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Injury Risk Management in Amateur Badminton Athletes in the Grati Community, Pasuruan Regency: Coach and Athlete Perspectives in sports education

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ABSTRACT (9 pt)

This study aims to analyze injury risk management practices among amateur badminton athletes by exploring the perspectives of both coaches and athletes in the Grati Badminton Community, Pasuruan Regency. The research seeks to identify key factors influencing injury prevention, response, and recovery processes within community-level sports education. The study incorporates insights from a small circle of individuals who are actively engaged in the community's training routine, providing a focused and in-depth view of how injury risks are recognized and handled. Data were collected using observation, semi-structured interviews, and documentation techniques, then analyzed through thematic analysis to capture in-depth insights regarding knowledge, attitudes, and practices related to injury risk management. Findings indicate that injury risk management in the community remains largely reactive, with preventive strategies yet to be systematically implemented. Coaches tend to rely on personal experience rather than evidence-based guidelines, while athletes exhibit limited awareness of injury prevention and rehabilitation principles. The absence of standardized operating procedures (SOPs), inadequate medical support, and minimal educational interventions further exacerbate the problem. This study provides a valuable empirical perspective on how grassroots-level badminton communities in rural Indonesia manage injury risks. It highlights the importance of structured educational programs and collaborative efforts between coaches, athletes, and supporting institutions to create safer and more sustainable training environments for amateur athletes.

INTRODUCTION

Injuries are one of the major challenges faced by athletes in various sports, including amateur badminton athletes in Indonesia. Amidst public enthusiasm for this sport, the risk of injury cannot be ignored, as it can seriously impact an athlete's performance and health. Anugrah et al. (2023) state that sports injuries are a part of physical activity that cannot be completely avoided but must be managed wisely. The role of the coach is crucial in this regard, as the coach is responsible for the physical and technical development of athletes, including injury prevention and management.

In badminton, speed and precision of movement are key to every match. Therefore, this sport demands prime physical condition and a strong mastery of technique to prevent athletes from becoming injured. Coaches who have sufficient insight into the types of injuries and how to treat them are able to take swift and appropriate action when an injury occurs, thereby minimizing the risk of complications (Anugrah et al., 2023).

The popularity of badminton in Indonesia extends beyond the professional level. At the amateur level, this sport has become a popular form of recreation, as seen in the badminton community in Grati, Pasuruan Regency. Sports activities in this community are not only aimed at fitness but also serve as a form of positive social interaction. However, frequent play without adequate supervision increases the potential for injury. Fitriana et al. (2022) noted that knee, ankle, and hip injuries are common complaints among amateur athletes. In fact, according to data from the National Sports Hospital

Information Media, of 365 badminton athletes who participated in competitions, 37 suffered serious injuries, a concerning figure (N. F. Fitriana et al., 2022).

The causes of injury are quite diverse. Muscle fatigue due to excessive training, lack of warm-up before playing, and suboptimal recovery all contribute to the high risk of injury (Imam et al., 2023). Furthermore, field conditions, lighting, and the use of substandard sports equipment also influence the likelihood of injury (Imam et al., 2023). Therefore, a comprehensive understanding of these factors is necessary so that coaches and athletes can develop an effective and applicable risk management system.

Unfortunately, understanding of injury prevention among amateur athletes remains minimal. Many are unaware of first aid measures when an injury occurs and tend to ignore early symptoms that could develop into serious injuries (Nasri & Leni, 2021). This highlights the urgent need to provide systematic education to athletes and coaches, particularly in amateur communities like Grati. This situation has been exacerbated by the pandemic, when many athletes experienced a decline in physical fitness due to reduced sports activities. When they return to exercise, their unprepared bodies are more susceptible to injury, particularly musculoskeletal injuries (Pristianto et al., 2023)

Furthermore, training related to injury prevention and management is generally only provided in professional settings. Amateur athletes in areas like Grati often lack access to such training, resulting in low awareness and skills in managing injuries (Pristianto et al., 2023). Therefore, education about injury risks needs to be directed to all elements of the community, including amateur athletes and coaches. Capacity building through hands-on training can be a solution to foster awareness and basic skills in preventing and managing injuries. In the context of Grati, this approach is crucial given the high level of badminton activity in the community. Unfortunately, information on injury risk management remains limited, leaving many athletes without sufficient knowledge to address it (Anugrah et al., 2023).

To address this gap, it is crucial to comprehensively identify the challenges faced by athletes and coaches and design solutions based on their experiences and needs. One proposed approach is the development of a practical injury risk management model that can be implemented by the community, aiming to improve the safety and health of amateur athletes (Apriantono et al., 2021). This approach can be theoretically framed using a socio-ecological perspective, which emphasizes multi-level influences on behavior—including individual knowledge and skills, interpersonal interactions between coaches and athletes, and broader community and institutional support. By grounding the model in such a framework, the intervention not only addresses individual capacities but also fosters systemic changes that support sustainable injury prevention practices in grassroots badminton communities.

Several solutions have been widely suggested, such as the importance of warming up before playing, using standard equipment, and measuring physical training. However, the implementation of these solutions on the field is often inconsistent. Many amateur athletes do not understand how to effectively implement preventative measures (Nasri & Leni, 2021). Therefore, guidelines designed based on the actual needs and experiences of coaches and athletes in the Grati community are needed. Wahyuni et al. (2021) emphasized that this type of guide can serve as a reference for developing positive habits for managing injury risk independently and sustainably. By gathering insights from coaches and athletes, this approach aims to formulate practical strategies for injury prevention. It is hoped that the resulting injury risk management model will enrich knowledge in this area while providing direct benefits to coaches and amateur athletes.

Community-based solutions are expected to strengthen training systems, improve safety, and create a safer and more supportive sporting environment for athletes in Grati. In this context, the study proposes the development of a practical injury risk management model tailored to the actual needs and conditions of the community. This model aims to provide clear guidelines for coaches and athletes, fostering consistent preventive practices and enhancing overall awareness of injury risks within grassroots badminton activities.

RESEARCH METHOD

A qualitative descriptive approach was chosen to gain an in-depth understanding of injury risk management in amateur badminton athletes, particularly from the perspectives of coaches and athletes. Data were collected through observation, semi-structured interviews, and documentation. The analysis followed the systematic framework proposed by Miles and Huberman (2014), which ensures a transparent and traceable pathway from raw data to conclusions. This process involved data reduction, where relevant information was selected and condensed; data display, in which patterns, categories, and relationships were organized to facilitate interpretation; and conclusion drawing and verification, which confirmed that the interpretations accurately reflected the participants' experiences. By applying this structured approach, the study provides a documented and rigorous linkage between empirical observations, participant perspectives, and the resulting thematic insights on injury prevention, knowledge gaps, and challenges faced by athletes and coaches.

This approach allows for exploration of subjective experiences and individual perceptions regarding how injuries are managed in everyday practice (Campbell et al., 2020). This approach is considered appropriate because it captures the meaning behind social actions and human behavior, particularly in the context of amateur sports, where knowledge and experience often inform decision-making (Surur & Gustiawati, 2023).

This study was conducted in July 2025 at the Grati Badminton Community in Pasuruan Regency. This location was selected due to the high level of community enthusiasm for badminton, demonstrated by the active participation of numerous athletes and coaches in community activities. To ensure the relevance and depth of insights, a purposive sampling technique was employed to select four participants: two coaches and two amateur athletes, who were considered knowledgeable and experienced in the community's training and injury practices.

A purposive sampling technique was selected to recruit participants who possessed direct experience and relevant knowledge related to injury practices within the community. The sample consisted of two coaches and two amateur athletes, representing the key informant groups needed to capture comprehensive and nuanced perspectives.

The small sample size (N = 4) is intentional and appropriate for qualitative inquiry, particularly within a localized and community-based context like Grati. The aim of this study is not generalizability, but rather to obtain rich, in-depth, and context-specific insights into injury management practices. The data collected from these four key informants were sufficiently detailed, and data saturation was reached, as no new themes emerged during later interviews.

This sampling strategy allowed the researcher to prioritize depth over breadth, ensuring a detailed understanding of the unique dynamics of the community.

Focusing on the Grati community allowed for a contextual exploration of training routines and injury management, taking into account environmental factors and the availability of facilities that influence how injury risk is locally managed.

The details of the subjects involved are as follows:

1. Two coaches and two amateur badminton athletes were recruited through a purposive sampling technique. This technique allowed for the selection of relevant participants with experience relevant to the issue being studied (Campbell et al., 2020).
2. The athletes were aged between 15 and 30, with varying levels of playing experience, both in terms of training duration and intensity.
3. The coaches had 5 to 10 years of coaching experience, providing diverse perspectives on injury management from varying levels of experience.

The implementation stages of this activity included several key procedures:

1. Initial observations, conducted to directly observe training activities, interactions between coaches and athletes, and general dynamics within the community.
2. Semi-structured interviews, used to explore the subjects' understanding and experiences regarding injury prevention and management efforts.
3. Documentation was collected as supporting data, such as injury reports, training activity notes, and photographs or recordings of activities.
4. Information validation was carried out through member checking techniques, which involve re-verifying data with the subjects to ensure accuracy and reliability.

The data sources collected were divided into two types:

1. Primary data, obtained directly through interviews and participant observation.
2. Secondary data, in the form of supplementary documents such as athlete injury history records, community training policies, and visual documentation.

The instruments used included:

1. Semi-structured interview guides, designed to be flexible yet focused on the topic being discussed.
2. Observation sheets, used to record detailed training activities and the types of injuries that occurred.
3. Documentation media in the form of photos or videos, which provided a visual depiction of training conditions and interactions on the field.

Data collection techniques were carried out through:

1. Semi-structured interviews, which allowed participants to openly share their experiences, particularly regarding injury prevention strategies.
2. Participant observation, which provided researchers with the opportunity to directly observe athlete behavior during training, including actions related to injury prevention or management.
3. Documentation, complementing and strengthening the findings from interviews and observations, provides a more comprehensive picture.

The collected data was analyzed using the analytical framework from (Miles & Huberman, 2014), which consists of three stages:

1. Data reduction, which is the process of filtering important information from all the data obtained to focus on relevant aspects.
2. Data presentation, which involves organizing information in tables, matrices, or narrative descriptions for easier understanding.
3. Drawing conclusions through interpretation of the compiled data to gain a comprehensive understanding of injury risk management among badminton athletes in the Grati community.

In this study, data triangulation was applied through observation, semi-structured interviews, and documentation. The findings derived from these three sources were systematically compared and cross-validated to ensure consistency, strengthen the credibility of the data, and build a robust and verified understanding of injury risk management practices in the Grati Badminton Community.

RESULTS AND DISCUSSION

Field Observation Results

As part of the data collection process for this study, researchers conducted direct observations of training activities at the Grati Badminton Community in Pasuruan Regency. The observations were conducted in a participatory manner to capture the dynamics of interactions between coaches and athletes, identify training patterns that could potentially lead to injury, and identify the extent to which injury prevention and treatment efforts are implemented on the field.

Observations took place during several training sessions in July 2025. The primary focus of the observations was on aspects such as warm-up and cool-down, coach-athlete communication, and actions taken in the event of an injury. Researchers also noted the availability of supporting facilities, such as first aid kits and training adjustments for injured athletes.

The following are the results of observations that have been recorded and analyzed descriptively:

Table 1. Observation Results

No	Focus of Observation	Field Findings	Information
1	Heating and cooling	Warm-up is done, but it is still general (light jogging, stretching) basic). Cooling is rarely done.	Inconsistent
2	Risky training techniques	A number of trainingfootwork intensively done without supervision of body posture which is good.	There is a risk of injury
3	Actions during injury	Coaches generally let athletes rest without further action or further examination.	Less responsive
4	Athlete's reaction to injury	Athletes often continue training despite experiencing mild pain in the wrist or knee.	Lack of risk awareness
5	Availability of handling tools injury	No first aid kit or facilities found recovery in the training area.	Available
6	Coach-athlete communication regarding injuries	Prevention education is not yet part of routine training programs.	Limited

7	Adaptation training moment injured athlete	The training program is not specifically tailored; injured athletes are simply rested.	No adaptation

Field observations conducted during several training sessions in July 2025 revealed a number of patterns related to injury risk management within the Grati Badminton Community. These findings not only describe what occurred on the field but also align with theoretical perspectives in sports education and injury prevention.

1. **Warm-up and Cool-down Practices**

   Training sessions showed that warm-up activities were performed but remained general in nature, consisting mainly of light jogging and basic stretching. Cool-down activities were rarely implemented. This condition reflects what Bahr & Krosshaug (2005) describe as a common gap in community-level sports, where preventive routines are often inconsistent and not based on evidence-based protocols. Proper warm-up and cool-down are widely recognized as essential components in reducing musculoskeletal injury risk, yet their application in amateur settings tends to be overlooked due to time constraints or limited knowledge.

2. **Risky Training Techniques**

   Footwork drills were performed intensively without consistent monitoring of body posture. Improper technique during repetitive movements increases biomechanical stress, which aligns with Meeuwisse's multifactorial injury model suggesting that intrinsic and extrinsic risk factors interact to create injury vulnerability. The lack of technique correction indicates limited pedagogical guidance, reinforcing theories that coaching experience alone cannot replace systematic training in injury biomechanics.

3. **Actions Taken During Injury Events**

   Coaches tended to instruct athletes to rest briefly when injuries occurred, followed by allowing them to continue training if the pain subsided. No structured injury assessment or first-aid procedure was observed. This aligns with findings from community sports research which show that injury responses are often reactive rather than preventive (Finch, 2006). The absence of a standardized injury management protocol increases the likelihood of aggravating minor injuries into more serious conditions.

4. **Athlete Responses to Pain or Discomfort**

   Athletes frequently continued their training despite experiencing mild wrist or knee pain. This behavior reflects low awareness of injury risk, a pattern often seen in amateur athletes who prioritize participation over safety. In line with Wiese-Bjornstal's integrated model of psychological response to sport injury, limited knowledge and fear of being sidelined can reduce athletes' willingness to report pain.

5. **Limited Supporting Facilities**

   No first aid kit, recovery equipment, or designated area for treating injuries was present at the training venue. Literature underscores the importance of environmental preparedness in injury risk management; the socio-ecological approach emphasizes that structural support plays a vital role in shaping athlete

safety behavior. The absence of facilities indicates that the training environment does not yet support proactive injury prevention.

6. **Coach–Athlete Communication About Injuries**

   Communication about injury prevention was minimal, with no structured educational component provided during training. This condition contrasts with educational sport frameworks, which place coaches as primary agents in delivering knowledge, modeling preventive behavior, and fostering injury awareness.

7. **Training Adaptation for Injured Athletes**

   When an athlete experienced discomfort, coaches simply instructed them to rest without modifying the session. Evidence-based guidelines recommend individualized training adjustments to prevent overuse and support safe return-to-play. The absence of adaptive programming reflects a gap between practice and pedagogical principles in sports injury management.

Semi-Structured Interview Results

To deepen the research subjects' understanding, perceptions, and experiences regarding injury risk management, researchers conducted semi-structured interviews with two coaches and two amateur athletes in the Grati Badminton Community. Interviews were conducted directly after training sessions, with an average duration of 30–45 minutes for each participant. The interview guide was designed to be flexible.

allows researchers to explore more deeply aspects that emerge spontaneously during the interview process.

The interviews focused on understanding sports injuries, injury prevention and management strategies, and challenges faced in training. The interview results are summarized in the following table:

Table 2. Semi-Structured Interview Results

No	Informant	Key Questions	Key Answers	Interpretation
1	Coach A	What are your actions when an athlete is injured?	"Usually me tell Take a rest first, if it's light then continue practicing again."	Handling not yet based on medical procedures
2	Coach B	Whether There is injury prevention program?	"There's nothing special yet, just a reminder to just warming up."	Prevention unstructured
3	Athlete A	How You handle injury moment training?	"If it's a minor injury, I'll just leave it alone. It'll get better later." heal itself."	Athlete knowledge is still minimal
4	Athlete B	Whether you Once get education about injuries?	"Never, usually Study from experience or see friends."	Lack of formal education about injuries

Interviews with two coaches and two athletes further confirmed the patterns observed on the field and provided insight into the underlying reasons behind the community's injury risk management practices.

1. **Coaches' Practices in Handling Injuries**
   Coach A stated that injuries were generally handled by telling athletes to rest temporarily, and training could resume if the pain was tolerable. This approach reflects reliance on personal experience rather than medical or pedagogical guidelines. According to sports medicine literature, coaches play a central role in early injury response; however, without proper training, responses tend to be intuitive rather than systematic.
2. **Lack of Structured Injury Prevention Programs**
   Coach B confirmed that there was no specific injury prevention program, aside from reminding athletes to warm up. This supports the theory that many community-level sports systems operate without formalized planning due to limited resources or insufficient coaching education. Finch's TRIPP framework emphasizes that injury prevention requires structured implementation and evaluation, something not present in this context.
3. **Athletes' Low Knowledge of Injury Management**
   Athlete A noted that minor injuries were often ignored and assumed to heal on their own. This reflects limited injury literacy, consistent with research showing that athletes at the amateur level often underestimate the seriousness of pain or early symptoms of overuse injuries. Their statements align with the concept that athlete education is a critical component of prevention but is often absent in informal training environments.
4. **Absence of Injury Education**
   Athlete B expressed that they never received formal education about injuries and relied on peer experience. This condition demonstrates the lack of structured pedagogical intervention, contradicting sports education frameworks that emphasize continuous athlete learning. The absence of educational initiatives further explains why injury management remains reactive and inconsistent.

Member Checking Results

As part of the process to ensure data validity, researchers validated the results of observations and interviews regarding training activities through member checking. This validation was carried out by reconfirming the preliminary findings with each participant, both coaches and athletes, to ensure that the recorded data accurately represented actual training conditions.

Subjects were provided with a summary of their observations and interview excerpts containing information about training structure, warm-up and cool-down implementation, injury management during training, and interactions between coaches and athletes. Each participant's response demonstrated a correspondence between what they observed and what they experienced.

The following is a summary of training data validation through member checking:

Table 2. Member Checking Results

No	Informant	Validated Practice Aspects	Subject Response	Validation Results
1	Coach A	Consistency of heating and cooling	"Of course, sometimes we missed cooling Because time limited training."	Validation accepted
2	Coach B	Frequency training and attention to the injured	"That's right, we practice three times a week, and I usually handle minor injury itself."	Confirmed as per
3	Athlete A	Duration of exercise and daily exercise pattern	"The training is about 1.5 hours, sometimes direct main, Sometimes there is a technique first."	Validation according to experience
4	Athlete B	Warming up And physical exercise techniques	"I usually warm up Alone. Sometimes coaches direct, but not always."	No corrections, data accepted

Community Dynamics and the Reality of Field Training

The themes identified in this section directly build on the findings presented earlier, particularly the observation results indicating inconsistent warm-up and cool-down routines, limited equipment availability, and the absence of first-aid procedures. These findings form the empirical basis for understanding how the Grati Badminton Community operates under challenging structural conditions.

The community's limited facilities and minimal institutional support constrain the quality and consistency of training, mirroring the earlier evidence that athletes often practice in cramped spaces with inadequate lighting and non-standard equipment (Salasa et al., 2023). These structural constraints inherently elevate injury risk and require coaches to rely on improvisation rather than systematic, evidence-based approaches (Nurrokhmah & Anggita, 2024).

The thematic interpretation of interview data further reinforces the observational findings, as coaches described relying heavily on personal experience, confirming a lack of formal competency in injury prevention (Prayoga et al., 2021) Although some coaches expressed awareness of safety practices, the findings revealed inconsistencies in their implementation an issue aligned with literature suggesting that amateur sports communities often operate reactively rather than proactively (Sinaga et al., 2022).

Documentation review also supported these findings, showing no written guidelines or SOPs for handling injuries. This absence contributes to the limited use of established protocols such as the PRICE method PRICE method (Protection, Rest, Ice, Compression, Elevation) (Waritsu et al., 2022). Combined with the high-intensity training reported by athletes, these factors increase vulnerability to injury, particularly when early symptoms are frequently ignored (Kadir et al., 2022). Social cohesion within the community identified through interview narratives as a motivating force also confirms the earlier finding that athletes sometimes feel pressured to continue training despite discomfort. This aligns with research highlighting the role of psychological stress in injury susceptibility (Gusma, 2022) (Hardyanto & Nirmalasari, 2020).

Taken together, these dynamics reflect that injury risk management is influenced not only by structural limitations but also by social and cultural factors. These insights directly extend the empirical findings and emphasize the need for multi-level interventions including evidence-based coach training, improved athlete awareness, and greater institutional support (Thoyfur et al., 2021) (R. N. Fitriana, 2022).

The challenges in Grati demonstrate that even motivated amateur communities can face systemic barriers that limit the effectiveness of injury prevention. Without formalized education, structured guidelines, and institutional backing, high-intensity training environments may inadvertently reinforce reactive practices rather than preventive ones.

Coaches' Perceptions Regarding Injury Risk

This theme expands on the interview findings presented earlier, in which coaches expressed varying levels of understanding regarding injury prevention, reinforcing the observation that preventive measures were inconsistently applied during training. These findings collectively illustrate the centrality of coaching perceptions in shaping injury management practices.

The thematic analysis shows that coaches' over-reliance on personal experience aligns with the earlier evidence of limited formal training in injury management. Interviews revealed that although some coaches recognized the importance of preventive strategies, they lacked clear knowledge of systematic implementation (Rahayu & MZ, 2024). This connection between the findings and the theme underscores how intuitive decision-making dominates coaching practice in the Grati community, consistent with patterns in other amateur sports settings (Wijayatiningsih et al., 2024).

Furthermore, the findings indicated that while some coaches attempted to adjust training intensity based on athletes' abilities, others adopted a passive attitude and viewed injuries as an inevitable part of sport. This disparity supports the need for structured capacity-building programs to equip coaches with skills in load management, injury recognition, and recovery planning (Aristiyanto & Sukarno, 2021).

Interviews with athletes also confirmed that early signs of injury—such as mild pain or muscle fatigue—were often dismissed. This finding highlights gaps not only in physical knowledge but also in understanding psychological stressors associated with injury risk (Suryobroto et al., 2022; Prasetya, 2022). The theme therefore directly extends the earlier empirical evidence and situates it within broader discussions on athlete well-being.

These findings collectively suggest that improving injury risk management requires comprehensive education addressing both physical and psychological aspects (Sardiman et al., 2022). By strengthening coaches' competencies, community-based training environments can become safer, more responsive, and more aligned with athlete needs (Anugrah et al., 2023).

The over-reliance on personal experience—confirmed through observation and interview data—demonstrates a systemic limitation that restricts preventive interventions. Addressing this gap through structured training, mentorship, and evidence-based guidelines can significantly improve coaching quality and foster a culture of proactive injury management in grassroots badminton communities.

Athletes' Experiences in Coping with Injury

The thematic analysis of athlete interviews reveals that injuries are perceived not merely as physical setbacks but also as sources of emotional and psychological stress. Many athletes reported feelings of neglect or marginalization following injury, compounded by uncertainty regarding recovery and fear of underperforming upon return to competition (Sari & Yatun, 2022). This aligns with Wiese Bjornstal's (2010) Integrated Model of Response to Sport Injury, which emphasizes that psychological responses including anxiety, frustration, and reduced self-efficacy directly affect an athlete's recovery process.

Athletes' limited understanding of first aid and basic injury management highlights a critical knowledge gap. Commonly used protocols such as the PRICE method (Protection, Rest, Ice, Compression, Elevation) are poorly understood, and athletes often rely on peer advice rather than medically sound practices (Nurhayati et al., 2023) (Triyanita & Pambudi, 2023). This indicates that injury prevention education at the grassroots level is insufficient. According to Prentice (2015), athletes' acquisition of injury management skills is essential for reducing secondary injury risk and promoting self-efficacy in rehabilitation, suggesting that formalized education programs should be integrated into community training sessions.

The analysis also highlights the importance of social and communication dynamics in coping with injury. Open dialogue between coaches and athletes is critical for creating an environment where injury reporting is normalized and not stigmatized (Iskandar et al., 2021). Social support both emotional and instrumental has been shown to accelerate recovery by mitigating stress responses and enhancing adherence to rehabilitation protocols (Sudirman et al., 2021). This perspective is supported by Bianco's (2001) framework on social support in sports, which identifies emotional, informational, and tangible support as key mechanisms to improve both psychological well-being and physical recovery in injured athletes.

Finally, the findings underscore the necessity of systematic and holistic support that combines medical care, psychological assistance, and structured recovery guidance (Laeto et al., 2024). Implementing educational interventions on first aid, injury recognition, and recovery planning, alongside fostering supportive communication networks within the community, can enhance athletes' resilience and promote safer participation in amateur badminton. The evidence suggests that integrating these practices not only mitigates the immediate effects of injury but also contributes to long-term athlete development and community-based sports sustainability (Prentice, 2015; Wiese-Bjornstal, 2010).

Injury Management and Prevention Strategies

The findings indicate that injury management within the Grati Badminton Community remains largely reactive, with coaches primarily responding to injuries rather than implementing systematic prevention strategies. This aligns with the broader understanding in sports science that reactive approaches increase long-term injury risk and reduce athlete performance sustainability (Candra et al., 2021). According to Smith & Norris (2002), effective injury prevention requires a structured, evidence-based approach, integrating risk assessment, preventive exercises, and educational interventions. Rosadi et al. (2022) also emphasize that planning training

programs based on empirical data and scientific principles is essential for minimizing injury incidence.

Practical strategies to improve injury management include muscle strengthening, dynamic warm-ups, structured cool-downs, and tailored load adjustments based on the athlete's physical condition (R. N. Fitriana, 2022). These strategies correspond to Meeuwisse's multifactorial model of sports injury causation, which highlights that injury risk results from the interaction between intrinsic factors (e.g., physical condition, technique, fitness) and extrinsic factors (e.g., training load, equipment, environmental conditions) (Meeuwisse, 1994). Applying this framework implies that coaches must not only address immediate physical risks but also systematically modify training environments and practices to mitigate future injury likelihood.

Another critical dimension is education and skill development for both coaches and athletes. As indicated in previous studies, knowledge gaps regarding first aid, rehabilitation, and injury recognition limit the community's ability to implement effective prevention measures (Candra et al., 2021). Integrating educational modules on biomechanics, movement analysis, and safe training practices can empower athletes to self-monitor and correct risky techniques. Understanding badminton-specific biomechanics allows coaches to identify improper footwork or stroke mechanics that may predispose athletes to overuse injuries.

Collaborative approaches are essential in developing a sustainable prevention system. Partnerships between coaches, athletes, and medical personnel create a multi-level support network that can address both immediate injuries and long-term preventive measures. This perspective is consistent with the socio-ecological model of sports injury prevention, which emphasizes interventions across multiple layers—from individual knowledge and behavior to organizational and environmental factors (Finch, 2006). Such a framework ensures that injury prevention is not limited to isolated practices but is embedded in a community-wide safety culture.

In conclusion, integrating scientific evidence, biomechanical understanding, and collaborative education into daily training routines can transform reactive injury management into a proactive, structured prevention system. This approach not only reduces the risk of injury but also enhances athletes' performance and sustainability in amateur badminton communities.

Structural and Non-Structural Constraints

The Grati badminton community faces multifaceted challenges in managing injury risk, which can be categorized into structural and non-structural constraints. Structurally, the community experiences limited facilities and equipment, reflecting the broader issue of inadequate resources in grassroots sports (Salasa et al., 2023; Nurrokhmah & Anggita, 2024). According to Shank (2012), proper infrastructure is a critical component of effective sports program delivery, as it directly influences both the quality of training and athlete safety. Without sufficient facilities, coaches and athletes are forced to adapt training sessions in ways that may increase the risk of injury.

Non-structural constraints are equally significant. The low awareness of injury prevention and management among coaches and athletes highlights a gap in knowledge and professional competency. Some coaches perceive injuries as a normal

or inevitable aspect of training, disregarding the potential long-term consequences, which aligns with the notion that attitudes and beliefs about risk strongly shape preventive behavior (Green, 2005). This mindset, combined with limited formal support from relevant institutions, results in sporadic implementation of preventive practices and inconsistent monitoring of athlete development. As noted by Bailey et al. (2010), non-structural factors such as knowledge, perception, and culture can be as influential as physical resources in shaping training outcomes and safety practices.

Implications for Practice and Potential Solutions

To address these constraints, community-based interventions should integrate both structural and non-structural approaches. Structurally, investment in facilities, equipment, and first aid provisions is essential to provide an environment conducive to safe training (R. N. Fitriana, 2022). Non-structurally, targeted education for coaches and athletes on injury prevention, early detection, and recovery techniques is crucial. The socio-ecological model of health promotion (McLeroy et al., 1988) provides a useful framework here, emphasizing that individual behavior is shaped by interactions with interpersonal, organizational, and community-level factors. For example, training coaches in evidence-based injury prevention methods can influence athlete behavior, while institutional support can reinforce consistent implementation.

Long-term solutions could also leverage technology, such as injury detection applications, digital reporting systems, or online monitoring platforms. These tools can provide continuous feedback, enhance record-keeping, and facilitate data-driven adjustments to training programs. Additionally, implementing a feedback loop between athletes, coaches, and administrators ensures that knowledge is applied and monitored in real time, promoting accountability and continuous improvement (Baumgartner & Jackson, 2011).

Validation of Findings Through Triangulation and Member Checking

The study employed a rigorous validation process combining triangulation (observations, interviews) and member checking to ensure the accuracy and credibility of the findings. This approach aligns with Creswell's (2014) recommendation that triangulation strengthens qualitative research by comparing multiple sources of data to confirm themes. Coaches and athletes confirmed that the interpretations reflected their lived experiences, reinforcing the reliability of the analysis.

This validation also highlighted that proposed strategies are grounded in practical needs, not theoretical assumptions. By integrating participant feedback into program design, interventions can address both physical safety and psychosocial considerations, fostering a more responsive and responsible training culture. As suggested by Martens (2012), continuous monitoring, reflection, and adaptation are key components in sustaining effective sports programs.

CONCLUSION

This study provides a comprehensive understanding of how coaches and athletes in the Grati Badminton Community, Pasuruan Regency, perceive and manage injury risks during training. The findings reveal that injury risk management remains in its

early stage, characterized by reactive rather than preventive practices. Coaches primarily depend on personal experience instead of evidence-based guidelines, while athletes frequently ignore early signs of injury due to limited knowledge and pressure to perform. Warm-up routines are carried out inconsistently, cool-down sessions are often neglected, and the absence of standardized operating procedures (SOPs), first aid facilities, and structured education further heighten the risk of injury.

The results emphasize the urgent need for integrating structured injury prevention programs into community-based sports education. Strengthening collaboration among coaches, athletes, and institutional stakeholders can foster a safer and more sustainable training culture. Educational initiatives, awareness campaigns, and access to medical and first-aid resources should become essential components of injury risk management in amateur sports environments, highlighting the role of sports education in promoting athlete safety, knowledge, and skill development.

This research is limited to a single badminton community in Pasuruan Regency, which may not fully represent the broader context of amateur sports in Indonesia. The qualitative design also restricts generalization, as data were drawn from a limited number of participants and focused primarily on subjective experiences.

Future studies are encouraged to adopt a mixed-method approach involving a larger sample across different regions to capture more diverse perspectives. Quantitative assessment of injury frequency, types, and contributing factors could complement qualitative insights. Moreover, evaluating the effectiveness of injury prevention training modules or educational interventions could provide practical strategies to enhance athlete safety, performance, and the overall quality of sports education at the grassroots level.

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