2024, Retos, 60, 263-268

Comparison of anxiety levels of individual and group athletes
Comparación de los niveles de ansiedad de deportistas individuales y grupales

*Nuridin Widya Pranoto, *varhatun fauziah, *Yovhandra Ockta, *Fiky Zarya, **Ari Iswanto, **Hedi Ardiyanto Hermawan, ***Gema Fitriady, ****Vlad Adrian Geantă, *****Bekir Erhan Orhan, ******Aydın Karaçam, ******Niyazi Sıdkı Adıgüzel
*Universitas Negeri Padang (Indonesia), **Universitas Negeri Yogyakarta (Indonesia), ***Universitas Negeri Malang (Indonesia), ****Aurel Vlaicu University of Arad (Romania), *****Istanbul Aydin University (Turkey), ******Bandırma Onyedi Eylül University (Turkey)

Abstract. The study of anxiety, particularly its relationship to sociodemographic variables, has been fruitful in sport psychology research. This study aims to determine the comparison of athletes' anxiety with the variables of gender differences and the type of sport played (individual/group). The application of structural equation modeling has been carried out on 80 Indonesian athletes. Of this number, 40 (50%) are female athletes and 40 (50%) are male athletes. They compete in a variety of individual sports (swimming, rock climbing; 50%) and team sports (basketball, volleyball; 50%). Athletes' ages ranged from 20-25 years (M = 22 years; SD = 4.99). After testing the measurement invariance of the first- and second-order models, across gender and sport type (individual vs. team), latent mean comparisons were investigated and statistics were calculated to obtain appropriate effect sizes. Significant differences were detected between male and female athletes as well as between individual and team sports. Female and individual sports athletes have higher levels of general sports anxiety. The results of this study provide evidence that anxiety is assessed differently by athletes based on gender and type of sport.
Keywords: Athlete anxiety; gender differences in sports; individual vs. team sports; sports psychology research; structural equation modeling in sports;

Resumen. El estudio de la ansiedad, especialmente su relación con variables sociodemográficas, ha sido ampliamente realizado en la investigación en psicología del deporte. El objetivo de este estudio era comparar la ansiedad de los deportistas con las diferencias de género y las variables del tipo de deporte (individual/grupal). Se aplicó un modelo de ecuaciones estructurales a 80 atletas indonesios. De ellos, 40 (50%) eran mujeres y 40 (50%) hombres. Los atletas competían en varios deportes individuales (natación, escalada; 50%) y de equipo (baloncesto, voleibol; 50%). La edad de los deportistas oscilaba entre los 20 y los 25 años (M = 22 años; DE = 4,99). Tras comprobar la invarianza de medida de los modelos de primer y segundo orden entre género y tipo de deporte (individual y de equipo), se exploraron las comparaciones de medias latentes y se calcularon los estadísticos de Cohen Day 1988 para obtener los tamaños del efecto correspondientes (Kline, 2016). Se encontraron diferencias significativas entre deportistas masculinos y femeninos y también entre deportes individuales y de equipo. Las mujeres y los deportistas individuales presentaron mayores niveles de ansiedad deportiva. Los resultados de este estudio aportan pruebas de que la ansiedad es evaluada de forma diferente por los deportistas en función del género y del tipo de deporte.
Palabras clave: Ansiedad del deportista; diferencias de género en el deporte; deportes individuales y de equipo; investigación en psicología del deporte; modelos de ecuaciones estructurales en el deporte;

Fecha recepción: 21-06-24. Fecha de aceptación: 10-08-24
Nuridin Widya Pranoto
nuridin@fik.unp.ac.id

Introduction

Athletes often experience various mental health symptoms and disorders(Xanthopoulos et al., 2020). Some of these include anxiety and related disorders, such as generalized anxiety disorder (GAD), panic disorder, social anxiety disorder, obsessive-compulsive disorder (OCD), post-traumatic stress disorder (PTSD), separation anxiety disorder, specific phobias, and anxiety. related to competitive performance, although the latter is not specifically diagnosed in the Diagnostic and Statistical Manual of Mental Disorders. Anxiety disorders are one of the most common mental health disorders in the world, with an earlier onset than most other mental health disorders(Mehrsafar et al., 2019). Athletes' anxiety can affect their fighting ability, as a healthy psychological state, or "smart character," is essential in competition. By implementing training strategies that focus on character development and fighting ability, athletes can manage their anxiety and improve performance ("Alnedral et al" 2020). Self-confidence is one of the factors that affect an athlete's anxiety, self-confidence is influenced by various factors, both internal (such as self-belief and ability) and external (such as coach support and environmental conditions). Athletes who lack confidence may have difficulty in achieving the targets that have been set (Ihsan et al., 2022). In addition, lower stress levels are associated with better sleep quality, and good sleep quality can help reduce anxiety(Sepdanius et al., 2023).

Anxiety is a psychological aspect that has a significant impact on individuals(Jun Ming Benjamin & Chee Keng John, 2021a), including athletes. In the competitive world of sports(Nien et al., 2023a), anxiety can be a factor that directly influences an athlete's performance. Athletes' anxiety can come in many forms, from pre-competition tension to actual competition anxiety(Katz et al., 2023). Athletes, as players in sports competitions, often face pressure to achieve the best results(Moore et al., 2023). Factors such as public expectations, personal expectations, and responsibilities to the team can be anxiety triggers that can affect their focus and performance. As a result, it is important to understand in depth how this anxiety can

impact certain aspects of an athlete's performance(Rouquette et al., 2021a; Tamminen et al., 2021). Anxiety can affect an athlete's concentration levels, motor coordination, and even decision-making abilities. In some cases, anxiety can be a driving force for some athletes to improve their performance, but at the same time, it can also be an obstacle that hinders their full potential.

Athletes experience a variety of mental health symptoms and disorders(Reardon et al., 2023).These differences in mental processing may also be reflected in neural activity, becauselongitudinal studyin neuroimaging carried out by(Sevinc et al., 2018)found that MBI and relaxation-based interventions were associated with reduced stress, but MBI showed increased functional connectivity in brain regions involved in sensory awareness and salience(Jun Ming Benjamin & Chee Keng John, 2021b), while relaxation-based interventions showed improvementfunctional connectivityin the brain areas involved in inhibition and intentional control(Kupper et al., 2021).Competitive sports can provide a conducive environment for developing the mediation of mental toughness (MT) in dealing with various stresses and anxieties(Jun Ming Benjamin & Chee Keng John, 2021c). Data from previous research has shown that the athlete population has significant rates of mental health problems related to inevitable stressors such as overtraining, competition, injury, social and media expectations.(Nien et al., 2023b).In the literature, sources of anxiety have been linked to the relationship a person has with a coach and the many interactions that occur during training and competition(Stephen et al., 2022). Athlete anxiety is often related to conditions such as Functional Ankle Instability (FAI), which can affect their performance and confidence. When an athlete experiences FAI, they may feel unstable or "wobbly" in their ankle, which can lead to concerns about possible re-injury. This anxiety can interfere with the athlete's focus and performance during competition or training(Syafrianto & Muchlis, 2021).

By understanding the effects of anxiety on athlete performance, effective anxiety management approaches can be developed. This involves identifying the source of anxiety, applying relaxation techniques, and establishing a supportive mindset(Xanthopoulos et al., 2020). Efforts to manage anxiety will not only improve athletes' general performance, but can also improve their psychological well-being(Vardar et al., 2007).In sport, athletes appear to engage in a variety of strategies to regulate their own emotions and the emotions of their teammates, often with the goal of improving performance and relationship outcomes (Hamidi & Besharat, 2010; Jamshidi et al., 2011).Although there is increasing research exploring the types of strategies athletes use to regulate their teammates' emotions and their motives for engaging in such actions, it is unknown whether these interpersonal emotion regulation efforts are associated with emotions and performance. Research among adolescent athletes suggests that efforts to regulate others' emotions are associated with their enjoyment and commitment in sport(Mehrsafar et al., 2019)however, the authors did not examine the relationship between interpersonal emotion regulation and athletes' actual emotions during competition or with competitive outcomes such as achievement of individual goals in competition(Patel et al., 2010).

This research departs from a significant phenomenon in the world of sports, namely competitive anxiety experienced by athletes. This anxiety is not just an emotional response, but is a complex psychological process that can affect cognitive, emotional and motor functions. In the context of competition, anxiety is often triggered by factors such as pressure to win, self-expectations, and tough physical challenges. The relevance of this research becomes even clearer when we consider that poorly managed anxiety levels can have a negative impact on an athlete's performance. Thus, there is an urgent need to investigate how this anxiety affects athletes' performance specifically, both in terms of reaction speed, concentration, and motor coordination. An in-depth understanding of the relationship between anxiety and athlete performance will be critical in developing intervention strategies that can help athletes manage their anxiety and achieve optimal performance in competitive situations.

Thus, one limitation in the literature to date concerns the relationship between interpersonal emotion regulation, anxiety, and performance in sport. Anxiety is defined as "a specific negative emotional response to competitive stressors"(Mehrsafar et al., 2020) and is an important emotion in athletes' competitive sport experiences(McLoughlin et al., 2021). Anxiety has been linked to impaired attention, reduced performance, and risk of injury(Ayuso-Moreno et al., 2020), and athletes' ability to effectively manage their anxiety in competition is critical to successful sporting performance(Hut et al., 2021). However, to date, there has been little research examining how athletes' interpersonal emotion regulation is associated with competition anxiety, and in turn, how this is associated with performance outcomes. Therefore, this study aims to address this gap in the literature by examining how athletes' interpersonal emotion regulation relates to their anxiety and goal attainment in competition.In this study, we assessed performance by asking athletes about their perceptions of achieving their personal goals in competition(Rouquette et al., 2021a), while controlling for team performance outcomes (e.g., wins/losses). We adopt this approach to assessing performance because of the nature of team sports, such that the team may lose the competition, but the athlete may feel that they performed well. Given that we are interested in interpersonal emotion regulation processes in athlete performance, it would be inappropriate to use team performance as a single performance indicator for all athletes on the same team.

Method

This study used a cross-sectional survey design to assess emotion regulation during competition. The survey was

conducted immediately after the regular competition. After obtaining approval from the first author's institutional research ethics board, recruitment was conducted in Indonesia, targeting interdependent and competitive team sport athletes as well as individual sport athletes. Coaches are contacted first to gain access to athletes. With the coach's approval, research team members met directly with the athletes after competitive events to collect data through surveys. Athletes who provided consent were asked to complete a questionnaire package, which reflected the competitive matches their team had recently played.

In this study, subjects were selected based on certain criteria to ensure the validity and reliability of the results. Inclusion criteria included athletes who were actively involved in official competition in the last six months, aged between 18 and 25 years, and had no history of previously diagnosed mental disorders. Exclusion criteria included athletes who had suffered a serious physical injury in the last three months or who were undergoing medical treatment that affected their psychological condition. In addition, elimination criteria were applied to subjects who failed to complete the entire questionnaire filling session or who provided inconsistent or illogical answers. The instrument used in this research was the Sports Competition Anxiety Test (SCAT). SCAT measures athletes' anxiety levels with the following classifications: low anxiety level (<17), moderate anxiety level (17–24), and high anxiety level (>24).

Statistical Analysis

To analyze the data, confirmatory factor analysis was used with the Paired T-Test (SPSS an IBM Company, Chicago, IL). The first step of this research was intended to assess the feasibility of the Sports Competition Anxiety Test (SCAT) instrument with a validity value of <17 Low Anxiety Level, 17 – 24 Medium Anxiety Level, and > 24 High Anxiety Level. Assessment of model suitability is based on several indicators, namely: chi-square ($\chi 2$) statistical test, the ratio of chi-square to its degrees of freedom ($\chi 2/df$), comparative fit index (CFI), goodness of fit index (GFI), parsimony comparative fit index (PCFI), parsimony goodness-of-fit index (PGFI), and root mean square error of approximation (RMSEA). In order to represent a good fit, these indices must have a value of less than 3 for$\chi 2/df$, above 0.60 for PCFI and PGFI, and above 0.90 for CFI and GFI (Arbuckle, 2008; Bentler, 1990; Blunch, 2008).

Results

The initial analysis obtained confirmed that the data was close to normal univariately (Kline, 2016). Because the Mardia test shows violations of multivariate normality (Bentler & Wu, 1993; Newsom, 2005), the bootstrap technique was used based on the recommendations of Bollen and Stine (1993) to adjust the p value of the Paired T-Test statistic.

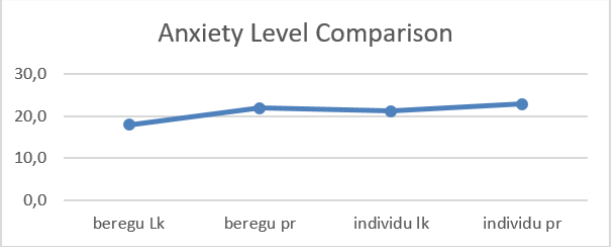

Figure 1. A comparative overview of athletes' anxiety levels

Diagram 1 presents a comparison of athletes' anxiety levels based on gender and type of sport. The illustration is that female individual athletes have the highest level of anxiety and male team athletes get the lowest score for their anxiety level. The data includes four categories that may be related to measurements or percentages in a study or survey involving team groups and individuals, divided by gender (men and women). Interpretation of these data takes into account the results recorded for each category, which may reflect the average or percentage of the parameters measured in the context of groups or individual men and women. The data records the results of anxiety level tests carried out on athletes, with the results divided by gender (men and women) and their status in a team context or as individuals. The recorded figures are as follows: "Beregu Lk" (men in groups) achieved a score of 18.0, while "beresu pr" (women in groups) recorded 21.9. On the other hand, "lk individuals" (individual males) show a value of 21.1, and "pr individuals" (individual females) display a value of 22.9.

Table 1.
Fit Results of the 1st and 2nd Order Sport Anxiety Model

Group	X	X2	df	X2/df	BS p	GFI	PCFI	Group
Man	Individual	845	714025	70	267792	< 0.001	.91	.71
	Group	719	516961	70	221964	< 0.001	.92	.72
Woman	Individual	914	835396	70	397021	< 0.001	.91	.71
	Group	875	765625	70	427372	< 0.001	.92	.72

Results of multi-group invariance testing indicated that the underlying factor structure of the SCAT was consistent across male and female athletes, as well as between individual and team sports. This indicates that the tested model of exercise anxiety applies consistently across groups. For detailed information regarding measurement invariance of sport anxiety models between gender and type of sport groups.Therefore, a stronger basis is established for testing latent mean differences between specific groups, thereby allowing appropriate and meaningful comparisons. A deeper interpretation of these data invites consideration of factors that influence anxiety levels in athletes. Variations between team groups and individuals, as well as differences between men and women, may reflect unique psychological dynamics in the context of sports competition. Further analysis is needed to understand these factors, including the influence of social pressure, coping strategies, and perceptions on individual and team performance.

Table 2.
Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Beregu.lk - Pribadi.lk	-3.15000	1.95527	.30916	-3.77533	-2.52467	-10,189	39	,000
Pair 2	Beregu.pr - Pribadi.pr	-.97500	1.36790	.21628	-1.41248	-.53752	-4,508	39	,000

Paired T-Test analysis presented in Table 2 shows that there are significant differences between male and female athletes regarding the construct of sports anxiety (i.e., team and individual models). Additionally, significant differences were observed when considering each of the dimensions integrated with the high-level sport anxiety construct. The positive df values presented in Table 3 indicate that the comparison group (i.e., women) had higher latent mean values than the reference group (i.e., male athletes) regarding the subscales of somatic anxiety and concentration disorders.

The comparison of individual and team sports, presented in Table 2, also revealed statistically significant differences in the sports anxiety construct (individual and team models). Additionally, significant differences in all dimensions were detected. A negative u value indicates that the reference group (i.e., team sports) has a higher latent mean than the comparison group (i.e., individual sports).

Design

Discussion

The main aim of this study was to examine the psychometric properties of the SAS-2 and whether athletes with different personal and contextual factors such as gender and sport type differ regarding their assessment of sport anxiety. The construct of high-level sport anxiety was investigated, as well as its three specific dimensions. This research contributes to the sport psychology literature in two main ways. The first contribution provides evidence of the fair to good psychometric feasibility of the sports anxiety scale (SAS-2), being a valid and reliable tool for use in the Portuguese sports context. Internal consistency and convergent and discriminant validity were all achieved.

In the context of team athletes, the analysis may involve understanding how group dynamics may influence athletes' anxiety levels during competition(Vardar et al., 2007; Xanthopoulos et al., 2020). When participating as part of a team, athletes can feel the social support and comfort of their peers(Jamshidi et al., 2011), which may help reduce anxiety levels. Factors such as a sense of solidarity, team support, and shared responsibility can provide athletes with a sense of confidence and psychological comfort when they compete. Similar to the results of research conducted by(Salleh et al., 2021).In situations where athletes compete individually, the pressure to perform well may be greater, as they must face challenges without direct support from the team(Jamshidi et al., 2011). Therefore, analysis of team athletes' anxiety level test results can provide valuable insight into the role of social support and group dynamics in managing anxiety in competitive sports (Patel et al., 2010).

(Isoard-Gautheur et al., 2012) found, that athletes who reported low mutual orientation with their coaches experienced higher levels of burnout which may lead to disconnection in the athlete's relationship and career in sport. Athletes' perceptions of their mother/father's responses, mediated by athlete self-esteem, influenced athletes' developmental and trait cognitive sport anxiety three months later(Rouquette et al., 2021b).College athletes demonstrated moderate anxiety-related concussion perceptions (12.8 ± 3.2; scores ranged from 4 – low anxiety to 20 – high anxiety). The majority of participants reported that concussions bothered them (60.7%), with sizable proportions being worried (46.7%), scared (40.7%), or anxious (25.0%) about sustaining a concussion (Beidler et al., 2021a).

Anxiety symptoms and disorders impact performance in sports. Anxiety affects attention, executive function, information selection, muscle tension, and stimulus processing—all of which are involved in exercise(Tamminen et al., 2021). Elite athletes who reported higher anxiety experienced more skill errors and negative performance outcomes(Reardon et al., 2021). For example, anxiety impacts balance among adolescents and young adults participating in gymnastics and is associated with poorer performance(Beidler et al., 2021b). Additionally, an athlete's interpretation of precompetition stress and anxiety may mediate the functional impact on performance(Silva & Paiva, 2023). That is, if an athlete interprets a feeling as something that helps to get "excited" to compete, it may be functionally adaptive. However, if the athlete perceives these feelings as detrimental, then the unhelpful behavioral response will be avoidance-based, and performance will be negatively affected(Mehrsafar et al., 2020). Previous research suggests that female athletes often experience higher levels of anxiety than men, perhaps due to more intense social pressure and performance appraisals. Additionally, athletes in individual sports such as tennis or golf tend to experience greater anxiety than athletes in team sports, due to a greater focus on personal performance (Biscué Viáfara, 2022). Therefore, we need to understand that anxiety in athletes requires an approach that considers the various practical and situational factors that influence their performance. Based on the findings of various studies, such as the reported differences in anxiety between female and male athletes, as well as between contact and non-contact sports, suggests that anxiety management strategies should be tailored to the specific needs of the individual and their sporting discipline. His requires support from coaches and

mental support staff who need to apply a personalized approach. For example, female athletes in individual sports may require more intensive support to manage anxiety related to assessment and performance, whereas male athletes in team sports may require an approach that focuses on group dynamics and team stress. For athletes in contact sports, where concerns about physical injury are often a focus, training that emphasizes effective relaxation and recovery techniques can be especially beneficial. By considering specific needs based on gender, sport discipline, and implementing an evidence-based approach from current research, coaching and mental support staff can help athletes manage their anxiety more effectively and improve their performance. Finally, anxiety in athletes is one of the factors most often associated with the occurrence and severity of sports injuries. Once an injury occurs, recovery and return to sport can also be negatively impacted by anxiety(McLoughlin et al., 2021). Of note, however, higher levels of satisfaction with social support received at the time of injury were also associated with reduced post-injury anxiety symptoms.

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Datos de los/as autores/as y traductor/a:

Nuridin Widya Pranoto	nuridin@fik.unp.ac.id	Autor/a
varhatun fauziah	fauziah44342@gmail.com	Autor/a
Yovhandra Ockta	yovhandra1999@gmail.com	Autor/a
Fiky Zarya	fikyzarya160416@gmail.com	Autor/a
Ari Iswanto	ariiswanto@uny.ac.id	Autor/a
Hedi Ardiyanto Hermawan	hedi_ardiyanto@uny.ac.id	Autor/a
Gema Fitriady	gema.fitriady.fik@um.ac.id	Autor/a
Bekir Erhan Orhan	bekirerhanorhan@aydin.edu.tr	Autor/a
Aydın Karaçam	akaracam@bandirma.edu.tr	Autor/a
Niyazi Sıdkı Adıgüzel	nsadiguzel38@gmail.com	Autor/a
Vlad Adrian Geantă	vladu.geanta@gmail.com	Traductor/a