7-item instrument that provides a valid and reliable measure of self-reported anxiety. (Löwe et al., 2008) To construct our grouping variable, we asked participants the question: “Do you worry about your weight?” We then grouped participants whether they responded “yes” or “no” to address our primary purpose.

Data are presented as mean (standard deviation) for continuous variables and the number within group (corresponding percentage) for categorical variables. We compared continuous variables between groups using independent samples t-tests or Mann-Whitney U tests given the normality of the variable tested, and compared categorical variables between groups using

chi-squared analyses or Fisher’s exact tests (if cell sizes were <5). We then constructed a multivariable logistic regression model, where the outcome variable was whether the participant worried about their weight (yes/no), and GAD-7 total and age were the predictor variables. Adjusted odds ratios and 95% confidence intervals (95% CI) were calculated to provide interpretation for multivariable logistic regression results. All analyses were two-sided, statistical significance was defined as $\alpha=0.05$, and analyses were performed using Stata version 15 (StataCorp, College Station, TX).

RESULTS AND DISCUSSION

We analyzed data from 73 gymnasts who completed all data elements related to the current investigation. Fifteen percent ($n=11$) reported worrying about their weight. Those who reported worrying about their weight were significantly older and taller than those who did not (Table 1). Other demographic characteristics such as sex, competition type, body mass index (BMI), BMI-for-age percentile, and training volume were not significantly different between groups. Those who reported worrying about their weight reported significantly higher GAD-7 scores (Figure 1) than those who did not (Figure 1). A significantly higher proportion of those who reported worrying about their weight also reported they thought they were fat when others say they are thin and had experienced menarche compared to those who did not worry about their weight (Table 1). After adjusting for the independent effect of age, worrying about weight was no longer significantly associated with GAD-7 scores (adjusted odds ratio= 1.13, 95% CI=0.98, 1.30, $p=0.10$), beliefs about their

body size (adjusted odds ratio=6.48, 95% CI=0.84, 50.1; $p=0.07$), or menarche (adjusted odds ratio=0.40, 95% CI=0.04, 4.14, $p=0.44$).

Table 1.
Characteristics of the two participant groups.

Variable	Worried About Their Weight (n=11)	Not Worried About Their Weight (n=62)	P value
Demographic and Training Characteristics			
Age (years)	13.3 (2.9)	10.9 (2.8)	0.01*
Sex (female)	10 (91%)	50 (81%)	0.68
Junior Olympic Competition Type athletes	7 (64%)	44 (72%)	0.72
Height (cm)	153.0 (12.3)	140.9 (16.1)	0.02*
Weight (kg)	44.7 (13.6)	37.0 (13.3)	0.10
BMI (kg/m ²)	19.0 (3.0)	18.4 (3.5)	0.62
BMI (percentile rank)	61.0 (24.8)	50.4 (23.0)	0.21
Age began gymnastics (years)	5.1 (1.8)	4.3 (2.1)	0.27
Average days spent training/week	4.3 (1.3)	4.1 (1.4)	0.72
Average hours spent training/week	15.7 (7.5)	15.0 (7.5)	0.82
Consider gymnastics more important than other sports	9 (82%)	53 (85%)	0.67
Psychosocial, medical, and menstrual health characteristics			
Believe yourself to be fat when others say you are too thin	3 (27%)	2 (3%)	0.02*
Food dominates your life	1 (9%)	0 (0%)	0.15
History of stress fracture	3 (27%)	6 (10%)	0.13
Female gymnast questions	N = 10	N = 50	
Reported having a menstrual period previously	5 (50%)	10 (20%)	0.04*
Presently taking any female hormones (e.g., estrogen, progesterone, birth control pills)	2 (20%)	1 (2%)	0.07
Believe losing your period is a normal response to a high level of athletic training	6 (60%)	22 (44%)	0.36

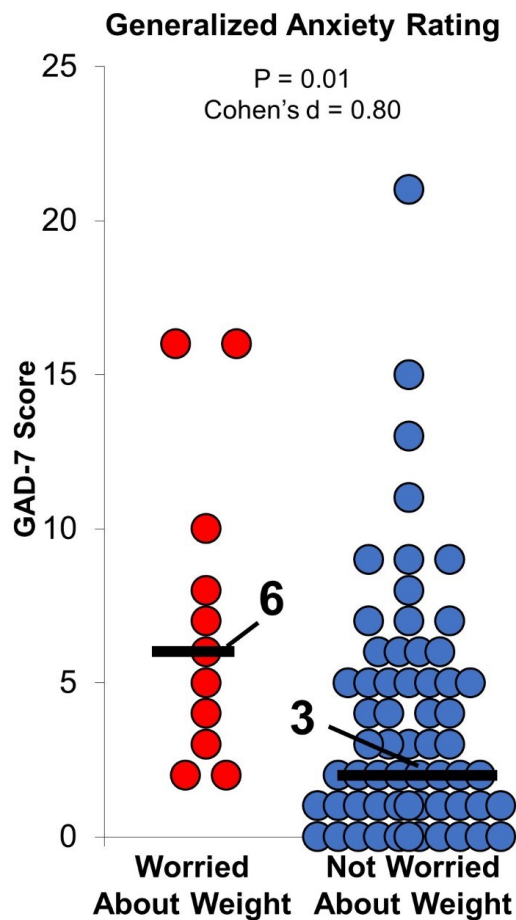


Figure 1 Self-reported anxiety ratings on the Generalized Anxiety (GAD-7) among gymnasts who did and did not report being currently worried about their weight.

DISCUSSION

We found that gymnasts who answered “yes” to the statement “Do you worry about your weight?” were older, more likely to report having a menstrual period previously, and more likely to think they are fat even through others say they are thin than gymnasts who do not worry about their weight.

These observations may not be specific to gymnasts, as puberty, which typically occurs between the ages of 9 and 13, is commonly regarded as a period in which adolescents not only go through a series of drastic physical changes, but also become increasingly concerned about their

appearance, social relationships, and self-image. (Parent et al., 2003) While this is true of many adolescents, the observed association between age and concern about weight may be particularly evident among gymnasts given the unique emphasis placed on physical appearance and body composition within this sport.

We also found that gymnasts who worry about their weight report significantly higher ratings of generalized anxiety than those not worried about their weight, though this association was no longer statistically significant after adjusting for age. This finding suggests that age may mediate the relationship between worrying about weight and self-reported generalized anxiety. Our data aligns with evidence that suggests anxiety symptoms, similar to concerns about body weight, are significantly associated with age (particularly during adolescence), with many symptoms beginning around the age of 11 years. (Jones, 2013) There is also evidence that shows there are higher rates of anxiety disorders among those who have eating disorders compared to those who do not. (Pallister & Waller, 2008) More prospective research is needed to better understand the relationship between age, anxiety, worrying about weight, and eating disorder risk.

It is prudent that health care professionals, coaches, and other stakeholders consider these results within the context of the work of other research groups when working with gymnasts. Researchers have demonstrated that individuals who worry about their weight and experience anxiety are more likely to develop an eating disorder. (Davison et al., 2003; Killen et al., 1996; Ohring et al., 2002) Given that gymnasts are already at a higher risk of developing clinical eating

disorders and subclinical disordered eating patterns, it is possible that as gymnasts grow older this worry about weight and generalized anxiety may be more likely to develop into a more serious, life-threatening eating disorder, especially if there is pressure to lose weight. (Leonkiewicz & Wawrzyniak, 2022; J. Tan et al., 2014; J. O. A. Tan et al., 2016) Eating disorders are difficult to treat given their extensive physical and mental health effects, therefore early detection and treatment are paramount. (Bonci et al., 2008; *IOC Consensus Statement on the Female Athlete Triad*, 2005) Our study was limited by the single geographic region in which we enrolled participants, and both the self-reported nature of the questionnaires and the weight concerns in question are susceptible to bias, thus, extrapolation of our findings to other types of athletes should be approached with caution. We collected data on a wide pediatric age range (8 to 18-year old) which may have affected our results, and younger athletes may not have fully understood the terms used in the questions. Further, the questions used to assess weight concerns may require additional investigation using reliable and valid measures of this outcome.

CONCLUSIONS

The results of our study suggest an association between a gymnast's age, generalized anxiety and concern about weight. Healthcare providers and coaches should be aware of this association and monitor gymnasts as they get older for weight concerns and/or increased anxiety. This may help gymnasts at risk to receive support they need to prevent the development of an eating disorder.

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