



Guidelines for Resolving Psychological Fatigue in Professional Badminton Athletes

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Abstract

Background and Aim: Professional badminton players must address psychological exhaustion if they hope to maintain their high level of play and general well-being. Athletes who effectively manage their mental tiredness are more likely to be able to sustain their focus, resiliency, and long-term professional success. This research article aims to develop guidelines for resolving psychological fatigue among professional badminton athletes. The study explores the underlying causes, manifestations, and strategies to manage psychological fatigue, emphasizing the importance of mental resilience and holistic athlete well-being.

Materials and Methods: The sample group consists of eight professional badminton athletes from the Chinese National Badminton Team, with an average age of 22.3 years, including both male and female participants. The selection of these athletes was purposive, focusing on those with at least one year of experience at the professional level and who have encountered psychological fatigue during their careers. The research employed qualitative methods, using semi-structured interviews as the primary tool. These interviews were conducted with both athletes and their coaches to gather in-depth insights into the psychological challenges faced and the coping mechanisms employed. The interview questions for coaches aimed to uncover the causes and management strategies of psychological fatigue, while the questions for athletes focused on their personal experiences and resolving psychological fatigue techniques. Data analysis involved thematic analysis, identifying patterns and themes related to psychological fatigue and self-adjustment strategies. The study used qualitative validation methods, including triangulation, member checking, and peer debriefing, to ensure the reliability and credibility of the findings.

Results: The results indicate that psychological fatigue in professional badminton athletes is influenced by various factors, including injuries, match losses, and the pressure of competing in hostile environments. The study found significant impacts on performance, such as impaired decision-making, reduced concentration, and decreased emotional regulation. Recovery strategies identified include mental resilience training, mindfulness practices, and the support of a robust network of coaches, psychologists, family, and teammates.

Conclusion: Addressing psychological fatigue requires a comprehensive approach integrating mental health programs with physical training. The study's guidelines advocate for regular mental resilience training, mindfulness practices, and tailored interventions to enhance athletes' mental well-being. By implementing these strategies, athletes can better manage psychological fatigue, improving their overall performance and sustaining their athletic careers.

Keywords: Psychological Fatigue; Resolving Psychological Fatigue; Badminton Athletes

Introduction

Badminton is a globally recognized sport with millions of enthusiasts and professional players. Historically originating from ancient civilizations and evolving through various iterations, today's version of badminton is a demanding sport requiring a combination of agility, power, and precision (Watkins, 2007). However, what is often overshadowed by its physical aspects are the immense mental demands placed on players (Kosack et al., 2020; Wiyata et al., 2022).

The very essence of sports competition is rooted not only in physical prowess but also in mental fortitude. The arena of competitive sports is as much a battleground of the mind as it is of the body. Athletes, in their quest for excellence, encounter high-pressure situations that test their psychological resilience. In these crucibles of competition, the mind can either emerge as an athlete's strongest ally or transform into the most formidable adversary. Mental strength, therefore, becomes as vital as physical conditioning (Iso-Ahola & Mobily, 1980; Weinberg & Gould, 2023).

Psychological fatigue in athletes, a condition distinct from its physical counterpart, represents a formidable challenge in the mental arena of competitive sports. Physical fatigue is characterized by a sensation of tiredness and a lack of energy that typically follows strenuous physical activity and is a well-understood phenomenon in sports science (DAVIS & BAILEY, 1997). Psychological fatigue,



however, navigates the more complex waters of cognitive and emotional exhaustion. This form of fatigue delves beyond mere physical tiredness, encapsulating a state of mental weariness that is often harder to detect and address (Ackerman & Kanfer, 2009).

At its core, psychological fatigue refers to a diminished capacity for mental work and a reduced efficiency of cognitive functioning, stemming from prolonged mental activities, emotional stress, or intense concentration (Smith et al., 2018; Van Cutsem et al., 2017). It manifests as an overwhelming sense of mental exhaustion, decreased motivation, and an increased perception of the effort required to perform tasks that were once routine or automatic (Martin et al., 2016). In the context of sports, such fatigue can originate from the relentless focus needed for training, strategic planning, and competition, coupled with the emotional strain of dealing with expectations, disappointments, and the constant pressure to excel (Beedie et al., 2005).

The repercussions of psychological fatigue on athletic performance are multifaceted. It can lead to impaired decision-making, reduced concentration, and a general decline in the efficiency of cognitive processes (Marcora et al., 2009). In sports like badminton, where quick and accurate decision-making is crucial, and the margin for error is minuscule, the impact of mental fatigue can be particularly debilitating. The athlete's ability to anticipate an opponent's move, execute complex motor skills, and maintain strategic focus can be severely compromised under the weight of psychological fatigue (Brown & Fletcher, 2017; Smith et al., 2018).

Moreover, the influence of psychological fatigue extends beyond the court. It has been linked to increased susceptibility to injuries due to a lack of mental alertness and compromised judgment (Bonilla et al., 2022). The chronic experience of psychological fatigue can also have significant implications on an athlete's overall well-being, contributing to feelings of burnout, decreased job satisfaction, and even withdrawal from the sport (Gustafsson et al., 2007).

In the dynamic and fast-paced environment of professional badminton, where athletes are constantly under the scrutiny of media, coaches, and fans, the pressure to perform can exacerbate psychological fatigue. The relentless pursuit of excellence, frequent travel for tournaments, and the need to balance personal life with professional commitments further compound the stress (Schaal et al., 2011).

Despite the growing recognition of the importance of mental health in sports, research focused specifically on psychological fatigue in badminton athletes remains limited (Schmit & Brisswalter, 2020). This gap in literature underscores the need for a deeper exploration of this issue, not only to enhance our understanding but also to develop effective strategies for intervention and support. Addressing psychological fatigue in badminton is essential not just for optimizing performance, but also for ensuring the long-term health and career sustainability of the athletes (Fletcher & Sarkar, 2012). While there is an abundance of research exploring physical fatigue, its causes, and its management, there remains a notable paucity of in-depth qualitative studies that focus specifically on psychological fatigue, especially among badminton athletes (Almonroeder et al., 2020). This gap in research is particularly striking given the importance of mental health and well-being in overall athletic performance.

The objective of this research is to create guidelines for resolving the psychological fatigue of professional badminton athletes. This research is crucial for several reasons. First, it provides a deeper understanding of the sources and impacts of psychological fatigue in a high-stakes sport like badminton. Second, it offers practical, evidence-based strategies to help athletes manage and mitigate mental exhaustion, thereby enhancing their performance and overall well-being. Lastly, this study is beneficial to athletes, coaches, sports psychologists, and sports organizations, emphasizing the integration of mental health programs with physical training.

By exploring the lived experiences of professional badminton athletes and their coaches, this research aims to shed light on the complex nature of psychological fatigue and develop comprehensive, actionable guidelines for resolving psychological fatigue. These insights are not only valuable for the badminton community but can also be applied to other sports where athletes encounter similar psychological challenges.



Objectives

To create the guidelines for resolving the psychological fatigue of professional badminton athletes.

Literature Review

1. *Psychological fatigue in professional badminton*

Psychological fatigue in professional badminton manifests uniquely due to the sport's high-speed nature and the intense mental concentration required during matches. As highlighted by (Schneider et al., 2020), badminton athletes often experience mental exhaustion from the constant decision-making and strategizing needed in real-time, impacting their reaction time and accuracy. This type of fatigue can significantly impair performance, as it leads to a decline in both cognitive functions and physical coordination, crucial for success in badminton. According to (Loiseau-Taupin et al., 2021), the accumulation of psychological fatigue over a tournament or competitive season can also lead to burnout, potentially jeopardizing an athlete's career longevity. The causes of psychological fatigue in professional badminton are multifaceted, encompassing both intrinsic and extrinsic factors. Intrinsic factors include the pressure of high-stakes competition, fear of injury, and personal expectations, as discussed by (Costa et al., 2022). Extrinsic factors, as identified by (Macquet & Fleurance, 2007), often involve rigorous training schedules, frequent traveling for tournaments, and the stress of maintaining rankings. The unique scoring system and unpredictability of matches in badminton further contribute to psychological strain, requiring players to maintain high levels of mental alertness and resilience, as noted by (Park, 2000). Effective management and recovery strategies are crucial in mitigating the impact of psychological fatigue in professional badminton athletes. Research by (Proost et al., 2022) suggests that mindfulness training can significantly reduce mental fatigue by enhancing focus and emotional regulation. Recovery strategies such as adequate rest, psychological counseling, and relaxation techniques are emphasized by (Russell et al., 2022) as vital for restoring mental energy. Additionally, (Barth et al., 2019) advocate for tailored interventions based on individual athlete's needs, including cognitive-behavioral techniques and stress management programs, to ensure holistic well-being and sustained performance.

2. *Mental health interventions in sports*

Mental health interventions in sports have become integral to the holistic development and well-being of athletes. According to (Drygas et al., 2012), such interventions encompass a range of strategies aimed at preventing mental health issues, managing existing conditions, and promoting overall psychological well-being. Common approaches include psychological education, stress management programs, and mental skills training. (Wilczyńska et al., 2022) Highlight the effectiveness of cognitive-behavioral techniques in helping athletes challenge negative thought patterns and develop coping mechanisms for high-pressure situations.

Team-based interventions and support systems are crucial components of mental health strategies in sports. Team psychologists and sports counselors play a pivotal role in creating a supportive environment, conducting regular mental health screenings, and providing individual or group counseling. Moreover, fostering a team culture that prioritizes mental health, as described by (Kegelaers & Wylleman, 2020), can significantly enhance resilience and coping capacity among athletes. This collective approach to mental well-being ensures that athletes do not face psychological challenges in isolation, promoting a more supportive and inclusive sporting environment.

3. *The global perspective on athlete's mental health*

The recognition of mental health as a critical aspect of an athlete's overall well-being has gained global momentum in recent years. The International Olympic Committee (IOC), in its consensus statement, has acknowledged mental health disorders as significant factors affecting athletes around the world (Vella et al., 2021). This global perspective is supported by studies like that of (Schinke et al., 2018), which highlight how different cultures and countries approach mental health in sports, reflecting a diverse array of practices and stigmas. Despite cultural variations, there is a universal consensus on the need to prioritize mental health, as it profoundly impacts athletes' performance, career longevity,



and quality of life. (Gulliver et al., 2012). Globally, there is considerable variability in the support systems available to athletes for mental health issues. In countries like the United States and Canada, there has been an increasing emphasis on integrating mental health professionals into sports teams (Breslin et al., 2017). However, in many parts of the world, especially in developing countries, such resources are limited or non-existent (Moesch et al., 2018). The disparity in support systems often reflects broader socio-economic factors and highlights the need for global initiatives to enhance mental health support for athletes across different regions and socio-economic backgrounds. Recognizing these disparities and challenges, there has been a global push for initiatives aimed at enhancing mental health support for athletes. Organizations like the World Health Organization (WHO) and international sports federations have begun to advocate for comprehensive mental health programs in sports (Henriksen et al., 2020). Initiatives such as #SameHere Global, a movement promoting mental health awareness in sports, signify the collective efforts to destigmatize mental health issues and create inclusive support systems for athletes worldwide (Rice et al., 2019). These global movements underscore the evolving understanding and approach to mental health in the athletic community, aiming for a future where athletes' mental well-being is as prioritized as their physical health.

4. Psychological resilience in badminton athletes

Psychological resilience in badminton athletes is a crucial attribute that determines their ability to cope with the unique challenges of the sport. According to (Gupta & McCarthy, 2021), resilience in badminton encompasses the capacity to recover quickly from difficulties, maintain focus during high-pressure matches, and adapt to adversities such as injuries or defeats. This form of resilience is not just about bouncing back; it's about bouncing forward, learning, and growing from the experience. As (Trigueros, Aguilar-Parra, Álvarez, et al., 2019) Argue, that resilient badminton athletes can transform obstacles into opportunities for development, thereby enhancing their overall performance and career longevity. Building resilience in badminton athletes involves a multifaceted approach. According to (Behncke, 2004), mental skills training, including goal setting, visualization, and self-talk, are essential for fostering resilience. Furthermore, (Trigueros, Aguilar-Parra, Cangas-Díaz, et al., 2019) Emphasize the role of a supportive environment, highlighting that coaching styles that promote autonomy, competence, and relatedness can significantly bolster an athlete's resilience. Additionally, balancing rigorous training with adequate rest and recovery, as indicated by (Malwanage et al., 2022), is crucial for maintaining mental fortitude and preventing burnout in badminton athletes. In practice, resilience in badminton manifests in various forms. Resilient players display an ability to stay composed under pressure, as highlighted by (Chen & Cheesman, 2013), who notes that elite badminton athletes often exhibit remarkable poise during crucial game points. Additionally, resilience involves effective stress management, with research by (Gross et al., 2017) Illustrating how resilient athletes use stress as a motivator rather than a hindrance. Furthermore, as (Cook, et al, 2023) Point out, that resilient badminton athletes demonstrate a strong commitment to continuous improvement, viewing challenges as opportunities for growth rather than obstacles.

Conceptual Framework

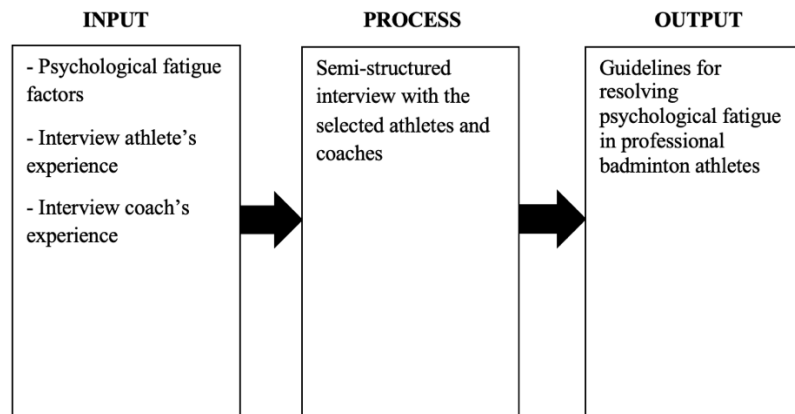


Figure 1 Conceptual Framework

Methodology

1. Population and Sample Group

The population for this study includes professional badminton athletes and their coaches from the Chinese National Badminton Team. Specifically, the sample group comprises eight professional athletes with a balanced representation of both male and female participants, averaging 22.3 years of age. These athletes have a minimum of two years of professional experience and have reported experiences of psychological fatigue. Additionally, six experienced badminton coaches, each with at least five years of coaching at the national or international level, were included. These coaches have a proven track record of managing athletes who have competed in significant tournaments like the Olympics, World Championships, and Thomas & Uber Cup.

2. Research Tools

2.1 Interview form

In this study, we delve into the multifaceted aspects of psychological fatigue in professional badminton athletes through a series of targeted interviews with both coaches and athletes. The interview questions for coaches are designed to uncover the causes, identification, and management strategies of psychological fatigue, as well as to gather insights into the impact of such fatigue on players' performances and the resources available for their support. For the players, the questions aim to explore their personal experiences with mental strain, the manifestation of psychological fatigue, their coping strategies, and ways they maintain mental resilience. Both sets of interviews also seek to gather success stories, shedding light on effective approaches to managing psychological fatigue and bouncing back. This comprehensive inquiry aims to provide a nuanced understanding of the psychological challenges faced by professional badminton athletes and the strategies employed to navigate these challenges.

Objectives for Coaches' Interview:

Objective 1: Understanding Causes of Psychological Fatigue

1. What are the main causes of psychological fatigue among professional badminton athletes?
2. Are there specific events or scenarios (like losing a match, injuries, or playing away games) that tend to exacerbate this fatigue?

Objective 2: Identifying and Addressing Mental Strain

1. How can you identify when a player is experiencing mental exhaustion or strain?
2. What coping strategies or interventions do you recommend or implement when you see a player is mentally fatigued?

Objective 3: Impact on Performance and Recovery Strategies

1. How does psychological fatigue affect a player's performance on the court?
2. How do you address a player's psychological well-being after a significant setback, such as an injury or a loss?

Objective 4: Available Resources and Success Stories

1. What resources or supports are available to players experiencing psychological distress?



2. Can you share any success stories where players successfully managed their psychological fatigue and rebounded in their performance?

Objectives for Players' Interview:

Objective 1: Personal Experiences with Mental Strain

1. Can you describe a time when you felt mentally fatigued or strained in your career? What caused it?

2. How does psychological fatigue manifest for you, both on and off the court?

Objective 2: Response and Coping Strategies

1. After experiencing setbacks, such as injuries or losses, how do you typically respond mentally and emotionally?

2. What strategies or techniques do you use to cope with or overcome psychological fatigue?

Objective 3: Mental Preparation and Resilience Building

1. How do you prepare mentally for high-stakes matches, especially when playing in an opponent's home court?

2. Are there any rituals, routines, or habits you engage in to maintain your mental well-being and resilience?

Objective 4: Seeking Support and Personal Success Stories

1. How do you seek support or assistance when you're feeling mentally overwhelmed? This could be from coaches, peers, professionals, or other sources.

2. Can you share a personal story where you successfully managed your mental fatigue and saw a positive change in your performance?

3. *Creating and Finding Quality Tools*

Creating high-quality research tools involved several steps to ensure reliability and validity. Initially, a thorough literature review was conducted to identify existing knowledge and gaps regarding psychological fatigue in sports. Based on this review, preliminary interview questions were drafted. These questions were then refined through consultations with experts in sports psychology and experienced badminton coaches, who provided valuable feedback on their relevance and clarity. To further ensure the effectiveness of the interview guides, pilot tests were conducted with a small group of athletes and coaches, leading to final adjustments. Triangulation, member checking, and peer debriefing methods were employed to validate the tools and the data collected, ensuring the credibility and reliability of the research instruments.

4. *Data Collection*

The data collection process involved conducting in-depth, semi-structured interviews with the selected athletes and coaches. Each interview lasted between 45 minutes to an hour, allowing participants to share their experiences comprehensively. Interviews were conducted in a comfortable and non-threatening environment to encourage openness and honesty. All interviews were audio-recorded with the participant's consent, and detailed notes were taken to capture non-verbal cues and contextual details. The recordings were then transcribed verbatim to ensure accuracy. This process ensured a rich and detailed dataset, capturing the nuances of psychological fatigue and its impact on athletes.

5. *Data Analysis*

5.1 Thematic Analysis of Interviews

We conducted a detailed thematic analysis of the data gathered from interviews with coaches and athletes. This method involved coding the transcripts meticulously to detect recurring patterns and themes centered on psychological fatigue and self-adjustment strategies. Through this process, we identified common stressors such as injuries and match losses, as well as the diverse coping mechanisms athletes use. The analysis also provided insights into how coaches recognize and manage psychological fatigue, enriching our understanding of the dynamics within professional sports environments.

5.2 Cross-Comparison and Validation



To validate the research findings, we employed cross-comparison techniques, contrasting the experiences and strategies reported by the players with the observations and methods described by the coaches. This approach ensured that the identified coping strategies and challenges were not isolated incidents but reflected a broader trend among professional badminton athletes, thereby reinforcing the validity of our conclusions.

5.3 Identification of Key Strategies for Self-adjustment

Further analysis concentrated on extracting and detailing specific strategies employed by players to manage psychological fatigue. Key strategies included mindfulness practices, engagement with support systems, and taking strategic breaks from sports activities. We explored the nuances of how these strategies were implemented and their effectiveness, offering practical insights that can be applied more broadly within sports psychology.

5.4 Interpretation of Data within the Context of Sports Psychology

The data was interpreted against the broader backdrop of sports psychology literature. This contextual analysis helped us understand how our findings align with, differ from, or augment the existing body of knowledge. It was particularly useful in framing the identified experiences and strategies within established theories of psychological resilience and coping mechanisms in sports.

5.5 Development of Guidelines and Recommendations

Based on our comprehensive analysis, the study concluded with the development of detailed guidelines for self-adjustment to mitigate psychological fatigue. These guidelines integrate the practical strategies used by professional badminton athletes and insights from their coaches, offering a resource for athlete well-being. The study also suggests holistic approaches for team management and coaching staff to foster mental resilience among athletes, extending the impact of our findings beyond the immediate research context.

6. Statistics Used in Data Analysis

While the primary focus of this research was qualitative, descriptive statistics were employed to summarize the demographic data of the participants, such as age, gender, and years of experience. These statistics provided a contextual background for the qualitative analysis, helping to situate the findings within the broader characteristics of the sample group. The qualitative data from the interviews were analyzed using thematic analysis, which did not involve complex statistical procedures but relied on identifying patterns and drawing meaningful conclusions from the narrative data. This dual approach of combining descriptive statistics with thematic analysis ensured a robust and comprehensive examination of psychological fatigue in professional badminton athletes.

Results

1. Order of Presentation of Research Results

The research results were presented in a structured order, starting with an introduction outlining the study's aims and methodology. This was followed by demographic information of participants, thematic analysis of major themes such as sources of psychological fatigue and coping strategies, and the impact of psychological fatigue on performance. The role of support systems was explored, along with personal success stories illustrating effective management of psychological fatigue. Finally, practical guidelines and recommendations were developed, and the conclusion summarized key findings and their implications for professional badminton and other sports.

2. Research results

This section provides a synthesized summary of the key interview outcomes from the study. By focusing on the critical insights gained from the discussions with coaches, experts, and professional badminton athletes, this summary encapsulates the significant themes, observations, and proposed interventions. Additionally, three tables are included to present a consolidated view of these outcomes.



Table 1 Coaches' Interview: Key Findings and Analysis

Section	Key Points
Identifying Causes of Psychological Fatigue	<ul style="list-style-type: none">- External pressures, such as competition, injuries, and hostile environments, were significant stressors for athletes.- Coaches highlighted the importance of internal coping mechanisms and resilience.
Addressing Mental Strain	<ul style="list-style-type: none">- Early detection and tailored interventions were emphasized.- Coaches play a crucial role in observing signs of psychological fatigue and providing support.
Impact on Performance and Recovery	<ul style="list-style-type: none">- Psychological fatigue affects decision-making, focus, and emotional regulation.- Recovery strategies involve mental resilience and emotional support.
Support Systems and Mental Health Interventions	<ul style="list-style-type: none">- The need for comprehensive support systems, including familial support, peer camaraderie, and professional mental health services.

Table 2 Athletes' Interview: Key Findings and Analysis

Section	Key Points
Personal Encounters with Psychological Fatigue	<ul style="list-style-type: none">- Personal and external pressures contribute to psychological fatigue.- Players experience various manifestations of mental strain, such as irritability, sleep disturbances, and a persistent sense of being overwhelmed.
Navigating Setbacks and Coping Mechanisms	<ul style="list-style-type: none">- Coping strategies include mindfulness, meditation, and engaging in hobbies outside badminton.- Athletes rely on support from coaches, sports psychologists, teammates, and family.
Strategies for Mental Preparation and Resilience	<ul style="list-style-type: none">- Visualization techniques, positive self-talk, and pre-game routines help athletes prepare mentally for high-pressure situations.- Regular mindfulness practices and balanced lifestyle practices contribute to resilience.
Seeking Support and Overcoming Mental Fatigue	<ul style="list-style-type: none">- A robust support system is crucial for athletes.- Personal success stories inspire others and offer practical coping strategies.

4. Expert Recommendations for Developing Guidelines

Based on the key findings from interviews with coaches, experts, and athletes, the following guidelines are recommended to address the various aspects of psychological fatigue in professional badminton athletes. This table aligns the key points from each section with specific guidelines to guide coaches, sports organizations, and athletes in creating a supportive and resilient environment.

Table 3 Guidelines for resolving psychological fatigue of professional badminton athletes

Analysis Section	Guidelines
Identifying Causes of Psychological Fatigue	<ul style="list-style-type: none">- Conduct regular assessments to identify stressors that contribute to psychological fatigue.- Provide resources and education to athletes to help them understand the common causes of psychological fatigue and how to manage them.



Analysis Section	Guidelines
Addressing Mental Strain	<ul style="list-style-type: none">- Implement early detection strategies to identify signs of mental strain.- Train coaches to recognize and address signs of psychological fatigue in athletes, promoting a proactive approach to mental health support.
Impact on Performance and Recovery	<ul style="list-style-type: none">- Develop recovery strategies that include mental resilience and emotional support.- Encourage athletes to maintain focus and emotional regulation through mental skills training and support systems.
Support Systems and Mental Health Interventions	<ul style="list-style-type: none">- Create comprehensive support systems that include coaches, sports psychologists, family, and teammates.- Ensure athletes have access to diverse mental health resources, including counseling and mindfulness training.
Understanding Psychological Fatigue	<ul style="list-style-type: none">- Promote internal coping mechanisms among athletes through mindfulness practices, cognitive-behavioral techniques, and stress management strategies.- Encourage coaches to play an active role in supporting athletes' mental health.
Available Resources and Success Stories	<ul style="list-style-type: none">- Provide a variety of mental health resources, including professional counseling, stress management workshops, and peer support groups.- Share success stories in sports psychology to inspire and guide athletes in overcoming psychological fatigue.
Building Resilience and Coping Mechanisms	<ul style="list-style-type: none">- Foster resilience through mindfulness practices, cognitive-behavioral techniques, and stress management strategies.- Encourage athletes to develop personal resilience through positive self-talk, visualization, and pre-game routines.
Personal Encounters with Psychological Fatigue	<ul style="list-style-type: none">- Acknowledge the diverse manifestations of psychological fatigue among athletes, including irritability, sleep disturbances, and emotional strain.- Implement tailored interventions to address specific stressors and support individual athletes.
Navigating Setbacks and Coping Mechanisms	<ul style="list-style-type: none">- Encourage mindfulness, meditation, and engaging in hobbies outside badminton to cope with stress.- Promote the importance of a balanced lifestyle and encourage athletes to maintain interests outside of their sport.
Strategies for Mental Preparation and Resilience	<ul style="list-style-type: none">- Teach visualization techniques, positive self-talk, and pre-game routines to help athletes prepare for high-pressure situations.- Encourage regular mindfulness practices and a balanced lifestyle to build resilience and maintain mental well-being.
Seeking Support and Overcoming Mental Fatigue	<ul style="list-style-type: none">- Establish a robust support system for athletes, including coaches, sports psychologists, teammates, and family.- Share personal success stories of overcoming mental fatigue to inspire and guide other athletes in their journeys.

Discussion

The qualitative research on psychological fatigue among professional badminton athletes reveals several critical themes related to key psychological challenges and strategies for resilience. Through a series of semi-structured interviews with athletes and coaches, the study identified the impact of psychological fatigue on athletic performance and the varied coping mechanisms employed by athletes. The analysis provides insights into the difficulties faced by athletes and coaches in cultivating essential traits such as willpower, mindfulness, confidence, commitment, and fighting spirit.



Willpower emerged as a central challenge due to the relentless training and competition schedules. Athletes often struggle to maintain motivation in the face of setbacks, while coaches find it challenging to keep athletes engaged without pushing them toward burnout. The solution lies in structured mental resilience programs and personalized goals, combined with peer support systems to sustain willpower through difficult times.

Mindfulness, recognized for its role in stress reduction and focus, presents a significant challenge in terms of consistent practice. The unpredictable schedules and intense pressure of competitions often lead to a lack of mindfulness integration. The study recommends regular mindfulness sessions, mindfulness education, and integrating mindfulness into physical training to foster a routine that balances physical and mental well-being.

Confidence is another critical aspect, especially after performance downturns. Restoring self-belief and avoiding overconfidence is a delicate balance. Constructive feedback mechanisms, visualization techniques, and success-sharing sessions are proposed as effective strategies to rebuild and maintain confidence among athletes and coaches. These approaches can help athletes regain their confidence after setbacks.

Commitment tends to fluctuate during periods of low performance or high stress, presenting a challenge for athletes and coaches alike. To address this, the study suggests goal-setting workshops, recognition and rewards for achievements, and balanced scheduling to prevent burnout. These methods can help athletes maintain steady commitment throughout their training and competitive careers.

Finally, the cultivation of a consistent fighting spirit within a team environment is complex. Athletes need both individual resilience and collective fighting spirit. Solutions such as sharing resilience stories, challenge simulations, and mental toughness workshops are proposed to instill a fighting spirit that aligns with athletes' journeys and struggles.

These findings contribute to the understanding of psychological fatigue in professional badminton athletes and provide practical recommendations for sports organizations, coaches, and athletes to enhance psychological resilience and performance. The study emphasizes the need for comprehensive support systems, tailored psychological training, and a culture of open communication to address the complex challenges faced by athletes in maintaining mental resilience. Therefore, building resilience in badminton athletes involves a multifaceted approach. Consistent with Behncke (2004), mental skills training, including goal setting, visualization, and self-talk, is essential for fostering resilience. Furthermore, Trigueros, Aguilar-Parra, Cangas-Díaz, et al. (2019) emphasize the importance of a supportive environment, highlighting that coaching styles promoting autonomy, competence, and relatedness can significantly bolster an athlete's resilience. Additionally, balancing rigorous training with adequate rest and recovery, as indicated by Malwanage et al. (2022), is crucial for maintaining mental fortitude and preventing burnout in badminton athletes.

Recommendation

Based on insights from interviews with professional badminton athletes and coaches, the following recommendations aim to address psychological fatigue and enhance the well-being and performance of athletes in the competitive world of badminton:

1. For Sports Organizations and Teams

Implement Comprehensive Psychological Training Programs: Develop structured programs that focus on building mental resilience through targeted exercises and activities. These should include regular sessions on mindfulness, stress management, and coping strategies, helping athletes strengthen their mental toughness over time.

Encourage Open Communication and Peer Support: Foster a culture where athletes feel comfortable discussing their struggles and seeking support. Establish peer support systems that allow athletes to share experiences and coping strategies, creating a more supportive team environment.

Integrate Mental Health Resources into Athlete Development: Provide access to mental health professionals and resources for athletes. This includes sports psychologists, counselors, and workshops dedicated to mental health awareness and education, ensuring athletes have a robust support network.



2. For Coaches

Adopt Personalized Coaching Approaches: Recognize that each athlete has unique psychological needs and tailor coaching strategies accordingly. This includes setting individualized goals, providing constructive feedback, and understanding each athlete's journey to maintain their confidence and commitment.

Utilize Goal-Setting and Feedback Mechanisms: Regular goal-setting workshops can help athletes focus on personal development and track progress. Constructive feedback mechanisms that emphasize growth and improvement can boost athletes' confidence and keep them motivated.

Enhance Knowledge of Psychological Techniques: Pursue ongoing education in sports psychology to improve coaching skills related to mental resilience. This can include learning about mindfulness practices, cognitive-behavioral techniques, and resilience-building strategies, allowing coaches to better support athletes' psychological needs.

3. For Athletes

Engage in Regular Mindfulness Practice: Commit to integrating mindfulness techniques into daily routines. This can include meditation, deep breathing exercises, or yoga, which can help reduce stress and improve focus during training and competition.

Seek Support and Use Available Resources: Leverage support systems, including coaches, teammates, and sports psychologists, to address psychological fatigue. Actively participate in team activities that promote a sense of community and collective resilience.

Focus on Personal Goals and Positive Reinforcement: Set achievable personal goals and celebrate small successes. This approach helps maintain commitment and fighting spirit, even during challenging times. Use setbacks as opportunities to learn and grow, fostering a positive attitude toward personal development.

These recommendations provide a comprehensive approach to managing psychological fatigue and enhancing the psychological resilience of professional badminton athletes. By focusing on personalized strategies, open communication, and regular mindfulness practice, athletes, coaches, and sports organizations can create an environment that supports mental health and peak performance.

References

- Ackerman, P.L., & Kanfer, R. (2009). Test length and cognitive fatigue: An empirical examination of effects on performance and test-taker reactions. *Journal of Experimental Psychology: Applied*, 15(2), 163–181. <https://doi.org/10.1037/a0015719>
- Almonroeder, T.G., Tighe, S.M., Miller, T.M., & Lanning, C.R. (2020). The influence of fatigue on decision-making in athletes: a systematic review. *Sports Biomechanics*, 19(1), 76–89. <https://doi.org/10.1080/14763141.2018.1472798>
- Barth V, Käsbaauer H, Ferrauti A, Kellmann M, Pfeiffer M, Hecksteden A, & Meyer, T. (2019). Individualized Monitoring of Muscle Recovery in Elite Badminton. *Frontiers in Physiology*, 10. DOI: 10.3389/fphys.2019.00778.
- Beedie, C., Terry, P., & Lane, A. (2005). Distinctions between emotion and mood. *Cognition and Emotion*, 19(6), 847–878. <https://doi.org/10.1080/02699930541000057>
- Birrer, D., & Morgan, G. (2010). Psychological skills training is a way to enhance an athlete's performance in high-intensity sports. *Scandinavian Journal of Medicine & Science in Sports*, 20(s2), 78–87. <https://doi.org/10.1111/j.1600-0838.2010.01188.x>
- Bonilla, D.A., Cardozo, L.A., Vélez-Gutiérrez, J.M., Arévalo-Rodríguez, A., Vargas-Molina, S., Stout, J.R., Kreider, R.B., & Petro, J.L. (2022). Exercise Selection and Common Injuries in Fitness Centers: A Systematic Integrative Review and Practical Recommendations. *International Journal of Environmental Research and Public Health*, 19(19), 12710. <https://doi.org/10.3390/ijerph191912710>



- Breslin, G., Shannon, S., Haughey, T., Donnelly, P., Leavey, G. (2017). A systematic review of interventions to increase awareness of mental health and well-being in athletes, coaches, and officials. *Syst Rev*, 6(1), 177. doi: 10.1186/s13643-017-0568-6.
- Brown, D. J., & Fletcher, D. (2017). Effects of Psychological and Psychosocial Interventions on Sport Performance: A Meta-Analysis. *Sports Medicine*, 47(1), 77–99. <https://doi.org/10.1007/s40279-016-0552-7>
- Chen, M.A., & Meggs, J. (2020). The effects of Mindful Sport Performance Enhancement (MSPE) training on mindfulness, and flow in national competitive swimmers. *Journal of Human Sport and Exercise*, 16(3). <https://doi.org/10.14198/jhse.2021.163.04>
- Cook, S.C., Todić, J., Spitzer, S., Quintana, V., Singletary, K. A., McGinnis, T., Patel, S., Montasir, S., Ducas, A., Martin, J., Glenn, N., Shaw, M., & Chin, M. H. (2023). Opportunities for psychologists to advance health equity: Using liberation psychology to identify key lessons from 17 years of praxis. *American Psychologist*, 78(2), 211–226. <https://doi.org/10.1037/amp0001126>
- Costa, Y.P., da Freitas-Júnior, C., Lima-Júnior, D., de Soares-Silva, E.L., Batista, G.R., Hayes, L., Fortes, L. de S. (2022). Mental fatigue and ball sports: a narrative review focused on physical, technical, and tactical performance. *Motriz: Revista de Educação Física*, 28. DOI: 10.1590/s1980-657420220004822.
- DAVIS, J.M., & BAILEY, S.P. (1997). Possible mechanisms of central nervous system fatigue during exercise. *Medicine & Science in Sports & Exercise*, 29(1), 45–57. <https://doi.org/10.1097/00005768-199701000-00008>
- Drygas, W., Jegier, A., Kostka, T., Dzikowska-Zaborszczyk, E., Kosińska, J., Kwaśniewska, M. (2012). Long-term effects of different physical activity levels on cardiovascular risk: results of a prospective 17-year follow-up study of middle-aged men. *Sports Med*. 3(4), 179–287.
- Fletcher, D., & Sarkar, M. (2012). A grounded theory of psychological resilience in Olympic champions. *Psychology of Sport and Exercise*, 13(5), 669–678. <https://doi.org/10.1016/j.psychsport.2012.04.007>
- Gardner, F. L., & Moore, Z. E. (2012). Mindfulness and acceptance models in sport psychology: A decade of basic and applied scientific advancements. *Canadian Psychology / Psychologie Canadienne*, 53(4), 309–318. <https://doi.org/10.1037/a0030220>
- Gross, J., Stern, J., Brett, B., & Cassidy, J. (2017). The multifaceted nature of prosocial behavior in children: Links with attachment theory and research. *Review of Social Development*. 26 (4). Doi: 10.1111/sode.12242.
- Gulliver, A., Griffiths, K.M., Christensen, H. (2012). Barriers and facilitators to mental health help-seeking for young elite athletes: a qualitative study. *BMC Psychiatry*. 12, 157. doi: 10.1186/1471-244X-12-157.
- Gupta, S., & McCarthy, P.J. (2021). Sporting resilience during COVID-19: what is the nature of this adversity and how are competitive elite athletes adapting? *Frontiers in Psychology*, 12, Article 611261. <https://doi.org/10.3389/fpsyg.2021.611261>
- Gustafsson, H., Kenttä, G., Hassmén, P., & Lundqvist, C. (2007). Prevalence of Burnout in Competitive Adolescent Athletes. *The Sport Psychologist*, 21(1), 21–37. <https://doi.org/10.1123/tsp.21.1.21>
- Henriksen, D., Creely, E., & Henderson, M. (2020). Folk pedagogies for teacher transitions: Approaches to synchronous online learning in the wake of COVID-19. *Journal of Technology and Teacher Education*, 28(2), 201–209.
- Iso-Ahola, S.E., & Mobily, K. (1980). “Psychological Momentum”: A Phenomenon and an Empirical (Unobtrusive) Validation of its Influence in a Competitive Sport Tournament. *Psychological Reports*, 46(2), 391–401. <https://doi.org/10.2466/pr0.1980.46.2.391>
- Kegelaers, J., Wylleman, P., & Oudejans, R.R.D. (2020). A coach perspective on the use of planned disruptions in high-performance sports. *Sport, Exercise, and Performance Psychology*, 9(1), 29–44. <https://doi.org/10.1037/spy0000167>



- Kosack, M.H., Staiano, W., Folino, R., Hansen, M.B., & Lønbro, S. (2020). The Acute Effect of Mental Fatigue on Badminton Performance in Elite Players. *International Journal of Sports Physiology and Performance*, 15(5), 632–638. <https://doi.org/10.1123/ijsp.2019-0361>
- Loiseau-Taupin M, Ruffault A, Slawinski J, Delabarre L, Bayle D. 2021. Effects of Acute Physical Fatigue on Gaze Behavior and Performance During a Badminton Game. *Frontiers in Sports and Active Living*, 3. DOI: 10.3389/fspor.2021.725625.
- Macquet AC, Fleurance P. (2007). Naturalistic decision-making in expert badminton athletes. *Ergonomics*, 50, 1433–1450. DOI: 10.1080/00140130701393452.
- Malwanage, K.T., Senadheera, V.V., Dassanayake, T.L. (2022). Effect of balance training on footwork performance in badminton: An interventional study. *PLoS One*. 17(11), e0277775. doi: 10.1371/journal.pone.0277775.
- Marcora, S. M., Staiano, W., & Manning, V. (2009). Mental fatigue impairs physical performance in humans. *Journal of Applied Physiology*, 106(3), 857–864. <https://doi.org/10.1152/jappphysiol.91324.2008>
- Martin, K., Staiano, W., Menaspà, P., Hennessey, T., Marcora, S., Keegan, R., Thompson, K. G., Martin, D., Halson, S., & Rattray, B. (2016). Superior Inhibitory Control and Resistance to Mental Fatigue in Professional Road Cyclists. *PLOS ONE*, 11(7), e0159907. <https://doi.org/10.1371/journal.pone.0159907>
- Meyers, A.W., Whelan, J.P., & Murphy, S.M. (1996). Cognitive behavioral strategies in athletic performance enhancement. *Progress in Behavior Modification*, 30, 137–164. <http://europepmc.org/abstract/MED/7567674>
- Moesch, K., Kenttä, G., Kleinert, J., Quignon-Fleuret, C., Cecil, S., & Bertollo, M. (2018). FEPSAC position statement: Mental health disorders in elite athletes and models of service provision. *Psychology of Sport and Exercise*, 38, 61–71. doi:10.1016/j.psychsport.2018.05.013
- Noetel, M., Ciarrochi, J., Van Zanden, B., & Lonsdale, C. (2019). Mindfulness and acceptance approaches to sporting performance enhancement: a systematic review. *International Review of Sport and Exercise Psychology*, 12(1), 139–175. <https://doi.org/10.1080/1750984X.2017.1387803>
- Park J-K. 2000. Coping Strategies Used by Korean National Athletes. *The Sport Psychologist*, 14, 63–80. DOI: 10.1123/tsp.14.1.63.
- Proost, M., Habay, J., De Wachter, J., De Pauw, K., Rattray, B., Meeusen, R., Roelands, B., Van Cutsem, J. (2022). How to Tackle Mental Fatigue: A Systematic Review of Potential Countermeasures and Their Underlying Mechanisms. *Sports Medicine* 52:2129–2158. DOI: 10.1007/s40279-022-01678-z.
- Rice, D., Nijs, J., Kosek, E., Wideman, T., Hasenbring, M.I., Koltyn, K., Graven-Nielsen, T., (2019). Polli A. Exercise-Induced Hypoalgesia in Pain-Free and Chronic Pain Populations: State of the Art and Future Directions. *J Pain*. 20(11), 1249–1266. doi: 10.1016/j.jpain.2019.03.005.
- Russell, S., Jenkins, D.G., Halson, S.L., Juliff, L.E., Kelly, V.G. (2022). How do elite female team sport athletes experience mental fatigue? Comparison between international competition, training, and preparation camps. *European Journal of Sport Science*, 22, 877–887. DOI: 10.1080/17461391.2021.1897165.
- Schaal, K., Tafflet, M., Nassif, H., Thibault, V., Pichard, C., Alcotte, M., Guillet, T., El Helou, N., Berthelot, G., Simon, S., & Toussaint, J.-F. (2011). Psychological Balance in High-Level Athletes: Gender-Based Differences and Sport-Specific Patterns. *PLoS ONE*, 6(5), e19007. <https://doi.org/10.1371/journal.pone.0019007>
- Schinke, R.J., Stambulova, N.B., Si, G., Moore, Z. (2018). International Society of Sport Psychology position stand athletes' Mental Health, performance, and development. *Int. J. Sport Exerc. Psychol.* 16, 622–639. 10.1080/1612197X.2017.1295557
- Schmit, C., & Brisswalter, J. (2020). Executive functioning during prolonged exercise: a fatigue-based neurocognitive perspective. *International Review of Sport and Exercise Psychology*, 13(1), 21–39. <https://doi.org/10.1080/1750984X.2018.1483527>



- Schneider C, Wiewelhove T, McLaren SJ, Röleke L, Käsbauer H, Hecksteden A, Kellmann M, Pfeiffer M, Ferrauti A. 2020. Monitoring training and recovery responses with heart rate measures during standardized warm-up in elite badminton athletes. *PLOS ONE*, 15, e0244412. DOI: 10.1371/journal.pone.0244412.
- Smith, M.R., Thompson, C., Marcora, S. M., Skorski, S., Meyer, T., & Coutts, A.J. (2018). Mental Fatigue and Soccer: Current Knowledge and Future Directions. *Sports Medicine*, 48(7), 1525–1532. <https://doi.org/10.1007/s40279-018-0908-2>
- Trigueros, R., Aguilar-Parra, J.M., Cangas, A.J., López-Liria, R., Álvarez, J.F. (2019). Influence of Physical Education Teachers on Motivation, Embarrassment and the Intention of Being Physically Active During Adolescence. *International Journal of Environmental Research and Public Health*. 16(13):2295. <https://doi.org/10.3390/ijerph16132295>
- Van Cutsem, J., Marcora, S., De Pauw, K., Bailey, S., Meeusen, R., & Roelands, B. (2017). The Effects of Mental Fatigue on Physical Performance: A Systematic Review. *Sports Medicine*, 47(8), 1569–1588. <https://doi.org/10.1007/s40279-016-0672-0>
- Vella, S., Schweickle, M., Sutcliffe, J., & Swann, C. (2021). A systematic review and meta-synthesis of mental health position statements in sport: Scope, quality, and future directions. *Psychology of Sport and Exercise*. 55(4), 101946. DOI:10.1016/j.psychsport.2021.101946
- Watkins, C. (2007). Inventing International Citizenship: Badminton School and the Progressive Tradition between the Wars. *History of Education*, 36(3), 315–338. <https://doi.org/10.1080/00467600500419810>
- Weinberg, R. S., & Gould, D. (2023). *Foundations of sport and exercise psychology*. Human kinetics.
- Wilczyńska, Dominika & Qi, Wen & Jaenes, José & Alarcón, David & Arenilla, María. (2022). Burnout and Mental Interventions among Youth Athletes: A Systematic Review and Meta-Analysis of the Studies. *International Journal of Environmental Research and Public Health*. 19(17), 10662 DOI:10.3390/ijerph191710662
- Wiyata, I.R., Kusuma, D.W.Y., & Irawan, F.A. (2022). Burnout and Dropout Analysis Of Badminton Adolescence Athletes: Reviewed in Psychological Aspect. *Journal of Physical Education and Sports*, 11(2), 152–162.