

p-ISSN : 2788-5070 | e-ISSN : 2788-5089

DOI(Journal): 10.31703/gpessr
DOI(Volume): 10.31703/gpessr/.2024(VII)
DOI(Issue): 10.31703/gpessr.2024(VII.I)



VOL. VII, ISSUE I, WINTER (MARCH-2024)

GPSSR

GLOBAL PHYSICAL EDUCATION & SPORTS REVIEW
HEC-RECOGNIZED CATEGORY-Y



Double-blind Peer-review Research Journal
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Article Title

Examining the Effect of Physical Training on Competitive State Anxiety Levels of Players

Global Physical Education & Sports Sciences
Review

p-ISSN: 2788-5070 e-ISSN: 2788-5089

DOI(journal): 10.31703/gpessr

Volume: VII (2024)

DOI (volume): 10.31703/gpessr.2024(VII)

Issue: I Winter (March-2024)

DOI(Issue): 10.31703/gpessr.2024(VII-I)

Home Page

www.gpessrjournal.com

Volume: VII (2024)

<https://www.gpessrjournal.com/Current-issues>

Issue: I-Winter (March-2024)

<https://www.gpessrjournal.com/Current-issues/7/1/2024>

Scope

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Abstract

This study investigated the influence of physical training on competitive state anxiety in athletes. Ninety athletes (19-25 years old) from three public and private universities in Lahore participated ($n = 30$ per sport category). The Competitive State Anxiety Inventory-2 (CSAI-2) assessed pre- and post-training anxiety levels. Descriptive statistics (Mean \pm SEM) were used to summarize data. Paired-sample t -tests explored the impact of the training program on overall state anxiety, while a one-way Analysis of Variance (ANOVA) examined the program's effect on CSAI-2 sub-scales cognitive, somatic anxiety, and self-confidence. Results revealed significant reductions in state anxiety for ergometer rowing, middle-distance, and long-distance athletes following the 8-week training intervention. We propose that the structured training program improves state anxiety in these athletes by potentially enhancing their fitness and psychological resilience. This study highlights the potential of physical training programs to optimize athletic performance by mitigating competitive anxiety.

Keywords: Players, Cognitive, Somatic Anxiety, Self-Confidence, Ergo Rowing Players, Middle, Long-Distance Runners

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Pages: 26-33

DOI: 10.31703/gpessr.2024(VII-I).04

DOI link: [https://dx.doi.org/10.31703/gpessr.2024\(VII-I\).04](https://dx.doi.org/10.31703/gpessr.2024(VII-I).04)

Article link: <http://www.gpessrjournal.com/article/A-b-c>

Full-text Link: <https://gpessrjournal.com/fulltext/>

Pdf link: <https://www.gpessrjournal.com/admin/Author/31rvloIA2.pdf>

Citing Article

04	Examining the Effect of Physical Training on Competitive State Anxiety Levels of Players						
	Author	Hurria Husein Muhammad Zafar Iqbal Butt Yasmeen Tabassum		DOI	10.31703/gpessr.2024(IX-I).04		
Pages	26-33	Year	2024	Volume	VII	Issue	I
Referencing & Citing Styles	APA	Husein, H., Butt, M. Z. I., & Tabassum, Y. (2024). Examining the Effect of Physical Training on Competitive State Anxiety Levels of Players. <i>Global Physical Education & Sports Sciences Review</i> , VII(1), 26-33. https://doi.org/10.31703/gpessr.2024(IX-I).04					
	CHICAGO	Husein, Hurria, Muhammad Zafar Iqbal Butt, and Yasmeen Tabassum. 2024. "Examining the Effect of Physical Training on Competitive State Anxiety Levels of Players." <i>Global Physical Education & Sports Sciences Review IX (I)</i> :26-33. doi: 10.31703/gpessr.2024(VII-I).04.					
	HARVARD	HUSEIN, H., BUTT, M. Z. I. & TABASSUM, Y. 2024. Examining the Effect of Physical Training on Competitive State Anxiety Levels of Players. <i>Global Physical Education & Sports Sciences Review</i> , VII, 26-33.					
	MHRA	Husein, Hurria, Muhammad Zafar Iqbal Butt, and Yasmeen Tabassum. 2024. 'Examining the Effect of Physical Training on Competitive State Anxiety Levels of Players', <i>Global Physical Education & Sports Sciences Review</i> , VII: 26-33.					
	MLA	Husein, Hurria, Muhammad Zafar Iqbal Butt, and Yasmeen Tabassum. "Examining the Effect of Physical Training on Competitive State Anxiety Levels of Players." <i>Global Physical Education & Sports Sciences Review VII.I (2024)</i> : 26-35. Print.					
	OXFORD	Husein, Hurria, Butt, Muhammad Zafar Iqbal, and Tabassum, Yasmeen (2024), 'Examining the Effect of Physical Training on Competitive State Anxiety Levels of Players', <i>Global Physical Education & Sports Sciences Review</i> , VII (I), 26-33.					
	TURABIAN	Husein, Hurria, Muhammad Zafar Iqbal Butt, and Yasmeen Tabassum. "Examining the Effect of Physical Training on Competitive State Anxiety Levels of Players." <i>Global Physical Education & Sports Sciences Review VII, no. I (2024)</i> : 26-33. https://dx.doi.org/10.31703/gpessr.2024(VII-I).04 .					



Global Physical Education & Sports Sciences Review

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DOI: <http://dx.doi.org/10.31703/gpessr>



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Title

Examining the Effect of Physical Training on Competitive State Anxiety Levels of Players

Abstract

This study investigated the influence of physical training on competitive state anxiety in athletes. Ninety athletes (19-25 years old) from three public and private universities in Lahore participated ($n = 30$ per sport category). The Competitive State Anxiety Inventory-2 (CSAI-2) assessed pre- and post-training anxiety levels. Descriptive statistics (Mean \pm SEM) were used to summarize data. Paired-sample t-tests explored the impact of the training program on overall state anxiety, while a one-way Analysis of Variance (ANOVA) examined the program's effect on CSAI-2 sub-scales cognitive, somatic anxiety, and self-confidence. Results revealed significant reductions in state anxiety for ergometer rowing, middle-distance, and long-distance athletes following the 8-week training intervention. We propose that the structured training program improves state anxiety in these athletes by potentially enhancing their fitness and psychological resilience. This study highlights the potential of physical training programs to optimize athletic performance by mitigating competitive anxiety.

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Keywords: [Players](#), [Cognitive](#), [Somatic Anxiety](#), [Self-Confidence](#), [Ergo Rowing Players](#), [Middle](#), [Long-Distance Runners](#)

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Introduction

Achieving peak performance in track events requires a delicate balance between physical conditioning and mental composure (Jekauc, 2024). State anxiety, characterized by transient feelings of worry and nervousness, can significantly impact an athlete's ability to perform at their best (Stephen et al., 2022). This study delves into the relationship between physical training and state anxiety among track athletes competing in

three distinct disciplines: Ergo rowing (indoor simulated 2000 m ergo rowing), middle-distance running, and long-distance running. These disciplines present unique physiological demands. Ergo rowing, while not technically track and field, offers a valuable training tool that emphasizes high-intensity, short-duration efforts. Middle-distance running requires a blend of speed and stamina, while long-distance running prioritizes sustained pace and exceptional aerobic capacity.



Investigating how training programs tailored to these diverse demands influence state anxiety can provide valuable insights for both athletes and coaches (Tabassum et al., [2021](#)).

While research has explored the connection between physical training and anxiety in various sports, limited studies have examined this relationship specifically within the context of track and field, particularly across these distinct disciplines. This study aims to bridge this gap by investigating whether training programs designed for each discipline - Ergo rowing, middle-distance, and long-distance running - differentially affect pre-competition state anxiety levels in athletes. It has been hypothesized that the 8-week physical training program has significantly improved the competitive state anxiety levels of university ergo rowing players, and middle and long-distance track events athletes.

Literature Review

State anxiety is a well-documented factor impacting athletic performance across various sports (Mahoney & Meyers, [2021](#)). Track and field events are no exception, with athletes experiencing heightened anxiety levels before and during competitions, which can negatively affect focus, technique, and ultimately, results (Sánchez-Sánchez et al., [2023](#)). Research by Cooper and colleagues suggests that optimal performance lies within a specific "zone of optimal functioning" where anxiety levels are neither too low nor too high (Cooper et al., [2021](#)).

Training programs play a crucial role in shaping an athlete's physical and mental state (Saadati, [2023](#)). Research suggests that training specific to an event can improve not only physical performance but also influence anxiety levels (Palazzolo, [2022](#)). For example, a study by Lasnier found that middle-distance runners who incorporated race pace training into their routine experienced reduced anxiety during actual competitions (Lasnier, [2022](#)). This suggests that training programs that mimic the demands of the competition can help athletes feel more prepared and manage anxiety more effectively (Ong & Chua, 2021). This study focuses on three distinct track disciplines with unique physical demands that may influence anxiety differently: Ergo Rowing, while not technically track and field, ergo rowing offers a valuable training tool for track athletes seeking to improve power and anaerobic capacity through high-intensity, short-duration efforts. Limited research exists on the specific impact of Ergo rowing training on state anxiety in track athletes. However, a study by Wilson investigating the

relationship between anxiety and heart rate in rowers suggests a potential link between training intensity and anxiety levels (Wilson, [2024](#)). Middle-Distance Running: this discipline requires a balance of speed and endurance. Training programs often incorporate interval training and tempo runs, which may improve anxiety management skills. A study by Antonio found that middle-distance runners who participated in mental training programs alongside physical training reported lower pre-competition anxiety levels (Antonio, [2023](#)). This suggests that training programs that address both physical and mental aspects can be beneficial. Long-Distance Running: long-distance running prioritizes sustained pace and exceptional aerobic capacity. Training programs typically involve high-volume, moderate-intensity runs. While research suggests long-distance running can be a good stress reliever (Nuutila, [2023](#)) the impact on pre-competition state anxiety remains less explored in track and field events. While previous research has explored the link between physical training and anxiety in athletes, a clear gap exists in understanding this relationship within the specific context of these diverse track disciplines. This study aims to address this gap by investigating whether training programs designed for Ergo rowing, middle-distance running, and long-distance running have differential effects on pre-competition state anxiety levels in track athletes.

Research Methodology

Participants

ninety male university athletes aged 19-25 years from three universities in Lahore participated in this study: University of Punjab (PU, n = 60, 20 per sports category), Government College University, Lahore (GCU, n = 15 per sports category), and University of Central Punjab, Lahore (UCP, n = 15 per sports category). Participants were recruited through a purposive sampling technique based on their involvement in ergo rowing, middle-distance running, or long-distance running events.

Design

a short-term longitudinal design with both experimental and survey methods was employed to investigate the effects of an eight-week physical training program on competitive state anxiety in athletes of Ergo rowers, middle-distance runners, and long-distance runners at different stages: pre-training, mid-training (after 04 weeks), and post-training/pre-competition. The study

comprised two distinct phases: a training phase and a competition phase.

Measures

baseline competitive state anxiety was assessed prior to the training program by organizing actual competitions: Ergo rowing: 2000 meters on indoor rowing ergometers at the University of the Punjab gymnasium, Lahore. Middle-Distance and Long-Distance Running: Competition held at Punjab Athletics Stadium, Lahore. Following each competition, participants completed the Competitive State Anxiety Inventory-2 (CSAI-2) questionnaire developed by Marton et al., 1999, which took approximately 15 minutes.

Statistical Analysis

The analysis of the data was conducted on GraphPad Prism version 6.0 software. Data from each research parameter was given as Mean ± SEM and statistically assessed using a two-tailed Paired sample t-test to check the effect of the physical training program on Cognitive Anxiety, Somatic Anxiety, and Self-Confidence. The researcher used Analysis of Variance (ANOVA) to explore the effect of physical training on Cognitive Anxiety, Somatic Anxiety, and Self-Confidence. This study employed Pearson correlation to check the relationship between physical training Cognitive Anxiety, Somatic Anxiety, and Self-Confidence of male university players of ergo rowing, middle and long distance.

Results

Figure 1

Group Comparison in Cognitive Anxiety, Somatic Anxiety, and Self-Confidence in Ergo-Rowing

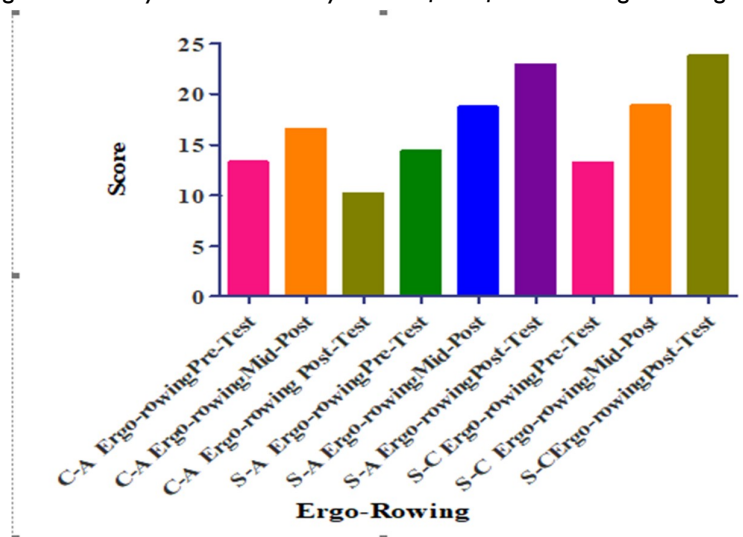


Figure 1 shows that cognitive anxiety in ergo-rowing, cognitive anxiety increased significantly from pre-test (13.27±0.24) to mid-post (16.53±0.21) by 25%. However, it significantly decreased from pre-test to post-test (10.17±0.18) by 23%, and even more from mid-post to post-test by 38%. Regarding somatic anxiety, there was a significant increase from pre-test (14.37±0.29) to mid-post (18.70±0.19) by 30%, and an

even larger increase from pre-test to post-test (22.87±0.23) by 59%. From mid-post to post-test, somatic anxiety further increased by 22%. For self-confidence, there was a significant rise from pre-test (13.23±0.31) to mid-post (18.80±0.26) by 42%, and a more substantial increase from pre-test to post-test (23.73±0.24) by 79%. Additionally, self-confidence improved from mid-post to post-test by 26%.

Table 1

Group Comparison in Cognitive Anxiety, Somatic Anxiety, and Self-Confidence in Ergo-Rowing

Group Comparison	Means ± SEM	Means ± SEM	Percentage difference
Pre Test vs Mid-Post	13.27 ± 0.24	16.53 ± 0.21	25↑***

Group Comparison	Means ± SEM	Means ± SEM	Percentage difference
Pre Test vs Post Test	13.27 ± 0.24	10.17 ± 0.18	23↓***
Mid-Post vs Post Test	16.53 ± 0.21	10.17 ± 0.18	38↓***
Somatic Anxiety in Ergo-rowing			
Pre Test vs Mid-Post	14.37 ± 0.29	18.70 ± 0.19	30↑***
Pre Test vs Post Test	14.37 ± 0.29	22.87 ± 0.23	59↑***
Mid-Post vs Post Test	18.70 ± 0.19	22.87 ± 0.23	22↑***
Self-Confidence in Ergo-rowing			
Pre Test vs Mid-Post	13.23 ± 0.31	18.80 ± 0.26	42↑***
Pre Test vs Post Test	13.23 ± 0.31	23.73 ± 0.24	79↑***
Mid-Post vs Post Test	18.80 ± 0.26	23.73 ± 0.24	26↑***

Figure 2

Group Comparison in Cognitive Anxiety, Somatic Anxiety, and Self-Confidence in Middle Distance

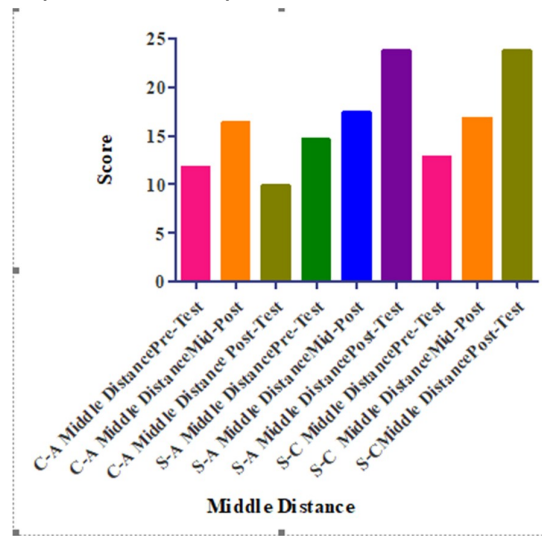


Figure 2 represents that middle distance group comparison, cognitive anxiety significantly increased from pre-test (11.70±0.19) to mid-post (16.33±0.19) by 40%, then significantly decreased from pre-test to post-test (9.80±0.12) by 16%, and further decreased from mid-post to post-test by 40%. Another set of data for cognitive anxiety showed a significant decrease from pre-test (23.77±0.29) to mid-post (17.40±0.32) by

26%, from pre-test to post-test (14.60±0.41) by 39%, and from mid-post to post-test by 16%. Self-confidence in the middle distance significantly increased from pre-test (12.80±0.33) to mid-post (16.80±0.22) by 31%, and even more from pre-test to post-test (23.73±0.24) by 85%. Additionally, self-confidence improved from mid-post to post-test by 41%.

Table 2

Group Comparison in Cognitive Anxiety, Somatic Anxiety, and Self-Confidence in Middle Distance

Group Comparison	Means ± SEM	Means ± SEM	Percentage difference
Pre-Test vs Mid-Post	11.70 ± 0.19	16.33 ± 0.19	40↑***
Pre-Test vs Post-Test	11.70 ± 0.19	9.80 ± 0.12	16↓***
Mid-Post vs Post-Test	16.33 ± 0.19	9.80 ± 0.12	40↓***
Cognitive Anxiety in Middle Distance			
Pre-test vs Mid-Post	23.77 ± 0.29	17.40 ± 0.32	26↓***
Pre-test vs. Post-test	23.77 ± 0.29	14.60 ± 0.41	39↓***
Mid-Post vs Post-test	17.40 ± 0.32	14.60 ± 0.41	16↓***
Self Confidence in middle-distance			

Group Comparison	Means ± SEM	Means ± SEM	Percentage difference
Pre-Test vs Mid-Post	12.80± 0.33	16.80± 0.22	31↑***
Pre-Test vs Post-Test	12.80± 0.33	23.73± 0.24	85↑***
Mid-Post vs Post-Test	16.80± 0.22	23.73± 0.24	41***

Figure 3

Group Comparison in Cognitive Anxiety, Somatic Anxiety, and Self-Confidence in Long Distance

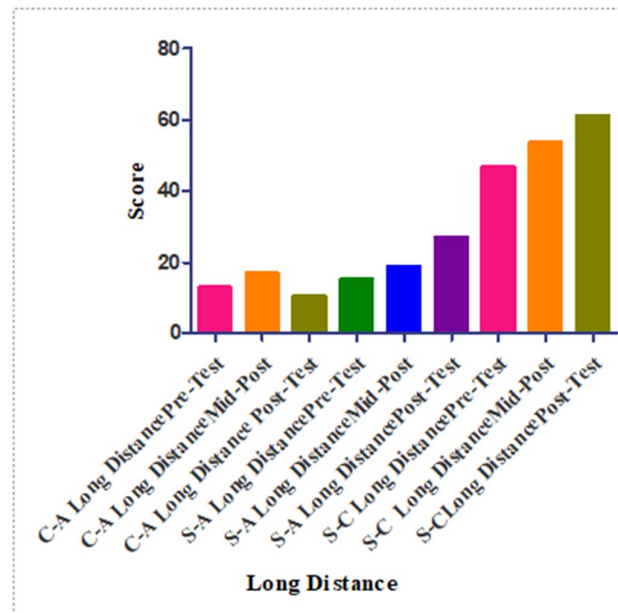


Figure 3 represents that in the long-distance group comparison, cognitive anxiety significantly increased from pre-test (13.00±0.20) to mid-post (17.10±0.24) by 31%, then decreased from pre-test to post-test (10.67±0.17) by 18%, and further decreased from mid-post to post-test by 37%. Somatic anxiety showed a significant decrease from pre-test (27.10±0.27) to mid-

post (18.97±0.24) by 30%, from pre-test to post-test (15.43±0.33) by 43%, and from mid-post to post-test by 19%. Self-confidence significantly increased from pre-test (13.27±0.23) to mid-post (18.73±0.22) by 41%, from pre-test to post-test (27.13±0.25) by 104%, and from mid-post to post-test by 44%.

Table 3

Group Comparison in Cognitive Anxiety, Somatic Anxiety, and Self-Confidence in Long Distance

Group Comparison	Means ± SEM	Means ± SEM	Percentage difference
Pre-Test vs Mid-Post	13.00± 0.20	17.10± 0.24	31↑***
Pre-Test vs Post-Test	13.00± 0.20	10.67± 0.17	18↑***
Mid-Post vs Post-Test	17.10± 0.24	10.67± 0.17	37↓***
Somatic Anxiety in long-distance			
Pre-test vs Mid-Post	27.10± 0.27	18.97± 0.24	30↓***
Pre-test vs Post-test	27.10± 0.27	15.43 ± 0.33	43↓***
Mid-Post vs Post-Test	18.97± 0.24	15.43 ± 0.33	19↓***
Self-confidence Long distance			
Pre-Test vs Mid-Post	13.27± 0.23	18.73± 0.22	41↑***
Pre-Test vs Post-Test	13.27± 0.23	27.13± 0.25	104↑***
Mid-Post vs Post-Test	18.73± 0.22	27.13± 0.25	44↑***

Discussion

The study's first objective was to investigate the effect of 8 weeks of physical training on competitive state anxiety of ergo-rowing, middle, and long-distance players, respectively.

Anxiety is often perceived as a detrimental emotional state, impacting perception in sporting events. A significant proportion of athletes regard it as impairing performance, potentially leading to declines in performance (Mulvey, (2024). Anxiety comprises three elements: cognitive anxiety, somatic anxiety, and self-confidence, but the first two elements markedly affect overall performance (Tabassum et al., 2021). These components are associated with negative anticipations regarding self-assessment or success, pessimistic self-dialogue presumptions, concerns about subpar performance, risks of failure, inability to concentrate, and disrupted attention (Jarvis, 2002).

Cognitive Anxiety

In our investigation, a score of cognitive anxiety was critically increased after the mid-post-test condition; however, after the post-test condition, its values improved significantly. The elevated score of cognitive anxiety in the mid-post condition depicts a lack of skills improvement in these players during training in all games, i.e., ergo-rowing, middle distance, and long distance. Moreover, this elevated level in mid-post condition indicates that players are still stressed about gaining perfection in these games.

The findings of our investigation have confirmed a similar trend. Additionally, sport-related individuals, i.e., sports psychologists, sports counselors, and coaches, should use our findings to deal with difficult situations the team and individual athletes face to reduce cognitive anxiety.

Moreover, the prominent reduction in the score of cognitive anxiety in post-test conditions indicates that athletes of these games are in improved skill condition. Hence, training for two months in these games can pronouncedly increase the overall performance of these players in future international events.

Somatic Anxiety

Somatic anxiety refers to the physiological responses associated with the fight-or-flight mechanism, manifesting as autonomic arousal and negative symptoms (Oladejo, 2021). These symptoms include sensations of apprehension, elevated blood pressure, muscle tension, accelerated heart rate, parched throat,

the sweat of the palms, and gastrointestinal discomfort commonly described as "butterflies in the stomach."

Our investigation score of somatic anxiety decreased pronouncedly after mid-post and post-test analysis in all three games, i.e., ergo-rowing, middle distance, and long distance.

In an investigation by Parnabas et al. (2015), scores of somatic anxiety and sports performances among rowing athletes of different skills were assessed. That investigation comprised 77 rowing participants, including (N=27) national players, (N=17) state athletes, (N=18) district athletes, and university players (N=15). The research findings documented that elite or national rowing athletes exhibited lower levels of somatic anxiety, indicating reduced performance in competitive situations. Moreover, their results also documented exits of negative correlation between somatic anxiety and sports performance among rowing players.

The findings indicate that somatic anxiety significantly influences the performance of middle-distance runners, as it is a conditional response in the performance arena. Consequently, it demonstrates that once execution commences, it markedly affects the performance of cognitive anxiety, and self-confidence also exhibits a significant correlation with performance.

Sport psychology professionals, including counselors and coaches, should leverage these findings to suggest suitable coping mechanisms for managing somatic anxiety among athletes at the university level.

Self- Confidence

In our investigation, the self-confidence score increased prominently after mid-post and post-test conditions in all three elite games, i.e., ergo-rowing, middle distance, and long distance.

Self-confidence, the belief in one's abilities to succeed in specific situations, is critical in managing this anxiety and enhancing athletic performance.

Physical training plays a pivotal role in improving self-confidence among university male players. Training programs emphasizing skill development, physical conditioning, and psychological preparedness enhance self-efficacy and belief in one's capabilities. This is supported by Bandura's self-efficacy theory, which posits that mastery experiences, vicarious experiences, verbal persuasion, and physiological states are vital sources of self-efficacy (Bandura, 1997). Successful engagement in physical training and achieving set goals bolster self-confidence. Regular training sessions where athletes see progress in their performance can increase their belief in

their abilities. For instance, Weight et al. (2020) highlight that mastery experiences are athletes' most influential source of self-efficacy. Observing peers or role models succeed in similar tasks during training can enhance an athlete's confidence. This aspect is particularly relevant in team sports, where players frequently witness the successes of their teammates (Pesidas et al., 2023). Positive feedback and encouragement from coaches and teammates during training sessions significantly boost self-confidence (Pesidas & Serrano, 2023). According to Hays et al. (2009), verbal persuasion can substantially impact an athlete's self-confidence and subsequent performance (Hidayatet et al., 2023).

Regular physical training improves physical fitness, which in turn can reduce anxiety and improve confidence levels. Sanader et al. (2021) suggest that physically fit athletes are less likely to experience the adverse effects of anxiety and more likely to feel confident in their abilities. Self-confidence serves as a buffer against competitive state anxiety. High levels of self-confidence can mitigate the effects of anxiety, leading to improved performance. Martens et al. (1990) proposed the Competitive State Anxiety Inventory-2 (CSAI-2), which includes self-confidence as one of its subcomponents, highlighting its importance in competitive anxiety.

The primary findings indicate a consistent and significant correlation between self-efficacy and fundamental psychological necessities. The outcomes further demonstrated that autonomous motivation is a more favorable form of motivation, as it facilitates the

interpretation of self-efficacy perceptions, thereby enhancing performance in competitive settings. Conversely, controlled motivation exhibits a detrimental effect.

The specific environment of Lahore can be a limiting factor in the outcomes of the present investigation. The present study has certain delimitations to consider when considering the research and its contributions. Since the present study only focused on male intervarsity players. Moreover, only ergo players, middle distance athletes, and long distances athletes were recruited. Hence, the findings of this investigation cannot apply to the players of other elite games. This investigation should also be conducted on other university games to have more authentic and reliable data. This investigative approach can also be applied to other departmental sports to better look at the trends of these parameters in our population.

Conclusion

State anxiety significantly impacts performance in track and field events. This review explores the potential benefits of training specificity in managing competitive anxiety. While limited research exists on the relationship between ergometer rowing training and state anxiety in track athletes, evidence indicates that tailored training programs for middle-distance and long-distance running may help manage anxiety. Further research is necessary to understand the complex relationship between physical training, competitive state anxiety, and performance across diverse track disciplines.

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