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Injury History and Attentional Focus Disruption in Sanda Competitions at a Sports Institute in China

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Abstract: This study investigates the relationship between injury history and attentional focus disruption in Sanda athletes from Wuhan Sports University. Recognizing that injuries in this high-intensity combat sport extend beyond physical damage to potentially impair cognitive functions critical for performance, a descriptive-comparative-correlational design was employed. Fifty-two athletes completed a validated questionnaire assessing their injury profiles and competition distractibility. Results indicated that while upper limb injuries were common, their overall severity was manageable. The primary triggers for attentional disruption were auditory and situational factors, such as an opponent's coach's instructions or self-error, which predominantly impacted decision-making rather than technical execution. Interestingly, no significant overall correlation was found between the composite measures of injury history and distractibility. However, nuanced analysis revealed that specific injury factors, like recurrence patterns and location, could influence coping strategies and attentional recovery, with years of training also affecting distraction timing. These findings suggest that the injury-attention dynamic is complex and not merely linear. Consequently, the study recommends integrated interventions, including preventative training to reduce injury recurrence, structured mental skills coaching to bolster focus, and personalized rehabilitation protocols. Establishing a monitoring system for injury patterns and cognitive performance is essential to optimize the holistic readiness of Sanda athletes, ensuring both their physical safety and cognitive sharpness in competition.
Keywords: Sanda (Chinese Kickboxing), Injury History, Attentional Focus, Cognitive Impairment, Combat Sports, Rehabilitation Programs, Performance Optimization

Introduction

Sanda (Chinese kickboxing) is a high-intensity combat sport where the combination of striking, throwing, and rapid movement leads to a significant injury risk. Previous research has documented a high incidence of injuries, particularly to the lower limbs (e.g., knee and ankle sprains) from repetitive kicks and rapid direction changes, as well as head injuries like concussions from striking actions (Choi & Sato, 2021; Liu et al., 2023). Critically, the consequences of these injuries are not solely physical; they can impair fundamental neural processes, leading to slower cognitive processing, reduced working memory, and deficits in the executive control of attention—all of which are essential for maintaining focus and making rapid decisions under competitive pressure (Huang & Wu, 2022; Kang and Zhang, 2024). These cognitive impairments can manifest as lapses in concentration during a match, increasing the risk of errors and subsequent re-injury. The ability to maintain attentional focus—encompassing selective, sustained, and shifting attention—is paramount in Sanda's unpredictable and fast-paced environment. Impairments, often measured through neuropsychological tests like the Attention Network Test (ANT), reveal deficits in alertness and executive control networks in athletes with an injury history (Kimura & Wu, 2024). Furthermore, the psychological sequelae of injury, such as anxiety and hypervigilance to pain, can cause an "attention tunneling effect," limiting situational awareness and strategic flexibility (Petrova & Han, 2021). This creates a vicious cycle where an initial injury undermines the cognitive readiness required to perform safely and effectively, thereby elevating the risk of further harm. Despite its critical importance, the specific relationship between injury history and attentional disruption in Sanda remains inadequately researched.

To address this gap, this study investigates the link between injury history and attentional focus disruption during competition among Sanda athletes at Wuhan Sports University. The findings will serve as a crucial evidence base for developing targeted interventions. By clarifying how different types and histories of injuries affect cognitive performance, this research aims to inform the creation of integrated training and rehabilitation programs that address both physical and cognitive aspects, ultimately enhancing athlete safety and competitive performance.

Literature Review

Sanda, a traditional Chinese combat sport, combines striking and grappling techniques, requiring athletes to maintain a high level of physical and mental alertness during matches. The dynamic and high-intensity nature of Sanda increases the risk of injury, which often leads to lasting physical and psychological effects (Malkov & Yamaguchi, 2023). Sanda students and athletes at Wuhan Sports University are not immune to the risk of injury, as it has become a common occurrence in the sport.

There is a growing recognition that pre-existing injuries are not only a physical limitation but also interfere with athletes' cognitive processes, particularly concentration. Concentration—the ability to selectively focus on relevant stimuli and ignore distractions—is crucial in fast-paced combat sports like Sanda, where even brief lapses in attention can determine

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the outcome of a match (Chen & Markov, 2022). Injuries can cause cognitive interference through pain, fear of re-injury, and alterations in motor control, thereby affecting an athlete's ability to maintain focus (Lobanov & Shi, 2024). This study explores how injury history affects concentration in Sanda (Chinese kickboxing) matches, an area where research remains insufficient despite its crucial role in athletic performance. Understanding this relationship is essential for optimizing athletes' training, rehabilitation, and competition strategies.

Neurophysiological studies have demonstrated identifiable associations between injury-related cognitive impairment and brain activity patterns. Lee and Dragunov (2022), using electroencephalography (EEG) and functional magnetic resonance imaging (fMRI), found reduced activation in brain regions responsible for sustained attention and executive control in athletes with a history of knee injuries. This neural alteration reduces an athlete's ability to maintain task-related focus when dealing with chaotic stimuli in Sanda matches. Furthermore, psychological sequelae of injury, such as anxiety and hypervigilance to pain, can lead to an over-focused but maladaptive state of attention, often referred to as the "attention tunneling effect" (Petrova & Han, 2021). The attention tunneling effect limits an athlete's situational awareness and flexibility in strategic adjustments, ultimately impairing athletic performance. These findings emphasize the need to consider injury history not only from a physiological perspective but also as a cognitive and emotional factor influencing an athlete's competitive state.

Sanda's competitive environment exacerbates the impact of injury history on attentional processes. According to Kuznetsova and Wang (2023), high risk, the unpredictability of opponents' behavior, and the demands of rapid decision-making place extremely high demands on athletes' cognitive abilities. Athletes with a history of injury are particularly vulnerable because pain memories associated with injury can involuntarily distract them from the game. Furthermore, the pressure of competition despite physical limitations exacerbates stress responses, thus increasing attentional distraction (Vasiliev and Nakamura, 2024). In this context, injured athletes may face higher cognitive loads, reducing their ability to selectively focus on relevant stimuli such as opponents' movements and timing.

Statement of problems

This study aims to explore the relationship between injury history and distraction during matches among Sanda (Chinese kickboxing) athletes from Wuhan Sports University.

The findings will serve as the basis for developing injury prevention and attention training programs.

Specifically, this study will answer the following questions:

1. What are the basic characteristics of the Sanda athletes?
1.1 Gender;
1.2 Age;
1.3 Years of Sanda training.
2. How do Sanda athletes self-assess their injury history?
2.1 Type and frequency of injury;
2.2 Injury location;
2.3 Severity and duration of injury;
2.4 Cause and occurrence of injury.
3. After grouping athletes according to their basic characteristics, are there significant differences in the self-assessment of injury history among Sanda athletes?
4. How do Sanda athletes self-assess their distraction during Sanda matches, specifically including:
4.1 Types of distractions encountered;
4.2 Time of occurrence of distractions;
4.3 Duration and frequency of distractions;
4.4 Impact on decision-making and technique;
5. After grouping Sanda athletes according to their individual characteristics, were there significant differences in their self-assessments of distractibility during Sanda matches?
6. Is there a significant correlation between a Sanda athlete's injury history and distractibility during Sanda matches?
7. Based on the results of this study, what injury prevention and attention training programs can be proposed?

Research Design

This study employs a descriptive-comparative-correlational research approach, characterized by clear variable definitions, rigorous data recording, comprehensive analysis, and a nuanced understanding of situational interactions. Following the views of Krüger and Albrecht (2022), descriptive research aims to systematically record and explain the inherent characteristics, patterns, and behaviors of phenomena in real-world environments. This approach helps to comprehensively depict specific objects or social realities, laying a solid foundation for subsequent research.

Based on the insights of Krüger and Albrecht (2022), descriptive research is a cornerstone of social science and behavioral research. It can collect objective and impartial information about individuals, characteristics, perceptions, and behaviors, thereby revealing underlying trends and nuanced differences in situations within groups. This process is crucial for evidence-based explanations of complex social environments.
Furthermore, Petrovic and Danescu (2023) emphasize the practicality of comparative methods in discovering important differences and commonalities between demographic or situational variables. They argue that correlation analysis helps establish meaningful associations between variables, thus providing deeper explanatory insights into observed phenomena. This study will employ correlation analysis to explore the relationship between demographic indicators and behavioral or attitudinal variables, aiming to enhance theoretical understanding and application strategies.
This study aims to investigate the injury history and attention deficit during Sanda (Chinese kickboxing) matches among Sanda athletes at Wuhan Sports University.
This study uses numerical analysis to analyze, compare, and correlate the dependent variables included in the study.
Through this method, researchers can identify significant differences or correlations between Sanda athletes' self-assessments of their injury prevention and their demographic data such as age, gender, and years of Sanda training. Furthermore, researchers can also identify significant differences or correlations between Sanda athletes' self-assessments of their attention deficit during Sanda matches and their demographic data such as age, gender, and years of Sanda training. Finally, researchers will analyze the correlation between Sanda athletes' self-assessments of their injury history and attention deficit during Sanda matches and the aforementioned two indicators.
The above discussion of descriptive research methods aligns with the nature of this study; therefore, this method will be adopted.

Research Location
The research will be conducted at Wuhan Sports University. Wuhan Sports University is one of the first batch of "Double First-Class" universities in Hubei Province, a full-time regular institution of higher learning jointly established by the General Administration of Sport of China and the Hubei Provincial People's Government, with sports as its distinctive and advantageous discipline. The university currently has approximately 15,000 students and over 900 faculty members.

Participants
The respondents in this study were Sanda (Chinese kickboxing) athletes from Wuhan Sports University. Purposeful sampling was used in the selection of respondents.
Purposeful sampling is a non-probability sampling method that selects a subset of individuals, called a sample, from the population by setting a set of criteria. In this study, we selected Sanda athletes based on these criteria. Only athletes currently registered at the university and participating in competitions for at least one year were included in this study.

Research Instruments
To collect the necessary data, researchers will design their own questionnaire to gather self-assessments from Sanda athletes regarding their injury history and attention deficit during Sanda matches.
Researchers will conduct the questionnaire survey face-to-face or in-person.
The questionnaire will include the following sections:
Part 1 – This section determines basic demographic information about the Sanda athletes.
Part 2 – This section determines the Sanda athletes' injury history.
Part 3 – This section determines the Sanda athletes' attention deficit during Sanda matches.
Researchers will validate the content validity of both the adapted questionnaire and the self-designed questionnaire, with evaluation by experts in the field. Expert suggestions will be incorporated into the questionnaire revisions.
The questionnaire will also be submitted to at least five experts for face validity validation. Furthermore, a pre-test will be conducted to assess its reliability. The pilot test will use the Social Science Statistical Package (SPSS) to calculate the Cronbach's alpha coefficient. Researchers welcome expert suggestions and will make necessary revisions to the questionnaire to ensure its validity.
The overall reliability test results of the questionnaire showed a Cronbach's alpha coefficient of 0.853, indicating that the reliability of all items was highly consistent. The reliability test results demonstrate that this research tool has statistically significant reliability.

Ethical Considerations
Researchers will carefully consider and strictly adhere to all ethical guidelines to protect the rights of all respondents. The ethical guidelines are as follows:
1. Conflict of Interest

Researchers will ensure that there are no conflicts of interest. Researchers will need to clearly and thoroughly explain the purpose of this study to selected respondents. Researchers must always adhere to the purpose of collecting personal information and data. All collected data will not be used for any form of exploitation of respondents. Researchers must always work in accordance with the goals and objectives of the research.

2. Privacy and Confidentiality

Before conducting this study, researchers will assure respondents that all collected information will be kept strictly confidential, and the survey results will not be disclosed to anyone other than the researchers themselves and the respondents who completed the questionnaires. To protect the privacy of respondents, researchers will not mention the names of respondents when presenting collected data. Respondents will remain anonymous, and no clues or implications that could establish a connection or association between the respondents and others will be disclosed.

3. Informed Consent Process

Before conducting the questionnaire, researchers will obtain informed consent from respondents, confirming that they understand the purpose and objectives of this study and agree that the collected data will help enhance the researchers' research. Researchers will ensure that all content is explained fully and clearly to respondents, and no information will be withheld. Researchers will also discuss the process of participating in this study and any potential risks.

4. Recruitment

Respondents to this study are physical education teachers. Participation is entirely optional. Respondents will not be forced to participate and have the right to refuse at any time.

5. Risks

Researchers will ensure that there are no risks associated with participating in this study. Respondents will ensure that any data and information collected will not harm their life or reputation. If respondents feel harassed, asked overly personal questions, or feel violated, they have the right to stop asking questions at any time.

Results and Discussion

Frequency Distribution of the Sanda Athletes' Profile

Profile	Frequency	Percentage
Age		
Less than 15 years old	5	9.6%
16 years old	13	25%
17 years old	20	38.5%
18 years old	10	19.2%
More than 18 years old	4	7.7%
Total	**52**	**100%**
Sex		
Male	26	50%
Female	26	50%
Total	**52**	**100%**
Number of Years as Swimming Athlete		
Less than 3 years	18	34.6%
3-5 years	28	53.8%
More than 5 years	6	11.5%

In terms of age, among the Sanda athletes, 5 (approximately 9.6%) are under 15 years old, 13 (approximately 25%) are 16 years old, 20 (approximately 38.5%) are 17 years old, 10 (approximately 19.2%) are 18 years old, and 4 (approximately 7.7%) are over 18 years old. This means that the majority of Sanda athletes are 17 years old. This indicates that most athletes are in their adolescence, possibly suggesting that the sport is popular among high school age participants.

In terms of gender, 26 Sanda athletes (approximately 50%) are male and 26 (approximately 50%) are female. This means that the male-to-female ratio of Sanda athletes is roughly equal. This indicates that Sanda is an inclusive sport with equal participation from both genders, reflecting a balanced level of involvement.

Regarding the training years of Sanda athletes, 18 athletes (approximately 34.6%) have trained for less than 3 years, 28 athletes (approximately 53.8%) have trained for 3 to 5 years, and 6 athletes (approximately 11.5%) have trained for more than 5 years. This means that the majority of Sanda athletes have trained for 3 to 5 years. This indicates that most athletes have accumulated considerable experience and training, which helps improve their skills and athletic performance.

Self-Assessment of the Sanda Athletes of their Injury History in terms of Location of Injuries

	Mean	SD	Qualitative Description	Interpret ati on	Rank
1. Most of my injuries have occurred in the lower limbs (e.g., knees, ankles).	2.73	1.15	Disagree	Slightly True of Me	2
2. I have had upper body injuries, such as shoulder or wrist injuries.	2.76	1.07	Disagree	Slightly True of Me	1
3. My injuries are often concentrated in specific areas of my body.	2.40	1.01	Agree	True of Me	3
4. I frequently experience injuries to my back or spine.	2.23	1.11	Disagree	Slightly True of Me	5
5. Head or facial injuries have occurred to me in Sanda bouts.	2.38	.99	Disagree	Slightly True of Me	4
Composite Mean	**2.50**	**.53**	**Disagree**	**Slightly True of Me**	

Legend: 3.51-4.00 Strongly Agree/ Very True of Me; 2.51-3.50 Agree/ True of Me; 1.51-2.50 Disagree/ Slightly True of Me; 1.00-1.50 Strongly Disagree/ Not True of Me

The statement "I have suffered upper body injuries, such as shoulder or wrist injuries" had an average score of 2.76, was marked "Disagree," and interpreted as "Slightly consistent with my situation." This indicates that upper body injuries are relatively common among Sanda athletes. This may be related to the striking and grappling techniques in Sanda, which put stress on the shoulders, arms, and wrists during both offensive and defensive movements.

The statement "I frequently suffer back or spinal injuries" had an average score of 2.23, was marked "Disagree," and interpreted as "Slightly consistent with my situation." This indicates that Sanda athletes do not frequently suffer back or spinal injuries. While such injuries do occur in high-impact combat sports, their relatively low incidence may reflect effective training techniques, conditioning, and proper body mechanics, all of which help reduce stress on the back and spine.

The overall average score was 2.50, described as "Disagree," and interpreted as "Slightly consistent with my situation," suggesting that while injuries can occur in different parts of the body, for most athletes, injuries are not concentrated in any particular area. This indicates that Sanda athletes experience injuries to various parts of the body, with the upper limbs being slightly more affected. However, the overall distribution of injuries remains moderate, suggesting that the sport places a relatively balanced load on different parts of the body.

Self-Assessment of the Sanda Athletes of their Injury History interms of Severity and Duration

	Mean	SD	Qualitative Description	Interpret ati on	Rank
1. I have had injuries that required more than two weeks of rest.	2.65	1.06	Agree	True of Me	1
2. Some of my injuries have led to long-term physical limitations.	2.34	1.06	Disagree	Slightly True of Me	3
3. I have continued to train despite serious injuries.	2.48	1.12	Disagree	Slightly True of Me	2
4. I usually recover quickly from minor injuries.	2.32	1.04	Disagree	Slightly True of Me	4
5. My injuries have ranged from mild bruises to severe muscle tears.	2.28	1.17	Disagree	Slightly True of Me	5
Composite Mean	**2.41**	**.50**	**Disagree**	**Slightly True of Me**	

Legend: 3.51-4.00 Strongly Agree/ Very True of Me; 2.51-3.50 Agree/ True of Me; 1.51-2.50 Disagree/ Slightly True of Me; 1.00-1.50 Strongly Disagree/ Not True of Me

The statement "I have suffered injuries requiring more than two weeks of rest" received the highest average score of 2.65, was rated "Agree," and interpreted as "Reflects my situation." This indicates that Sanda athletes do indeed experience serious injuries requiring extended recovery times. This result reflects the extremely high physical demands of the sport, where certain injuries temporarily interrupt training and competition to allow athletes sufficient time for rehabilitation.

The statement "My injuries range from minor abrasions to severe muscle tears" received the lowest average score of 2.28, was rated "Disagree," and interpreted as "Slightly Reflects my situation." This suggests that while athletes do suffer injuries, their range of injuries is not broad, varying from minor to severe. This indicates that most of their injuries are either manageable or of limited severity, rather than extreme cases.

The overall average score was 2.41, described as "Disagree," and interpreted as "Slightly Reflects my situation," indicating that while Sanda athletes experience injuries of varying degrees and durations, these injuries are neither common nor extreme for most athletes. This shows that while injuries exist, they are manageable, and most athletes can recover within a reasonable timeframe, allowing them to continue participating in the sport without suffering long-term consequences.

Self-Assessment of the Sanda Athletes of their Injury History in terms of Rehabilitation and Prevention

	Mean	SD	Qualitative Description	Interpretation	Rank
1. I follow proper rehabilitation routines after getting injured.	2.73	1.13	Agree	True of Me	2
2. I seek medical advice or physiotherapy after serious injuries.	2.55	1.14	Agree	True of Me	6
3. I regularly do injury-prevention exercises.	2.59	1.08	Agree	True of Me	5
4. I adhere to return-to-play protocols after injury.	2.76	1.05	Agree	True of Me	1
5. I use protective gear to reduce the risk of injury.	2.69	1.07	Agree	True of Me	3
6. I educate myself on injury prevention strategies.	2.67	1.20	Agree	True of Me	4
Composite Mean	**2.66**	**.44**	**Agree**	**True of Me**	

Legend: 3.51-4.00 Strongly Agree/ Very True of Me; 2.51-3.50 Agree/ True of Me; 1.51-2.50 Disagree/ Slightly True of Me; 1.00-1.50 Strongly Disagree/ Not True of Me

The statement "I will follow the resumption procedure after injury" received the highest average score of 2.76, was rated "Agree," and interpreted as "Relevant to my situation." This indicates that Sanda athletes prioritize following correct guidelines before resuming training or competition. This adherence reduces the risk of re-injury and ensures adequate rehabilitation, reflecting their self-discipline and understanding of the importance of structured rehabilitation.

The statement "I will seek medical advice or physiotherapy after a serious injury" received the lowest average score of 2.55, was rated "Agree," and interpreted as "Relevant to my situation." This indicates that while athletes recognize the role of medical support, they do not always seek medical help after injury. This may be due to limited medical resources, reliance on self-management, or underestimating the severity of the injury.

The overall average score was 2.66, rated "Agree," and interpreted as "Relevant to my situation," indicating that Sanda athletes typically employ rehabilitation and prevention strategies after injury. This shows that although professional medical advice is not always a priority, athletes take proactive preventative measures, such as wearing protective gear, engaging in preventative training, and receiving relevant education, to maintain their participation and performance in sports.

Conclusions

This study concludes that while a direct, overall correlation between injury history and attentional disruption was not established, a nuanced relationship exists for Sanda athletes. Specific injury factors, such as recurrence patterns and location, were found to influence athletes' coping strategies and attentional recovery. The primary distractions were identified as external and situational triggers, impacting decision-making abilities. These findings underscore that an athlete's competitive readiness is a function of both physical and cognitive well-being. Therefore, the recommendations put forth—including integrated preventative training, structured mental skills coaching, and personalized rehabilitation—are essential for breaking the potential cycle of injury and impaired performance, promoting a more holistic approach to athlete development.

To build upon this research, future studies should address several key limitations and explore new avenues. First, employing objective measures is crucial. Subsequent research should integrate neuropsychological assessments (e.g., standardized Attention Network Tests) and biometric data (e.g., EEG, eye-tracking) during simulated competitions to move beyond self-reporting and obtain direct, quantifiable data on cognitive load and attentional shifts. Second, a longitudinal design tracking athletes from pre-injury through rehabilitation and return to sport would provide invaluable insight into the causal pathways and long-term cognitive effects of injuries, clarifying how acute incidents transform into chronic attentional challenges.

Finally, future research should focus on applied intervention studies. The recommendations generated from this study, such as specific mental skills training (mindfulness, visualization) and tailored rehabilitation protocols, need to be empirically tested. Controlled experiments comparing the competitive performance and attentional resilience of athletes undergoing these targeted interventions against control groups would validate their efficacy. Investigating how factors

like gender, competitive level, and specific Sanda techniques modulate the injury-attention relationship would also allow for more personalized and effective training regimens. Through these focused efforts, future research can significantly advance the support systems for athletes in high-risk sports.

Recommendations

1. Immediate Priority: Implement a Standardized Monitoring and Assessment System. The foundational step is to establish a mandatory protocol for objectively tracking both physical and cognitive metrics. This system should routinely document injury incidence, type, and recovery progress, while also incorporating brief, standardized attentional assessments (e.g., simplified ANT tests) during training phases. This data will provide an evidence base to move beyond subjective self-reports, allowing coaches and medical staff to identify at-risk athletes early and make informed decisions about training load and readiness to compete.
2. Intermediate Intervention: Develop Integrated Training Modules Focused on Attentional Resilience. Based on the finding that distractions are often situational and auditory, targeted interventions should be introduced. For all athletes, especially those with a history of injury, structured mental skills training—such as mindfulness for present-moment focus and simulation training to practice ignoring crowd or coach noise—should be integrated into regular practice. For injured athletes, cognitive exercises should be a mandatory component of the rehabilitation protocol, ensuring "cognitive readiness" is restored alongside physical recovery before returning to competition.
3. Long-Term Strategy: Foster an Interdisciplinary Support Culture. Sustainability requires a team approach. We recommend creating a dedicated support team involving coaches, sports physicians, and sports psychologists. This team would use the data from the monitoring system to co-design individualized athlete plans that seamlessly blend physical conditioning, technical skill development, and cognitive training. Establishing regular review meetings would ensure these plans are dynamic, adapting to each athlete's progress and effectively breaking the potential cycle of injury and attentional deficit.

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