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RESEARCH ARTICLE

A review of WMSU-CCSPE response to sports injuries through socio-ecological perspectives

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ABSTRACT

When an individual sustains an injury during sports, the manner in which the injury is managed has a direct impact on the recovery process and the athlete's long-term well-being. Immediate actions, such as ceasing the activity, administering first aid, and stabilizing the injury, are essential in preventing further harm. Hence, it is essential to implement effective sports injury response strategies to protect the well-being of student-athletes participating in college sports programs. This mixed-methods paper explored the application of socio-ecological model (SEM) in understanding the response mechanisms of college students toward sports-related injuries. Students from Western Mindanao State University (WMSU) College of Sports Science and Physical Education (CCSPE) were conveniently sampled (n=60) to be interviewed about their experiences and perceptions regarding sports injury response in the campus. The findings indicated that an individual's immediate emotional reaction, such as fear, anxiety, or empathy, influenced their decision-making process during an injury event. The responses at the intrapersonal level also involved an individual's ability to manage their emotions and remain composed in high-stress environments, which directly impacted their ability to take effective action, such as alerting appropriate personnel for help or assisting the injured individual in the best possible way. The interpersonal level extended beyond the individual, emphasizing the importance of external relationships, such as those with peers, teammates, coaches, and family members. These social connections were key determinants in shaping behaviors during emergencies, as individuals often relied on the support, guidance, and reassurance of others when responding to crises. Sports organizations and educational institutions were responsible for implementing safety protocols, training athletes and staff on how to respond to injuries, and ensuring the availability of medical resources such as first-aid kits or emergency medical personnel. Finally, policies that mandated injury prevention programs, established safety standards for sports equipment, and enforced protocols for handling injuries contributed to shaping how individuals perceived and responded to risks in sports. Recognizing the influence of multiple levels—individual, interpersonal, organizational, and policy—on injury response, this approach highlighted the need for a comprehensive, multi-contextual strategy to enhance the effectiveness of injury prevention and response systems.

Keywords: socio-ecological model; sports education; sports injury response; risk perception

1. Introduction

There is ongoing global concern regarding sport and recreational injuries[1,2]. Preventing such injuries is

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a challenging task due to the multifactorial nature of their causes and the various risk factors involved[3]. As such, a comprehensive approach is necessary to tackle this issue, one that considers the existing sports culture and the behaviors of athletes[4-6]. While numerous injury prevention strategies have been assessed in sports[7], the lack of in-depth behavioral and social science research, whether independently or in combination with other methods, has been identified as a key factor hindering the widespread adoption and effective implementation of preventive measures[8].

Engaging in sports offers numerous benefits, including enhanced physical fitness and improved overall health[9]. However, it also carries the risk of injury, and in some rare cases, even death[10]. Interventions that consider multiple levels of influence—ranging from the individual at risk to broader policies at local, state, or national levels—have proven most effective in mitigating adverse outcomes[11]. As such, identifying the appropriate intervention levels and integrating existing evidence and behavioral theories may enhance prevention strategies aimed at reducing mortality in sports[12]. A recent review has pointed out the limited use of behavioral and social science frameworks in addressing unintentional injury prevention[13]. While these frameworks have seen substantial growth in other areas of health research, they are still not widely employed in injury prevention efforts[13]. Moreover, several studies in the injury prevention field have emphasized the importance of integrating behavioral and social science theories into the creation and implementation of effective interventions[14,15].

This paper investigated the concept of socio-ecological perspectives in responding to sports-related injuries. This paper examined how students at WMSU-CCSPE react and respond when witnessing sports injuries. Incorporating behavioral and social science theories into the development of interventions aligns with the rationale behind evidence-based strategies in education and public health[16-18]. These theories offer frameworks to identify target behaviors and groups, develop relevant interventions, measure behavioral changes, and assess the success of implemented strategies[16]. This systematic approach can provide perspectives, enabling educators and program planners to create interventions with higher acceptance and implementation rates. This study examined the factors influencing safety and learning behaviors, such as the dynamics of motivation and environmental influences, both positive and negative[19]. Theories grounded in these frameworks also enhance the likelihood of successful planning, implementation, and evaluation of interventions compared to strategies lacking a theoretical foundation[6,20].

This study proposed the use of SEM in understanding the actions and behaviors of WMSU-CCSPE students when responding to sports-related injuries, integrating the ideas of intrapersonal, interpersonal, community, and institutional perspectives into the WMSU sports development program. The socioecological framework, initially proposed by Bronfenbrenner in the 1970s as ecological systems theory[21], can serve as a tool to facilitate health-related behavioral changes[22]. This framework identifies five levels of influence: (1) intrapersonal, which pertains to individual factors such as a student or learner; (2) interpersonal, involving relationships with teachers, parents, and peers; (3) organizational, referring to institutions like schools or learning communities; (4) environmental, including cultural norms and physical learning spaces; and (5) policy, which includes institutional guidelines and government regulations[22]. The model was initially created to analyze individual development through a comprehensive, system-oriented lens, emphasizing the interactions between individuals and the various contexts they inhabit, which subsequently influence their overall development[23]. It has since been utilized and modified to explore numerous other domains, particularly health-promoting behaviors, including physical activity[24-26].

Early studies on sports-related injuries indicated that relevant perspectives towards the application of SEM in responding to sports-related injuries and sports emergencies. Von Rosen et al.[27] believed that

providing athletes with education on interpreting pain signals may serve as an effective strategy to enhance their risk perception. Whatman, Walters and Schluter[28] supported this explaining negative attitudes of athletes can be linked to the incidence of sports injuries. Soligard et al.[29] observed that both coaches and athletes acknowledged the importance of an adequate warm-up prior to training sessions in minimizing the risk of sports-related injuries. While Perera, Åkerlund and Hägglund[30] believed it is essential to consider the impact of training load and recovery, particularly in youth athletes who have a developing musculoskeletal system. In SEM perspective, these findings can be linked to the system employed in a sports development program. For example, there is a need to address multiple levels of influence when examining strategies for injury prevention in sports emergencies. Educating athletes, developing positive attitudes, and implementing structured training practices align with the intrapersonal and interpersonal levels of SEM, while organizational and policy-level considerations—such as institutional support for sports programs and adherence to safety standards—can further enhance the effectiveness of interventions. Integrating these multi-level perspectives can provide a comprehensive approach to minimizing risks and improving safety behaviors among WMSU students and athletes.

2. Literature review

In the Philippines, sports are a celebrated avenue for showcasing physical abilities, yet they also carry significant risks of injury[31]. In educational institutions, the sports program is fundamentally integrated through physical education, which constitutes a consistent element of the primary and secondary school curricula in the country[32]. The Commission on Higher Education (CHED) Memorandum Order No. 08, Series of 2022, also known as the Guidelines on the Tertiary Sports Development Program (TSDP), aims to promote inclusive sports with equal emphasis on providing opportunities and fostering responsibilities. Its objectives include building character and leadership among students while establishing a holistic sports development program at the tertiary level. This initiative seeks to advance academic excellence, support youth development, and contribute to the cultivation of good citizenship[33]. Commitment to wellness, community development, self-discipline, and national unity should transcend mere glory and achievements[33-35]. Nonetheless, persistent concerns and challenges continue to impact the state and condition of sports, particularly involving different institutions, actors, stakeholders, and regulations.

Collegiate sports programs face a high prevalence of sports-related injuries, which poses significant challenges for prevention and support systems within college sports programs[36]. Athletes experiencing injuries frequently encounter detrimental impacts on their performance, as well as their physical and mental well-being, which can hinder their capacity for long-term participation in sports[37]. These injuries span a spectrum from minor issues, such as sprains and strains, to severe conditions, including fractures, dislocations, and ligament tears[31]. Contact sports like football generally have higher injury rates compared to non-contact sports such as swimming, yet all sports inherently carry risks, whether from physical contact, overuse, or misuse of body parts[31]. The occurrence of such injuries may elevate the risk of reinjury and can contribute to mental health challenges, including feelings of blame, frustration, performance anxiety, and the pressure to resume training[38,39]. Preventive strategies, including strength training and conditioning, are widely practiced among athletes, yet injuries remain an unavoidable aspect of sports participation[40-42].

Consequently, this paper looked into the context of behavioral and social science frameworks, particularly the SEM, to describe the response of CCSPE students to sports-related injuries. Despite the evaluation of various injury prevention measures in sports, it has been indicated that the absence of thorough and focused research in the behavioral and social sciences related to sport injuries—whether considered independently or alongside other strategies—may hinder the successful adoption and dissemination of

effective institutional strategies[12,43,6]. Bronfenbrenner's SEM is a key approach to understanding the response of CCSPE students towards sports-related injuries as it "integrates both factors and dimensions that impact this behavior"[44]. This is critically interesting because studies pointed out the need to expand the potential roles of behaviors in the development of effective sport injury response and prevention strategies.

The socioecological systems theory emphasizes the significant role of societal beliefs and ideologies while considering the complex interconnections among individuals. It employs a comprehensive socio-ecological perspective to analyze behavior and its determinants[45]. Originally introduced in the 1970s to explore human development, the SEM was later formalized as a theory in the 1980s[46]. Since its inception, the SEM has been adapted and reinterpreted across various fields to develop multilevel approaches addressing diverse issues, including public health promotion, violence prevention, encouraging healthy college environments, ensuring safe practices in primary care, and advancing bowel cancer prevention initiatives[47].

Joshua[48] examined South African Rugby Union (SARU) coaches' perceptions of catastrophic injury risks, highlighting dynamics within rugby communities that are not well understood. Coaches' risk-protective and risk-averse behaviors are shaped by their perceptions of injury risks, which are influenced by individual, interpersonal, and societal factors viewed through the lenses of SEM. While common factors influence risk perceptions across socioeconomic groups, differences exist in the weight coaches from varying backgrounds place on these factors. Beyond sports-science parameters, these perceptions are shaped by subjective beliefs and socio-cultural contexts unique to South Africa. To address these disparities, sports governing bodies should adopt socio-ecological approaches to injury prevention and consider the local context in coach development programs.

Register-Mihalik et al.[49] highlighted the critical role of athletic trainers in ensuring safety based on the socio-ecological framework. Their frequent interactions across various levels allowed them to advocate for policy enforcement, educate stakeholders on concussion policies, and create safer playing environments. Athletic trainers provide essential medical oversight, implement effective safety procedures, and educate coaches, parents, and athletes on recognizing, responding to, and managing concussions. The study emphasized that preventing sports-related concussions requires a multifactorial approach, moving beyond basic education to strategies that influence intentions, behaviors, and injury outcomes. With the socio-ecological framework, athletic trainers can design policies, procedures, and educational programs that significantly enhance safety and well-being in athletic settings.

Further, one particular study resonates with the direction this paper wanted to follow. Vella et al.[50] observed that injury risk acceptance is an inherent aspect of high-performance sports, driven by various socio-ecological factors. Participants frequently characterized an injury according to its impact on performance as a personalized process. This aligns with descriptions found in other high-performance athletic environments where in this setting, the players concentrate on attaining optimal performance and enhancing the likelihood of team success[51,52,50] argued that when reporting an injury, physicians must place the athlete within their social context[53], facilitating and assisting them in their self-management choices. Since preventing sports injuries is a learning process, teaching athletes how to handle injuries gives them more confidence and improves their feeling of self-efficacy in managing their own health[52,54]. In addition, their participants recognized the significance of collaboration and communication across team stakeholders for handling injury risks, with internal communication being important to injury mitigation[55,56]. Developing an integrated support system must prioritize communication that enhances performance optimization, promoting consistent messaging and collaborative decision-making[57].

This paper adapted the view of Vella et al.[50] in self-managing injuries and bringing this SEM perspective to broader context, particularly when witnessing a sports-related injuries. The SEM framework has traditionally been employed to understand complex health behaviors, but this study expands its utility by exploring how response behaviors manifest across multiple levels of influence. Specifically, it examined how individuals' responses to sports injuries are shaped not only by their personal characteristics but also by the social, organizational, and policy structures surrounding them.

3. Research questions

This paper analyzed the practices of WMSU-CSSPE students in response to sports injuries through socio-ecological behaviors. This study also examined the actions taken by response teams in addressing sports injuries, analyzed using SEM. Below are the specific questions answered in this paper.

(a) What are the demographics of the WMSU-CCSPE students?

(b) What sports have frequent sports injuries?

(c) What types of injuries are common among WMSU-CCSPE students?

(d) What are the common causes of sports injuries among the students?

(e) What interventions were taken for sports-related injuries?

4. Methods

4.1. Research design

This paper was a mixed-method analysis regarding the response to sports-related injuries among WMSU-CCSPE students. Mixed methods research involves systematically collecting, analyzing, and integrating quantitative and qualitative data based on timing, weighting, and mixing to address research objectives[58]. Greene[59] describes mixed methods as "an approach to investigating the social world that ideally involves more than one methodological tradition and thus more than one way of knowing". This paper was explanatory in nature, which aims to explain the emerging cause-effect relationships relevant to a phenomenon[60]. This paper asserted that for an effective response to take place, it is essential to conduct a thorough and critical analysis of the situation to fully understand its complexities, identify key factors influencing the issue, and develop appropriate and informed interventions or actions. This study answered one important question in sports-injury response: How do people around emergencies react to the situation? This will provide insight into the level of competence the students demonstrated in managing sports-related emergencies within school settings.

4.2. Participants and sampling

WMSU-CCSPE students were the primary participants of this study. Participants, particularly the Bachelor of Science in Physical Education (BPED) students and pre-service teachers (PST), were conveniently sampled to be surveyed and interviewed. Convenience sampling refers to the data gathering method involving a research population that is readily accessible to the researcher[61], sometimes requiring them to go to public locations and "ask passersby to participate"[62]. In sampling the participants, a table was set up in front of the gymnasium, a central and frequented location, to ensure easy access to potential participants. Students passing by were approached and invited to participate in the study. They were briefly informed about the purpose of the research and, upon signing the consent, were surveyed and interviewed on the spot. Finally, there were 60 CCSPE students who participated in this study, 55 BPED students and 5 AST students. Convenience sampling offers the advantages of reduced effort, lower costs, and minimal time

investment by utilizing readily accessible participants[63]. However, one major concern was selection bias, as the sample may not be representative of the broader population. This can affect the external validity of the study, meaning the results may not be generalizable to other contexts or groups.

4.3. Research instrument

A checklist was developed to gather the responses from the participants. The checklist had five parts: demographics profiles, types of sports with most injuries, types of injuries, causes of sports injuries, and sports injuries treatment and intervention. Students were asked to reflect on their past experiences, including emergencies they witnessed. Checklists are effective tool that serve as mnemonic aids, hence diminishing the likelihood of omitting essential items during assessment[64]. However, using a checklist as the sole instrument for data collection is insufficient; therefore, interview questions were also developed to provide additional depth and context to the data.

A guide for semi-structured interviews was designed to elicit the narratives from the participants. Semi-structured interviews offer flexibility and adaptability, which allows for a critical understanding of participants' thoughts and perspectives while maintaining a structured format[65]. The flexibility of the semi-structured format permitted the interviewer to ask follow-up questions, facilitating clearer and more thorough exploration of participants' career expectations[66]. This dynamic interaction between interviewer and participants is crucial for capturing the perspectives and experiences of the participants[67]. The interview guide not only shapes the interview's quality but also influences the study's outcomes by organizing and facilitating discussions while enabling probing questions that yield rich, detailed data[68,69]. **Table 1** presents the interview guide questions developed to gather the responses of the participants.

Table 1. Interview guide questions.

Interview Questions	Thematic Indicators	Interpretation
1. How do you typically respond when you experience a sports-related injury?	Response behavior, coping mechanisms, emotional reactions	To understand individual-level responses (personal coping strategies) and to assess how the social environment (coaches, teammates) influences these responses.
2. What immediate actions do you take after getting injured during a sports activity?	Immediate response actions, perceived urgency, self-care strategies	To explore personal perceptions and actions at the individual level, and how external factors (like access to medical help, support from teammates) influence immediate actions.
3. Who do you turn to for help when you get injured? Why?	Social support networks, sources of help (coaches, medical staff, peers)	To investigate the role of interpersonal relationships and social networks in injury response, and to assess the influence of support systems on injury management at the individual and interpersonal levels.
4. How do you feel physically and emotionally during and after a sports injury?	Emotional and physical reactions, stress and anxiety levels	To examine the psychological and emotional impact of sports injuries on students, which can be influenced by personal factors, social expectations, and perceived support systems.
5. What are your thoughts on the current injury prevention practices and interventions?	Perceptions of injury prevention practices, awareness of safety measures	To assess participants' views on the effectiveness of injury prevention strategies at the organizational level (coaches, institutions) and their understanding of these practices within the broader environment.
6. Have you ever experienced a situation where you didn't receive help for your injury? What happened?	Lack of support, perceived neglect, social and environmental factors influencing response	To explore barriers to receiving help, emphasizing systemic (organizational) factors like access to medical resources or institutional policies affecting support during injury situations.
7. In your opinion, what could improve the way sports injuries are handled in school settings?	Suggestions for improvement, awareness of resources, policy suggestions	To understand how students perceive the broader institutional and community-level factors that could influence the effectiveness of injury management and prevention strategies within their school environment.

4.4. Data gathering procedure

Prior to gathering data, the researchers sought permission from the CCSPE college dean.

In Phase 1, the researchers set up a table in front of the gymnasium, a location frequently visited by students, to facilitate participant access. The table was equipped with necessary materials for data collection, such as consent forms, surveys, and interview guides. The interviewer began each session by explaining the research objectives to the participants, ensuring them of the confidentiality of their responses, and emphasizing the voluntary nature of their participation. After gathering quantitative data from checklists, Phase 2 (interview process) followed. Interviews serve as an essential method for listening to and interpreting personal narratives, allowing participants to express the meaning of their lived experiences[70]. Interviews are particularly useful for exploring individual lived experiences, distinguishing this method from others like grounded theory or ethnography[71]. To conduct effective qualitative interviews, several critical steps must be followed, including developing clear research questions, identifying participants, discussing confidentiality, and using a structured interview guide with thematic questions and follow-up probes[72]. A structured interview guide was used, featuring thematic questions that aligned with the study's research aims. These questions were followed by prompts designed to encourage participants to elaborate on their experiences. Interviews, recognized for their value in social science research, allow for a more informal conversational style that encourages participants to freely express their perceptions and experiences[73,74]. To ensure the quality of the interviews, three key principles were observed, as highlighted by Shensul et al.[75]: maintaining the natural flow of the interviewee's narrative, encouraging a positive discussion, and avoiding interviewer bias. The interviewer worked to create a comfortable environment by asking introductory questions and allowing participants to speak in their native languages. The tone of the interview remained neutral, with a focus on empathy and careful listening, promoting trust and facilitating a natural flow of conversation[76]. To preserve the accuracy of the data, the entire interview was recorded with the participant's consent, using Microsoft Excel (version 2407) for transcription and analysis. **Figure 1** presents the mixed-method workflow explaining the processes of data gathering.

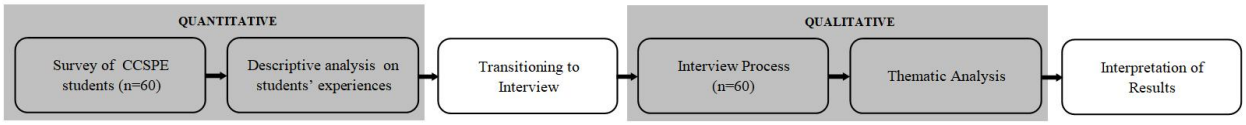

Figure 1. Data gathering workflow of the study.

4.5. Data analysis

JASP (Jeffreys's Amazing Statistics Program) version 0.18.2, an open-access statistical software, was used to analyze the responses from checklists. Frequency table was used to descriptively summarize the demographics and responses of the participants. Frequency tables are used to delineates the quantity of observations corresponding to each potential value of a variable[77]. This study analyzed the common sports injuries, causes of sports injuries, and interventions taken using frequency distributions.

As a follow-up, thematic analysis was conducted to analyze the narrative responses from the participants. Thematic analysis, particularly reflexive thematic analysis, goes beyond identifying surface-level patterns by uncovering deeper shared meanings, organized around central concepts[78]. The coding process is both dynamic and flexible, allowing codes to evolve as the researcher's understanding of the subject matter develops. Reflexive thematic analysis emphasizes the subjective nature of coding, encouraging researchers to acknowledge how their personal perspectives may shape data interpretation[79]. This subjectivity, rather than compromising the analysis, strengthens the emerging ideas and insights from the data[80]. Reflexivity, a cornerstone of qualitative research, ensures that researchers critically assess how their views influence both the data collection and analysis processes[81]. To enhance the reliability of the findings, the analysis utilized an inductive approach, where themes and codes were drawn directly from the

data without preconceived theoretical biases. This bottom-up approach allowed the analysis to remain true to participants' lived experiences, minimizing researcher bias and ensuring that the participants' voices guided the interpretation of the results. With the six phases outlined by Braun and Clarke[82] shown in **Figure 2**, the researchers systematically developed themes that accurately reflected the participants' experiences, contributing to a valid and grounded understanding of the phenomenon under investigation.

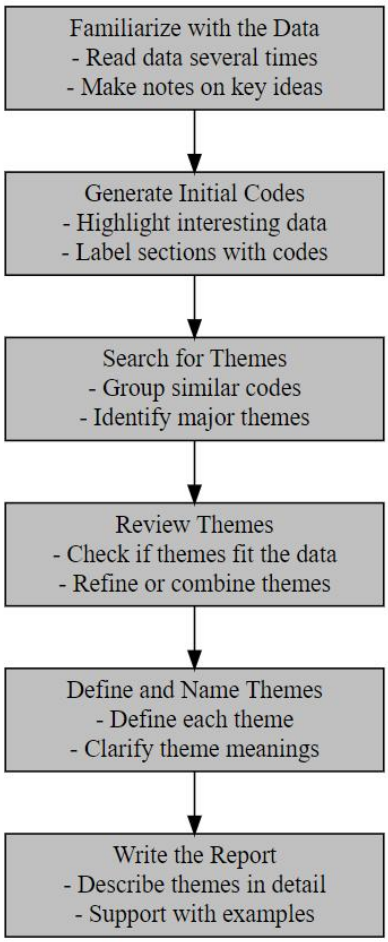

Figure 2. Six phases of reflexive thematic analysis.

5. Results

Question 1: What are the demographics of the WMSU-CCSPE students?

The demographic profiles of the students provided an overview of their key characteristics, like their age, sex, and weight. Descriptive analysis in **Table 2** revealed that most students were within 20-24 years old (n=51; 85.0%). Some of them were 15-19 years old (n=7; 11.06%) and 25-29 years old (n=2; 3.33%). In terms of sex, most of the were female students (n=31; 51.66%), while there were 29 male students (48.33%). Based on their weight, most students were between 41kg and 55kg (n=27; 45.0%), while some (n=18; 30.0%) weighed between 56kg to 60kg. A small portion of students weighed ≥60kg (n=10; 16.66%) and ≤40kg (n=5; 8.33%).

Table 2. Demographic profiles of the WMSU-CCSPE students.

	Frequency	%
Age		
30 years old and above	0	0
25-29 years old	2	3.33
20-24 years old	51	85.00
15-19 years old	7	11.66
Sex		
Female	31	51.66
Male	29	48.33
Weight		
≥66kg	10	16.66
56kg-60kg	18	30
41kg-55kg	27	45
≤40kg	5	8.33
Total	**60**	**100**

Question 2: What sports have frequent sports injuries?

Descriptive analysis in **Table 3** revealed that CCSPE students observed the most sports injuries in soccer (n=10; 16.66%), basketball (n=9; 15.0%), and taekwondo (n=9; 15.0%). Some also mentioned Karate Do (n=6; 10.0%), softball (n=5; 8.33%), Arnis (n=5; 8.33%), Speak Takraw (n=4; 6.66%), volleyball (n=4; 6.66%), running (n=3; 5.0%), badminton (n=3; 5.0%), and swimming (n=2; 3.33%).

Table 3. Sports with frequent injuries.

	Frequency	%
Soccer	10	16.66
Basketball	9	15
Taekwondo	9	15
Karate Do	6	10
Softball	5	8.33
Arnis	5	8.33
Sepak Takraw	4	6.66
Volleyball	4	6.66
Running	3	5
Badminton	3	5
Swimming	2	3.33
Total	**60**	**100**

Question 3: What types of injuries are common among WMSU CCSPE students?

Descriptive analysis in **Table 4** indicated that students observed the greatest number of injuries like sprains (n=15; 18.33%), bruises (n=10; 16.66%), and swollen muscles (n=7; 11.66%). Some also observed dehydration (n=6; 10.00%), knee injuries (n=5; 8.33%), and strains (n=4; 6.66%). None of the students observed concussions, rapture, and dislocation.

Table 4. Common injuries among WMSU-CCSPE students.

	Frequency	%
Sprains	14	25.00
Bruises	10	16.66
Swollen Muscle	7	11.66
Dehydration	6	10.00
Knee Injuries	5	8.33
Strains	4	6.66
Cuts and Abrasions	3	5.00
Fracture	3	5.00
Dental Damage	2	3.33
Rotator Cuff Injuries	2	3.33
Stress Fracture	1	1.66
Nose Injuries	1	1.66
Achilles Tendon Rapture	1	1.66
Concussion	0	0
Rapture	0	0
Dislocation	0	0
Total	**60**	**100**

WMSU-CCSPE students were asked about their perceptions of sports with frequent injuries. One theme emerged as a prominent contributing factor in sports injuries—the nature of the sports itself. In sports like basketball and soccer, the inherent contact and fast-paced nature of the game increase the likelihood of injuries occurring, as these sports often involve rapid changes in direction, jumping, and pivoting. This results in a higher frequency of injuries, such as ankle sprains, knee injuries, and bumps and bruises. The intensity and physical demands of these sports create environments where injury is almost expected, with the risk of injury rising from the aggressive and fast-paced actions required to compete. As a result, players often experience injuries from movements such as landing wrong or going for the ball during intense play.

> "I think some sports, like basketball and soccer, just have more contact, so it's more likely that someone will get hurt. It's almost expected that you'll get a few bumps and bruises."

> "In soccer, injuries happen a lot because of the fast-paced nature of the game, especially when players go for the ball all at once. A lot of ankle sprains or knee injuries happen because of the constant direction changes."

> "Basketball is tough on your knees and ankles because of all the jumping and pivoting. I've had a few sprained ankles, and I've seen a lot of people get injured from landing wrong after a jump shot."

The nature of a sport, even in non-contact activities, can still influence the frequency of injuries, particularly through overexertion and aggressive behavior. In sports like badminton, where physical contact is minimal, injuries often arise not from direct impact but from the tendency of some players to push themselves too hard during training or competition. This overexertion leads to a higher risk of injury, particularly when athletes are too eager to win or become overly aggressive, often without proper preparation.

These behaviors can cause stress on the body, increasing the likelihood of injuries, even in the absence of physical contact.

> "Honestly, I've seen more injuries in badminton, especially when people push themselves too hard during training. It's not about contact, but overexertion can really lead to injuries."

> "I've noticed that people who are too eager to win tend to push too hard, which leads to injuries. Being overly aggressive can cause injuries, especially if the person isn't fully prepared."

Question 4: What are the common causes of sports injuries among the students?

Descriptive analysis in **Table 5** indicated that observed sports injuries because of overtraining (n=24; 40.0%), improper warm-up (n=16; 26.66%), over-use of power (n=11; 18.33%), and poor techniques (n=9; 15.0%).

Table 5. Common causes of sports injuries.

	Frequency	%
Over Training	24	40.00
Improper Warm-up	16	26.66
Over-use of power	11	18.33
Poor Techniques	9	15.00
Total	**60**	**100**

WMSU-CCSPE students were asked about the possible causes of these injuries. They also believed that most students overtrain and had improper warm-up procedures. Thematic analysis revealed that students expressed significant concerns about the intensity and preparation in their training routines, highlighting key issues such as overtraining and improper warm-up techniques. Many participants noted that overtraining, particularly before competitions, was a common practice driven by the desire to excel, which often led to physical strain and subsequent injuries. Further, students emphasized that improper or skipped warm-ups were frequent, with some jumping into intense activities without adequately preparing their muscles. This lack of preparation was perceived as a critical factor contributing to the stiffness and susceptibility to injuries during games and practices.

> "I think a lot of students get injured because they overtrain. They want to perform well, so they push their bodies too hard, and that's when accidents happen."

> "Some injuries happen because people don't warm up properly. They just jump right into intense activities without preparing their muscles."

> "Overtraining is a big problem, especially before competitions. People think they need to practice nonstop, but they end up hurting themselves instead."

> "I've noticed that improper warm-ups are a common issue. Skipping stretches or rushing through them makes the body stiff and prone to injuries during the game."

Some mentioned that students also overuse of power when training or competing, while others mentioned about poor techniques. Students are concerned about the overuse of power and poor techniques as significant contributors to sports-related injuries. Participants emphasized that excessive force without proper form often leads to muscle strains or joint injuries, particularly in sports like taekwondo and basketball. They

observed that relying on brute strength over technique, such as improper blocking or stealing in basketball or overpowered swings in Arnis, increases vulnerability to injuries. Similarly, incorrect body mechanics and alignment, such as improper grips or strokes in swimming, were noted to strain specific muscle groups, resulting in recurring or severe injuries.

> "I think some students get hurt because they try to use too much force without the right technique. For example, in taekwondo, if you kick too hard without proper form, you can easily hurt your ankle or pull a muscle."
>
> "In basketball, I've noticed that players sometimes push too hard when they're trying to block or steal the ball. Instead of using proper footwork or body positioning, they rely on brute strength, which leads to injuries."
>
> "In sports like Arnis, not using the correct grip or movement can lead to injuries. People swing too hard without focusing on their wrist or elbow alignment, and they end up straining themselves."
>
> "I've seen this happen in swimming too. When students overuse their power without focusing on their stroke technique, it can lead to shoulder or back injuries."
>
> "In volleyball, players often try to spike the ball with too much force, and they don't pay attention to their landing. That's why they end up twisting their knees or ankles."

Question 5: What interventions were taken for sports-related injuries?

Descriptive analysis in **Table 6** indicated that students observed treatments like asking students to rest after an injury (n=22; 36.66%), compressions (n=15; 25.0%), and ice (n=12; 20.0%). Some students observed seeking medical care/attention (n=6; 10.0%) and have doctor's appointment (n=2; 3.33%).

Table 6. Treatment in sports injuries.

	Frequency	%
Rest	22	36.66
Compression	15	25
Ice	12	20
Seek Medical Care/Attention	6	10
Elevation	2	3.33
Doctors Appointment	2	3.33
Total	**60**	**100**

When students were asked about their feelings when witnessing a sports-related accident taking place, most of them felt worried while others immediately sought assistance from coaches. Narratives revealed that students' feelings when witnessing sports-related accidents were deeply tied to anxiety, fear, and a sense of helplessness. Many expressed an immediate concern for the injured person's well-being, highlighting the emotional impact of observing such incidents. Statements reflected self-awareness and vulnerability, as students recognized their own susceptibility to similar injuries, particularly when proper training or precautions were lacking. A recurring theme was the sense of helplessness, where students felt powerless to intervene effectively, intensifying their emotional response.

> "When I see someone get hurt, I immediately feel anxious and wonder if they're okay. It makes me think about how fragile our bodies are during these games."
>
> "I always worry if the injury is serious. It's scary because it reminds me that it could happen to me too, especially if we don't train properly."
>
> "I feel helpless at first, like there's nothing I can do. It makes me think about how vulnerable we all are in these situations."

Students expressed significant concerns about their role in responding to sports-related injuries, emphasizing the importance of seeking immediate professional assistance by involving coaches or medics during emergencies. Many highlighted the value of staying calm and supportive, recognizing their role in comforting injured teammates and ensuring they feel cared for until professional help arrives. A recurring theme was the perception of teamwork extending beyond the game, where rallying together during an injury builds trust and camaraderie. Some also noted the need for more training or drills on handling accidents, suggesting that preparedness at the team level could enhance overall safety and confidence during critical moments.

> "The first thing I do is call for the coach or the team medic. They know how to handle these situations better, and I feel like it's my responsibility to help."
>
> "Seeing a teammate get hurt pushes me to stay calm and supportive. I try to comfort them and make sure they're not alone until help arrives."
>
> "The coaches are really good at stepping in during emergencies, but I feel there could be more drills on how players can handle accidents when they happen."
>
> "I believe teamwork isn't just about the game; it's also about looking out for each other. When someone gets injured, we rally together to provide support and keep them reassured."

Students raised concerns about the need for improved safety measures in sports activities, emphasizing the importance of enforcing stricter policies on warm-up and cool-down routines to minimize the risk of injuries. They also highlighted the availability of first-aid kits as a positive step but stressed the need for regular safety checks on equipment to prevent accidents that could otherwise be avoided. These concerns reflect a broader desire for proactive strategies and institutional accountability to ensure safer environments for athletes.

> "There should be stricter policies about warming up and cooling down. I think that would help reduce injuries in the first place."
>
> "It's good that we have first-aid kits around, but I think schools need to enforce regular safety checks on equipment to prevent avoidable accidents."

6. Discussion

SEM provide a framework for analyzing a complex and growing interactions among intrapersonal, interpersonal, and societal factors that shape risk perception and behavior in both groups and individuals[48]. SEM frequently focuses on the individual, community, institution, and policy dimensions[83]. In the last fifty years, significant insights have been gained regarding the causes of injuries by analyzing data on injury incidence and examining the evolving patterns in injury types. The primary obstacle society faces in the

future is enhancing safety interventions and adopting strategies that will most significantly reduce the incidence of injuries[84].

In sports, effectively structured interventions are essential in mitigating fatalities associated with sports activities[85]. Consequently, the development of effective prevention strategies aimed at reducing mortality in sports could be enhanced by pinpointing the specific level(s) where intervention is necessary, alongside the incorporation of existing evidence and behavioral theory[86]. The shift in behavior is likely to involve various stakeholders, including the individual performing the action, trainer, family members, and teammates[5]. Early studies suggested that employing a social or behavioral theory could prove advantageous in the formulation of intervention strategies aimed at enhancing the adoption and adherence to exercise-related injury prevention programs[5]. Given that these strategies are effective for public health and safety campaigns, it is probable that they would also substantially aid in the prevention of sports injuries[19,87]. Hence, Scarneo et al.[85] the SEM is applicable and necessary for addressing all potential causes of sport-related fatalities and injuries as well.

Initially, a behavior in response to sports injuries stems from intrapersonal level (within oneself). The intrapersonal level of the socioecological framework focuses on the physical and cognitive characteristics of athletes, as well as their prior experiences[21,22]. This paper primarily focused on the cognitive factors in shaping the behaviors of WMSU-CCSPE college students in responding to sports injuries. Cognitive aspects include the athlete's knowledge and attitudes about sport-related injuries and illnesses, including risk and prevention behaviors[85]. For example, one student said that "When I see someone get hurt, I immediately feel anxious and wonder if they're okay." Emotions can influence a person's thoughts, behaviors, and decision-making in responding to sports-related injuries. Human responses are influenced not only by reflexive thinking but also by emotion schemas, which are dynamic interactions between emotions, perceptions, cognitive processes, and relational factors. These emotion schemas shape how individuals interpret and respond to their circumstances, guiding their actions and decisions in ways that are deeply influenced by their emotional experiences[88,89]. WMSU-CCSPE students revealed that "The first thing I do is call for the coach or the team medic. They know how to handle these situations better, and I feel like it's my responsibility to help." Even though their emotions were heightened in these high-pressure moments, many still prioritized the well-being of the injured individual, knowing that they were not equipped to handle medical emergencies alone. This sense of duty and willingness to support others highlighted the importance of training and preparation in emergency situations.

Consequently, it is essential for athletes to be aware of their own risk levels to alert those at the intrapersonal level who are supervising and providing care[85]. This also reflected from students' account saying, "injuries happen a lot because of the fast-paced nature of the game, especially when players go for the ball all at once." This can be presented as risk perception toward a sport, allowing students to take extra precautionary measures in sports participation or encountering emergencies. Risk perception is a process wherein athletes identify, anticipate, and manage risk occurrences during training and competition, influenced by personality attributes. It also constitutes a psychological process in which risk information is evaluated and assessed based on prior experiences[90,91]. The study of Kern et al.[92] indicated that self-efficacy is slightly correlated with risk-taking, and as self-efficacy perception rises, risk perception diminishes. Apparently, WMSU-CCSPE students displayed a keen awareness of risk perception in sports, which significantly influenced their views on the inherent dangers associated with certain sports activities. For instance, high-contact sports like basketball and soccer were often considered riskier due to their physical nature, while sports like badminton or swimming were perceived as less hazardous, though still carrying risks associated with overexertion or improper technique. Their understanding of risk also extended

to the recognition of inadequate safety measures, such as poor warm-up practices, overtraining, or the absence of proper coaching support, which heightened the likelihood of injuries. Risk perception denotes the decision maker's assessment of the chances of encountering the substance of a risk, so it may be characterized as the decision maker's evaluation of the uncertainty associated with the risk inherent in a specific situation[93,94], and this mechanism also affect how they respond to the emergency they experience[95].

Interpersonal level also influenced students' response behaviors to sports injuries. The interpersonal level of the socioecological framework emphasizes the critical role of external stakeholders—such as coaches, athletic trainers, parents, and peers—in influencing the safety and well-being of athletes[22]. These individuals shape athletes' behaviors and decisions through their interactions and attitudes. For instance, coaches who equate limited water intake with mental toughness may inadvertently place athletes at greater risk for heat-related illnesses, highlighting the significant impact of stakeholder perceptions on athlete safety[96,97]. In this paper, having positive environment within a sports organization can strengthen students' mental fortitude during an emergency. For example, "…teamwork isn't just about the game; it's also about looking out for each other." Students believed that having coaches that encourage supportive environment, like how coaches teach sports teamwork, not only enhances performance but also builds resilience in challenging situations. This approach not only boosts morale but also prepares students to respond more effectively to emergencies, reducing feelings of helplessness and anxiety. Generally, the support received by individuals may have contributed to positive affect; emotional support likely enhanced emotions of security and care, while esteem support probably bolstered views of competency and the belief in their ability to cope[98]. Support, from SEM perspective, enabled students to feel positive when they experience sports-related emergencies, and encourage them to act proactively to any emergencies they experience and observe.

In broader level, WMSU-CCSPE college students also recognized the importance of strict policies and safety checks in protecting the athletes from sports-related injuries. The organizational level within the socio-ecological framework emphasizes the role of structured communities, such as schools or sports institutions, in shaping the behavior and safety of athletes through formal and informal guidelines[21,22]. Policies, whether explicitly written or embedded in organizational culture, establish expectations and norms that influence both individual actions and interpersonal dynamics[21,22]. For instance, practices like fire drills and other safety protocols reflect an institution's commitment to ensuring a secure environment and its response to perceived risks[85]. Similarly in this paper, the sports organization has a fundamental role in managing risks and promoting safety among WMSU-CCSPE students. Students believed that "It's good that we have first-aid kits around, but I think schools need to enforce regular safety checks on equipment to prevent avoidable accidents." This highlighted their belief that risk management extends beyond providing basic medical supplies; it requires consistent enforcement of preventive measures such as routine equipment inspections, safety protocols, and the implementation of structured guidelines. These actions not only mitigate potential hazards but also instill a sense of security and trust within the organization, reinforcing the value of prioritizing student well-being in sports settings.

Hence, from socio-ecological perspective, requires the establishment of clear policies, adequate training, and the allocation of resources to effectively address potential risks and ensure safety within the sports environment. In Canada, junior and minor hockey teams have universal access to insurance, but coverage limitations and varying organizational resources create disparities. To address these differences, specific emergency action plans are essential, with organizational capacity playing a key role in their effectiveness[99]. In order to create a safer and healthier environment for athletes at all levels of sport, long-term objectives for surveillance include standardizing reporting procedures among sports organizations, improving coordination

between medical professionals and sports governing bodies, and putting evidence-based interventions into place to prevent illnesses and injuries[100,101].

7. Recommendations

This paper addressed the conceptual gap between socio-ecological behaviors in emergency response and sports development programs. SEM provides a comprehensive framework for understanding risk perception and response to sports-related injuries among WMSU-CCSPE students. At the intrapersonal level, students' cognitive awareness of risks, primarily shaped by emotions and past experiences significantly influenced their actions during emergencies, with many relying on coaches or medics for support. At the interpersonal level, the role of external stakeholders, such as coaches and peers, was critical in encouraging a supportive environment that strengthened students' resilience and proactive responses. At the organizational level, formal policies and safety protocols, such as routine equipment checks and emergency preparedness measures, were recognized as essential in mitigating risks and promoting student well-being. These insights reflected the importance of capacitating organizations through emergency plans, adequate training, and resource allocation to ensure safety in sports environments. For WMSU-CCSPE, integrating these could enhance the institution's capacity to manage risks, improve injury prevention strategies, and develop a culture of safety, to protect students and promote a healthier, more supportive sports environment.

8. Conclusion

This study explored the response behaviors of WMSU-CCSPE college students to sports injuries through SEM perspectives. The findings highlighted that the cognitive awareness of risks, particularly shaped by emotions and prior experiences, plays a pivotal role in students' actions during sports emergencies. At the intrapersonal level, students exhibited a strong sense of responsibility and awareness of their limitations, often relying on trained professionals like coaches and medics during emergencies. The interpersonal level emphasized the importance of a supportive environment with coaches and peers, which helped enhance students' resilience and proactive behaviors in addressing sports injuries. Finally, at the organizational level, the study revealed that formal policies, safety protocols, and structured safety checks within sports organizations are crucial in reducing the risk of injuries and fostering a culture of safety. The SEM framework provided an understanding of how these interconnected levels contribute to students' risk perception and response behaviors towards sports.

However, there were limitations that needed to be addressed. The study was conducted with WMSU-CCSPE college students, limiting the generalizability of the findings to other student populations or athletes involved in different types of sports. Future research should aim to include a diversified sample from various academic disciplines and sports backgrounds. The reliance on self-reported data from students may introduce biases, such as social desirability bias, where participants may overreport. Future studies could incorporate observational data or interviews with coaches and other stakeholders to obtain more comprehensive insights. While the study primarily focused on cognitive and emotional aspects of risk perception, other factors, such as physical training, environmental conditions, and specific sports-related challenges, could also play a significant role in influencing response behaviors. Expanding the scope to include these factors could provide a more holistic view of the issue.

Further, there were important aspects that needed to be considered in the context of WMSU sports management. Sports organizations should prioritize training athletes, coaches, and staff on the recognition of risks and emergency response procedures. This can involve regular workshops on first aid, injury prevention, and emotional resilience in sports settings. Coaches and teammates should be encouraged to create

emotionally supportive environments that empower students to respond confidently in emergency situations. Positive reinforcement and teamwork can significantly improve athletes' mental preparedness. Schools and sports organizations should implement strict safety policies and protocols, including regular safety checks, equipment inspections, and emergency action plans. These measures should be reinforced consistently to ensure adherence and to promote a culture of safety. Adequate resources, such as first-aid kits, emergency training for staff, and appropriate insurance coverage, should be made available to ensure effective responses to sports-related injuries. Further studies can investigate how the integration of SEM can be expanded to include the psychological aspects of risk perception and coping mechanisms in diverse sports settings, including those with less physical contact.

Conflict of interest

The authors declare no conflict of interest.

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