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ADMINISTRATIVE INFORMATION

Support - No.

Review Stage at time of this submission - Completed but not published.

Conflicts of interest - None declared.

INPLASY registration number: INPLASY202620004

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 2 February 2026 and was last updated on 2 February 2026.

INTRODUCTION

Review question / Objective To systematically review the patterns, mechanisms, risk factors, and prevention strategies of cheerleading-related injuries reported between 2010 and 2025.

Rationale This review provides evidence-based support for standards of cheerleading safety management and training, and offers a reference for developing targeted preventative measures.

Condition being studied The literature to be included must meet the following conditions: (1) the research subjects are cheerleaders/cheering participants and report the site of injury, incidence, prevalence, risk factors or related influencing factors; (2) the research type is an original empirical study; (3) it has been published in a peer-reviewed journal; (4) the full text is available for quality assessment and data extraction.

METHODS

Search strategy This systematic review was conducted in accordance with the Guidelines for the Systematic Reviews (PRISMA)(Tugwell & Tovey, 2021). A systematic search was conducted in four major databases covering the period from 2015 to 2025: Google Scholar, Web of Science, Science Direct, and Scopus. Search queries were constructed based on research topics and combined with subject terms and free terms to ensure the widest possible capture of literature related to cheerleading injuries.

Participant or population Cheerleaders.

Intervention No.

Comparator No.

Study designs to be included (1) the study subjects are cheerleading/cheerleading participants and report the site of injury, incidence,

prevalence, risk factors or related influencing factors; (2) the study type is an original empirical study; (3) it has been published in a peer-reviewed journal; (4) the full text is available for quality assessment and data.

Eligibility criteria This systematic review screened studies based on pre-defined criteria. Literature must meet the following conditions to be included: (1) the study subjects are cheerleading/cheerleading participants and report the site of injury, incidence, prevalence, risk factors or related influencing factors; (2) the study type is an original empirical study; (3) it has been published in a peer-reviewed journal; (4) the full text is available for quality assessment and data extraction; This study excluded the following types of literature: (1) informal academic publications, such as conference abstracts, news reports and materials that have not been peer-reviewed; (2) articles whose main research content is not related to sports injuries, such as those involving only technical analysis, anatomical descriptions or non-injury results; and (3) studies with incomplete data, missing key results or for which the original text could not be obtained for quality assessment.

Information sources Electronic database.

Main outcome(s) A total of 13 studies were included, with overall evidence quality ranging from moderate to high. Lower extremity sprains and strains, particularly ankle and knee sprains and strains, were the most common injuries. Head, cervical spine, and spinal injuries were less common but often led to serious consequences. Acrobatics, tumbling, throwing, and human pyramids were the main injury mechanisms, with falls considered the primary direct cause. Technical difficulty, athlete experience and training intensity, training load, and inadequate protective measures were key risk factors. Rule changes, coach training, improved landing areas, and the use of protective equipment are associated with reduced injury risk.

Quality assessment / Risk of bias analysis Two reviewers independently assessed the methodological quality of the included studies using the Newcastle-Ottawa Standards of Science (NOS)(Botelho et al., 2011; Carra et al., 2025). Prospective cohort studies, retrospective cohort studies, and registration-based epidemiological studies were assessed using the Newcastle-Ottawa Scale (NOS). Cross-sectional questionnaire studies were assessed using the Joanna Briggs Institute (JBI) Analytical Cross-sectional Study Quality Checklist(Munn et al., 2023). Case reports

were assessed using the JBI Case Report Quality Assessment Checklist. Any disagreements were resolved through discussion or by consulting a third reviewer.

This study adopted GRADE (Guyatt et al., 2025), the methods employed were used to evaluate the certainty of evidence in the included studies. Given that this review primarily consisted of observational studies, the initial level of evidence was set as "low" and a comprehensive assessment was conducted considering factors such as risk of bias, inconsistency, indirectness, and imprecision. The level of evidence was adjusted as necessary. Ultimately, the certainty of evidence for each major outcome was categorized as high, moderate, or low to enhance the credibility of the study's findings.

Strategy of data synthesis All data included in the study were extracted using a structured data extraction table. The data extraction table contained the following information: publication date from January 1, 2010 to December 31, 2025; language: English; authors; year; study design; monitoring period; population (sample size, sex, age, height, weight); principal findings; definition of injury; data collection methods; risk factors; statistical analysis; incidence and prevalence of injury; injury location; injury type; injury mechanism; and significant risk factors for injury.

Subgroup analysis No.

Sensitivity analysis No.

Language restriction English.

Country(ies) involved Malaysia.

Keywords Cheerleading; sports injury; risk factors; injury prevention; systematic review.

Contributions of each author

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