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Competition anxiety between participants of individual, dual, and team sports: A comparative study of foreign sports students in Beijing Sport University

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Abstract
This study is designed to assess the level of competition anxiety between participants of individual, dual, and team sports. It also separately examines the somatic anxiety, worry, and concentration disruption for the respondents in each sports group. The Sport Anxiety Scale-2 (SAS-2) and one-way ANOVA were used to obtain the desired results. Data was collected using questionnaires from 60 international sports students at Beijing Sport University. Results of the study indicate that the mean anxiety of athletes engaging in individual sports was the highest, this was followed by participants involved in team sports and dual sports. The Tukey post hoc test for testing the significant differences between the pair of means further revealed that the means of individual sports is highest and significantly different ($p<0.05$) from both the means of dual and team sports. Moreover, the total somatic anxiety was 0.47 (47%) and higher than the other two anxiety factors (worry, and concentration disruption) in the individual sports group. The dual sports group also showed similar results, however, in the team sports group, the highest problem faced by athletes was concentration disruption and worry. The deduction from these results suggests that sports anxiety tends to make athletes perform poorly during competitions since it affects their confidence and self-esteem. It is therefore salient for sports management stakeholders to develop appropriate mechanisms that will help athletes cope with situations that trigger anxiety during competitions.

Keywords: Sports anxiety, individual sports, team sports, dual sports, performance

1. Introduction
A person's ability to feel or experience some level of anxiety can be directly linked to the situation being confronted with. Though this anxiety may emerge from different sources, it still shares some commonality; thus, it can have a long-lasting negative impact on the well-being of the individual. In other jurisdictions, anxiety is considered a normal and healthy emotion; however, experiencing disproportionate levels of it may require medical attention. According to Raglin (1992) [1], anxiety is regarded as an emotion normally characterized by strong feelings of tension, worrying thoughts, and mostly accompanied by a significant increase in blood pressure levels. The triggers of anxiety can be broadly classified into environmental, genetic, and individual living habits or personality factors (Martens *et al.*, 1990) [2]. The environmental triggers include difficulties at work, family, and relationship problems; genetic triggers can be traced to the family history of anxiety problems that are likely to be passed on to subsequent generations; individual habits may include using illicit substances. Moreover, medical conditions such as chronic diseases, medication effects, and prolonged recovery induced by intensive surgery can also be attributing factors (Hanin, 2010) [3]. In general, anxiety been experienced by people from all sorts of life (including professional sport program participants) can generate detrimental effects such as uncontrollable feelings of worry or nervousness, increased blood pressure, nausea, restlessness, increased irritability and distress, difficulties in concentration, and insomnia (Dobson,1985) [4]. While anxiety level classification relies on the amount of distress and impairment experienced, the four types are mild anxiety, moderate anxiety, severe anxiety, and panic level anxiety.

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Extreme forms of these stressors may eventually result in anxiety disorder requiring immediate medical attention (Beck and Clark, 1988) [5]. Ballenger (1999) [6] indicates the common types of anxiety disorders to be generalized anxiety disorder (GAD), panic disorder (PD), specific or social phobia (SP), posttraumatic stress disorder (PTSD), and obsessive-compulsive disorder (OCD).

The negative role played by anxiety on the development of the sporting potential of athletes before and during games has increased recently (Hanin, 2010) [3]. Coaches expect athletes to perform at their full potential during competitive sports programs. However, several thoughts linger in their mind on the competition day. Though some of these thoughts may derail their performance, others are considered to cause lesser effects on performance achievements. The negative effects of anxiety on elite athletes' performance during competitive games is attributed to the occurrence of circumstances such as nervousness, lack of concentration, muscle fatigue, heavy and abnormal breathing, vomiting, severe headache, mild sickness, sweating, and increased sensitivity to surroundings. However, the level of anxiety being experienced can be related to the kind of sports practiced (Kleine, 1990) [7]. The first category such as individual sports is perceived to generate a lot of tension among participants since they are competing as individuals (Jones, 1995) [8]. However, some team competitions in individual sports such as the Davis Cup and the Fed Cup also occur. Examples of individual sports include field athletics such as 100m, 200m, 400m race, ice skating, skiing, archery, shooting, golf, and bowling, skateboarding, weightlifting, high jumping, hand gliding. The second, dual sports involve two players competing against each other and include boxing, wrestling, fencing, martial arts, table tennis, lawn tennis, and racquetball. The third group is team sports involving organized groups of players competing against each other. These include sports such as football, soccer, lacrosse, volleyball, basketball, softball, and baseball.

When the broader role of sports is considered, it helps an individual much more than in the physical aspects alone. Sports builds character, teaches and develops strategic thinking, analytical thinking, leadership skills, goal setting, and risk-taking among participants. Though these influential benefits may be forgotten especially during competitive sporting events, it is worth mentioning that a high level of achievement is a desirable trait separating good athletes from the bad ones (Correia and Rosado, 2018) [9]. A set of issues such as fear and nervousness resulting in low performance among sport participants are attributed to anxiety experienced before and during sports event participation (Mace and Carroll, 1986) [10]. Since the major interest in most sports events lies in improving self-confidence and sport self-efficacy leading to increase performance, dealing with competitive anxiety which directly retards sports performance becomes desirable (Graydon, 2002; Besharat and Pourbohlool, 2011) [12, 11].

A vast literature exists on the effects of anxiety on the performance level of athletes before and during participation in competitive sports. For example, the seminal work of Englert and Bertrams (2012) [13] in determining the role of self-control strength and state of anxiety in sports performance revealed that increasing self-control strength could reduce the negative anxiety effects in sports and improve athletes' performance under pressure. The negative effects of anxiety on the performance level of different athletes were also revealed by these studies (Hackfort and

Spielberger, 1990; Smith et al., 1990; Baker et al., 2000; Woodman and Hardy, 2003; Cresswell and Hodge, 2004) [14, 15, 32, 16, 17, 18]. Best to our knowledge, all previous literature on the topic did not focus on the anxiety level or its effects on the performance of sports students enrolled in sports universities. Although we may argue that pre-competitive anxiety effects on the performance of both pro and non-pro athletes may share some similarities, it is worth mentioning that substantial study on the exact level of anxiety developed by student-athletes (in different sport groups) aspiring to become professionals will be very useful to trainers, coaches, sports psychologists, sports doctors, and sports therapists. Hence this study was initiated to fill this gap by studying the induced level of anxiety by international sports students' before and during participation in different sport groups such as individual sports, dual sports, and team sports. Also, the 3-factor anxiety (somatic, worry, and concentration disruption) were separately measured and compared across each sport group. In pursuance of these objectives, the Sport Anxiety Scale-2 (SAS-2) developed by Smith et al. (2006) was adopted to measure the level of anxiety developed by student-athletes in each sport group. The rest of this study is organized as follows; Section 2 deals with the methodology, which includes questionnaire design, sample selection, data collection, hypothesis statement, and data analysis protocols. Section 3 extensively deals with the presentation and discussion of results obtained. Section 4 builds on the deductions made from the results and concludes on the subject with relevant recommendations and policy implications.

2. Methodology
2.1 Study area
The study was conducted in Beijing Sport University (BSU) located in China using international students currently enrolled in different sports disciplines. The university was founded in 1953 as the Central Institute of Physical Education, and later changed to the Beijing Institute of Physical Education in 1956 then to the Beijing Sport University in 1993. It is one of the national key universities and also a "Project 211" University under the direct leadership of the General Administration of Sport of China. It is also among the first batch of "Double First-Class" university project in China. Currently, the university consists of four divisions namely: Physical Education and Health, Humanities and Social Sciences, Olympic Sports Division, and Sports Engineering. The university is used as the main center for training all professional Chinese athletes preparing for both local and international games. BSU has over 10,000 student population (comprising of undergraduates and postgraduates) majoring in different courses. Currently, the university has established international relations with 128 higher educational institutions in 45 countries and has trained over 20, 000 foreign students from 110 countries.

2.2 Data collection
The study used primary data collected through a well-structured questionnaire for the period 2020/2021 academic semester. A two-stage sampling technique was used to select representative international sports students for analysis. The first stage, sports group sampling involves the selection of three sports groups (individual sports, dual sports, and team sports). The second stage known as group participant identification involved the selection of twenty students from each sport group. This process was facilitated with the help of

a mobile application because all international students on campus were already registered on the "Wechat mobile application", hence requesting for sports group identification before questionnaire distribution was important. Moreover, a random sample of 15 students (5 from each group) was used to pre-test the questionnaires for correcting order bias, wrong wording of key sports terms, and lack of understanding or misinterpretation of the key parts of the SAS-2 scale. Key stakeholders such as lecturers and sports coaches were also consulted to know their expectations in executing this project. Finally, an electronic version of the questionnaire was sent to each identified member from a sports group. Thus, the 60 students (20 each selected from the 3 groups) were made to answer the questionnaire electronically via a URL sent to them. The first set of questions seek to solicit demographic information while the second focused on their anxiety levels before and during sports competitions using the 4-point Likert scale. The response on the scale ranges from one (not at all) to four (very much), and measures responses for three anxiety factors: somatic anxiety, worry, and concentration disruption. Finally, the 60 athletes were tasked to answer 15 questions (5 each for the three anxiety traits described above), with no time constraint for completion.

2.3 Hypothesis statement

The data on the anxiety levels of international sports students participating in individual, dual, and team sport will be subjected to one-way ANOVA to determine which sports anxiety is the highest. The hypothesis to be tested is given as:

$$H_0 : \mu_{Ind\_sp} = \mu_{Dual\_sp} = \mu_{Team\_sp}$$

$$H_1 : \mu_{Ind\_sp} \neq \mu_{Dual\_sp} \neq \mu_{Team\_sp}$$

The null hypothesis that stipulates there is no difference between the mean anxiety level of participants in the three sports groups was tested against the alternative hypothesis that at least one group mean differs. Subsequently, the somatic anxiety, worry, and concentration disruption for the respondents in each sport group were evaluated separately. The statistical software Statistical Package for Social Sciences (SPSS) was used for all data analysis.

3. Results and discussion
3.1 Demographic characteristics

The demographic characteristics for the sample are displayed in Table 1. This is a representation for all respondents participating in individual sports, dual sports, and team sports. From the table, it was evident that more than major (65%) of the respondents were males, while the rest were females. This does not come as a surprise because most sports environments are dominated by males. After all, sporting activities require physical strength and endurance. Moreover, in many countries, women are marginalized in terms of sport participation because society considers them to opt for better professions instead of sports. Following the religion or cultures of certain countries, it is believed that sporting activities should only be practiced by males while females marry early or stay at home to cater for their children. Nevertheless, this idea has evolved with constant education and awareness campaigns concerning the importance of sports to the wellbeing of individuals as well as acting as a catalyst for information distribution in solving community issues. Currently, more females (Muslims, Christians, and Buddhists) are engaging in elite sports.

Table 1: Characteristics of respondents (pooled)

Variable	Category	Frequency (N=60)	Total (%)
Gender	Male	39.0	65.00
	Female	21.0	35.00
Age (years)	18-25	17.0	28.33
	25-30	23.0	38.33
	30-35	13.0	21.66
	>35	7.0	11.66
Marital status	Single	37.0	61.66
	Married	23.0	38.34
	Divorced	0.0	0.00
Family size (count)	Non	18.0	30.00
	1-3	17.0	28.33
	3-6	21.0	35.00
	>6	4.0	6.67
Education level	Bachelor's	30.00	50.00
	Masters	24.00	40.00
	Ph.D.	6.00	10.00
	Post Doctorate	0.00	0.00
Sport participation experience (years)	1-3	6.0	10.00
	3-6	16.0	26.67
	6-9	10.0	16.67
	>9	28.0	46.66
Competing as an athlete in an international sports event	Yes	33.0	55.00
	No	27.0	45.00
Competing as an athlete in a local/national sports event	Yes	56.0	93.33
	No	4.0	6.67

A vast literature exists on the issue of gender inequality in sports program participation (Benn *et al.*, 2010; Kay, 2006; Cortis *et al.*, 2007; Engel, 1994; Miller *et al.*, 2000) [20, 21, 22, 23, 24]. The age category indicates that the majority (38.33%) of the respondents were between 25-30 years, and 28.33%

between 18-25 years. This was expected because an active age is required for sports participation. It is further stipulated that young people are more likely to perform better than adults in most sport disciplines (Eime *et al.*, 2016; Jenkin *et al.*, 2017; Wicker *et al.*, 2009) [25, 26, 27]. Concerning marital

status, 61.66% were single and the rest legally married. The number of family dependents indicates that grossly 30% of the respondents had no children which further supports the previous explanation of the majority of respondents being single. Education development is very important for elite athletes since it can have a positive effect on their performance level (Aquilina, 2013; Jonker *et al.*, 2009) [28, 29]. Moreover, it is further believed that combining elite sporting activities with tertiary education generates better results because courses such as stress management and coping strategies are taught to participants and also, instructions from coaches during the field of play are easily understood by educated athletes (Cosh, 2015) [30]. The experience of

respondents revealed that 46.66% had more than 9-year's participation in sporting events. Finally, 55% of students have competed as athletes in international sporting events while 93.33% have also competed in local sports events.

3.2 Anxiety levels among respondents
The descriptive statistics for the anxiety levels for all 60 respondents in the study is presented in Table 2. From the results, the individual sports group recorded a mean anxiety score of 43, while dual-sport and team sport reported 36.40 and 37.90 respectively. The overall mean anxiety score was 39.10.

Table 2: Descriptive statistics for the data on anxiety in different sport group

Sports Group	N	Mean	Std. Dev.	Std. Err.	95% Confidence Interval for Mean		Min.	Max.
					Lower Bound	Upper Bound		
Individual sport	20	43.00	5.95	1.33	40.21	45.78	36.00	54.00
Dual sport	20	36.40	5.05	1.12	34.03	38.76	28.00	44.00
Team sport	20	37.90	4.77	1.06	35.66	40.13	30.00	47.00
Total	60	39.10	5.92	0.76	37.56	40.63	28.00	54.00

However, the minimum and maximum values indicated 36 and 54 anxiety scores for individual sports groups. The participants of dual-sport recorded a minimum score of 28 and a maximum of 44, while team sport participants had 30 and 47. However, deciding on which group has the highest anxiety level needs to be substantiated with a reliable statistical methodology. Solely depending on the mean values obtained in Table 2 may be misleading. Since we are dealing with three means, the most appropriate test will be one-way ANOVA, and the test results are displayed in Table 3. Per the test results, F-statics is 8.56 and significant at 5% (p-value < 0.05). This implies that the null hypothesis of no difference among mean anxiety of the three-sport groups is rejected at 5% in favor of the alternative hypothesis.

Table 3: ANOVA table for the data on anxiety

Athletes Anxiety	Sum of Squares	df	Mean Square	F-*value*	Sig. (p-Value)
Between Groups	478.80	2	239.40	8.56	0.001
Within Groups	1592.60	57	27.94		
Total	2071.40	59			

Since heterogeneity has been observed among the means, a post hoc test for comparing mean anxiety levels among the sports groups using the Tukey HSD test is adopted. In this test, a critical difference is computed at a particular level of significance (5%) for each pair of means. If the P-value for any pair of means is less than 0.05, it indicates a significant difference among them at 5% and vice versa.

Table 4: Tukey HSD test for post hoc comparison of mean anxiety

(I) Type of Sport	(J) Type of Sport	Mean Diff. (I-J)	Std. Err.	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Individual Sport	Dual Sport	6.60*	1.67	0.00	2.57	10.62
	Team sport	5.10*	1.67	0.01	1.07	9.12
Dual Sport	Individual Sport	-6.60*	1.67	0.00	-10.62	-2.57
	Team sport	-1.50	1.67	0.64	-5.52	2.52
Team sport	Individual Sport	-5.10*	1.67	0.01	-9.12	-1.07
	Dual Sport	1.50	1.67	0.64	-2.52	5.52

*The mean difference is significant at the 0.05 level.

From the post hoc test results displayed in Table 4, there is a significant difference between the mean of individual sport and dual sport since the associated p-value is 0.00 (*p*<0.05). Similarly, the mean difference between individual sport and team sport is significant at 5% (p=0.001) suggesting a difference between the two means. However, at a 5% significance level, the mean difference between dual sport and team sport is insignificant (p=0.64). These results indicate that the mean anxiety for individual sports participants is higher than dual and team sport participants. Displayed in Figure 1, we complement the above discussion with the

means plot for anxiety scores. Similar to this study is that of Pluhar *et al.* (2019) [31] who concluded that individual sport athletes are more likely to suffer anxiety or depression than team sport athletes because the former is very tense and has a higher concentration level before and during competitions than the latter. The seminal work of Smith and Smoll (1990) and Zeng (2003) [33] further stipulates that the observed difference between the levels of anxiety for university athletes engaged in team sports was higher than those in individual sports, however, the self-confidence between the two sports groups was in favor of team sports.
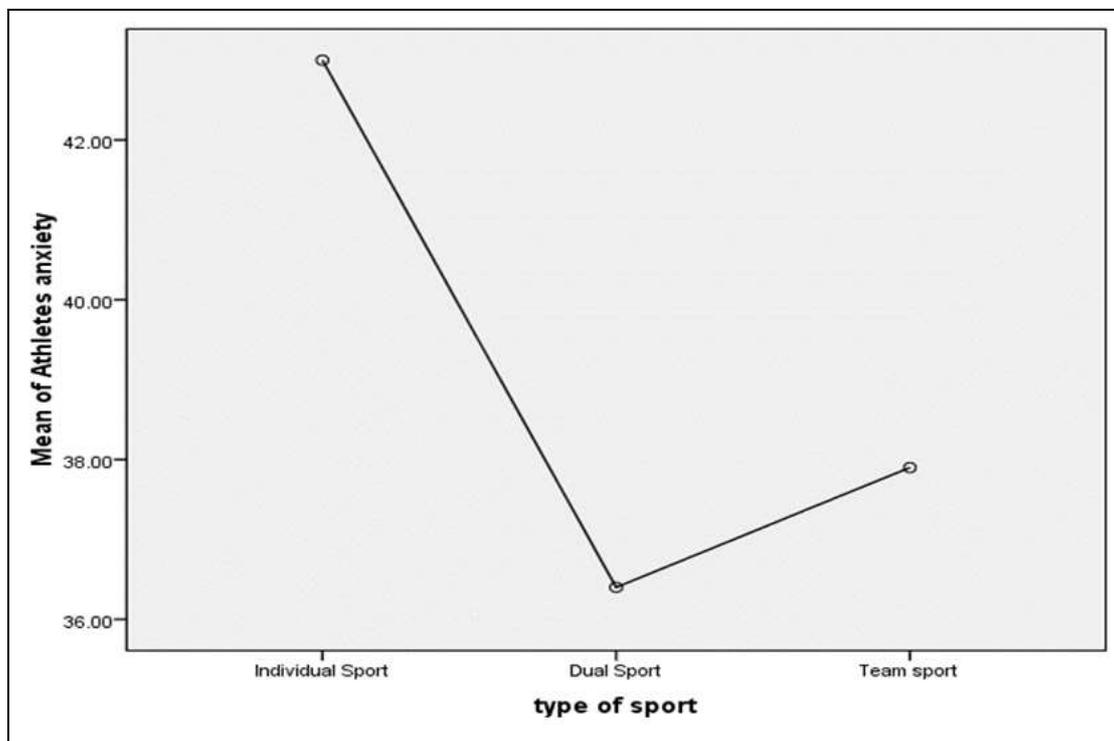
Fig 1: Means plot for mean anxiety

3.3 The 3-factor anxiety scores among respondents in the sport groups

This section made extensive use of the anxiety scores obtained via the questionnaires and further classified them based on the perceived effects on selected athletes. The mode of classification as indicated in Appendix 1, Table 1 involves the selection of 5 questions each from the 15 SAS-2 scale questions that are perceived to be contributors to somatic anxiety, worry, and concentration disruption among athletes.

Table 5: The 3-factor mean anxiety score across sport groups

Sport Group	3-Factor Anxiety		
	Somatic	Worry	Concentration disruption
Individual sport	0.47 (0.12)*	0.35 (0.11)	0.18 (0.10)
Dual sport	0.34 (0.09)	0.33 (0.12)	0.33 (0.10)
Team sport	0.22 (0.10)	0.37 (0.06)	0. 41 (0.21)

*The values in parenthesis are standard deviations. All values can be converted back to % by ×100)

From Table 5, total somatic anxiety was 0.47 (47%) and higher than the two anxiety factors (worry 0.35, and concentration disruption 0.18) in the individual sports group. According to Krane *et al.*, (1994) [34], somatic anxiety is accompanied by reactions culminating in significant focus on physical symptoms such as pain, weakness, shortness of breath consequently resulting in major distress and retarding proper functioning. The individual has excessive thoughts and feelings, which will lead to fear and nervousness. The somatic items in this study included students' getting tense in both body and stomach resulting in shaky muscles and stomach upset before or during competitions. In dual sport, somatic anxiety has represented the most serious problem being faced. The issue of worry, concentration, and disruption also carried similar weights in the dual sport group. However, in the team sports group, the highest problem faced by athletes was concentration disruption (0.41), and worry (0.37). The study of Andrews and Borkovec (1988) [35] further aligns with our present findings that induction of worry can produce moderate degrees of both anxiety and depression in athletes.

4. Conclusion and Recommendation

The effect of anxiety in most sports groups has for long been a subject of great interest to coaches, athletes, and sports researchers. However, the presence of emotion and motivational factors causing athletes to peak sometimes in competition, while putting up disappointing performances other times is also evident in most sports. Besides injuries, anxieties are regarded as the main reasons why athletes cannot perform up to their best capabilities. Due to the crippling effects of anxiety on performance, the sports community consisting of coaches, athletes, educators, and sports psychologists are constantly researching the topic and finding new ways of dealing with it. This present study presents empirical evidence by indicating that the mean anxiety of internal sports students engaged in individual sport was highest (43), followed by team sport participants (37) and dual sport participants (36). The one-way ANOVA and Tukey post hoc test revealed a similar trend and further supports the assumption that all three sports groups have different levels of anxiety. Moreover, the 3-factor anxiety scores among respondents in the different sport groups indicated that individual sports participants' total somatic anxiety was 0.47 (47%) and highest than the worry items (0.35) and concentration disruption (0.18). The dual sport group also had its somatic anxiety component consisting of 0.34 (34%), while 33 (33%) for both worry items, and concentration and disruption. Finally, team sports showed concentration and disruption items to be the most critical factor affecting athletes in this study. In this study, we recommend much attention be devoted to dealing with anxiety issues particularly among athletes engaging in individual sports since this is certainly a prerequisite for achieving higher performance. Sports researchers can aid this outcome by developing good sport training programs both at the local and elite levels to help tackle competitive anxiety issues among athletes.

Appendix 1

Table 1: Sport Anxiety Scale: Reactions to Playing Sports

No.	Before or while I compete in sports	Not At All	A little Bit	Pretty Much	Very Much
1	It is hard to concentrate on the game	(1)	(2)	(3)	(4)
2	My body feels tense	(1)	(2)	(3)	(4)
3	I worry that I will not play well	(1)	(2)	(3)	(4)
4	It is hard for me to focus on what I am supposed to do	(1)	(2)	(3)	(4)
5	I worry that I will let others down	(1)	(2)	(3)	(4)
6	I feel tense in my stomach	(1)	(2)	(3)	(4)
7	I lose focus on the game	(1)	(2)	(3)	(4)
8	I worry that I will not play my best	(1)	(2)	(3)	(4)
9	I worry that I will play badly	(1)	(2)	(3)	(4)
10	My muscles feel shaky	(1)	(2)	(3)	(4)
11	I worry that I will mess up during the game	(1)	(2)	(3)	(4)
12	My stomach feels upset	(1)	(2)	(3)	(4)
13	I cannot think clearly during the game	(1)	(2)	(3)	(4)
14	My muscles feel tight because I am nervous	(1)	(2)	(3)	(4)
15	I have a hard time focusing on what my coach tells me	(1)	(2)	(3)	(4)

Scoring Key. Somatic: Items 2, 6, 10, 12, 14; Worry: Items 3, 5, 8, 9, 11; Concentration Disruption: Items 1, 4, 7, 13, and 15.

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