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Temporal structure, attack timing, and Golden Score dynamics in elite judo: protocol for a scoping review

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ADMINISTRATIVE INFORMATION

Support - None declared.

Review Stage at time of this submission - The review has not yet started.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 25 March 2026 and was last updated on 25 March 2026.

INTRODUCTION

Review question / Objective Primary review question. What evidence exists on the temporal structure of attacking behaviour and Golden Score dynamics in elite judo competition, and how have these phenomena been operationalised and measured?

Secondary review questions.

- What types of evidence exist on temporal structure, attack timing, pacing, and Golden Score dynamics in elite judo competition?
- How have key temporal constructs been operationalised, defined, and measured across studies?
- Which contextual moderators have been studied most often (for example sex, weight category, round, rule epoch, score status, or competition level)?
- What observational instruments, coding systems, software tools, and reliability/validity procedures have been used?
- Where are the principal knowledge gaps, especially regarding event-level attack timing,

inter-attack intervals, and repeated-athlete modelling during Golden Score?

Objectives.

- to map the range of temporal variables used in elite judo performance analysis, including attack timing, combat phases, effort-to-pause ratio, scoring time, match duration, and Golden Score duration;
- to summarise how contextual moderators are incorporated into elite judo temporal analyses;
- to map the methodological characteristics of observational and notational studies, including operational definitions, coding procedures, software, and evidence of reliability or validity;
- to identify conceptual and analytical gaps in the literature that justify future event-history and multilevel modelling work;
- to provide a transparent, reproducible search strategy and data-charting framework for the completed review.

Rationale Elite judo contests are structured around a regulation period followed, when necessary, by an unlimited Golden Score period.

Existing work has characterised combat duration, effort-to-pause ratios, phase distributions, sex and weight-category differences, rule-related temporal changes, and selected scoring patterns. However, the evidence base remains fragmented: studies differ in how they define combat phases, what temporal units they report, whether they analyse regular time and Golden Score separately, and whether they provide reliability or validity evidence. Most studies summarise time at the bout or phase level rather than modelling event-level attack onset or inter-attack intervals. This heterogeneity, together with the exploratory aim of mapping concepts, measures, methods, and gaps, supports the use of a scoping review rather than a conventional systematic review.

Condition being studied Temporal structure and attacking behaviour in elite judo competition. This review addresses sport performance, not a health condition. The review also covers the observational methodology used to study these phenomena.

METHODS

Search strategy Searches will follow the JBI three-step approach, organised around four concept clusters: (1) judo; (2) temporal constructs; (3) competitive context; and (4) observational/performance-analysis methods. All search strings will use Boolean operators (AND, OR). Filters: English language; database coverage from inception to 30 March 2026. The final search strategies are documented in the protocol appendix.

Participant or population Senior elite or international judoka, and/or elite judo contests involving senior athletes in IJF-sanctioned or comparable high-level competitions, including Olympic Games, World Championships, Masters, Grand Slam, Grand Prix, Continental Championships, and World Ranking events.

Intervention Not applicable. The concept of interest is the temporal structure of attacking behaviour and Golden Score dynamics in elite judo competition, and the observational methodology used to study them.

Comparator Not applicable. This is a scoping review. Findings will be mapped descriptively across contextual moderators (sex, weight category, round, score status, rule epoch, competition level) where reported.

Study designs to be included Primary empirical sources only: observational studies, notational

analyses, time-motion analyses, retrospective competition analyses, and instrument-development or validation studies. Reviews, opinion pieces, editorials, and purely physiological training studies without relevant competition-temporal data will be excluded.

Eligibility criteria Inclusion (additional to PCC): reports at least one temporal variable (e.g., attack timing, inter-attack intervals, combat duration, effort-to-pause ratio, Golden Score duration, combat phases) or describes/validates an observational instrument used to generate such data; published from database inception to 30 March 2026; English language full text only. Exclusion: non-judo combat sports; youth-only, cadet-only, or junior-only samples unless senior elite data are separately extractable; training-only or laboratory studies without relevant competition-temporal data; recreational or sub-elite contexts only; full text not obtainable.

Information sources Four electronic databases will be searched: MEDLINE (via PubMed), Scopus, Web of Science Core Collection, and SPORTDiscus (via EBSCOhost). Supplementary searching will include backward reference-list screening, forward citation chasing in Scopus and Web of Science, targeted hand-searching of key journals, and limited Google Scholar searching. The electronic databases to be searched are MEDLINE (via PubMed), Embase, Scopus, Web of Science Core Collection, and SPORTDiscus (via EBSCOhost). Supplementary searching will include backward reference-list screening of included sources, forward citation chasing in Scopus and Web of Science, targeted hand-searching of key journals in judo performance analysis, and limited Google Scholar searching only to identify hard-to-locate relevant records or citation links. Database coverage will extend from inception to 30 March 2026.

Main outcome(s) A structured evidence map across four domains: (a) attack timing and pacing; (b) time-motion structure and combat phases; (c) Golden Score dynamics; and (d) observational methodology, instruments, and software. The charting form will additionally capture whether event-level timing data suitable for recurrent-event analysis are available.

Additional outcome(s) A narrative gap map identifying the scarcity of event-level attack-onset and inter-attack interval data, the limited use of models designed for recurrent attacks or repeated athlete performances, and methodological inconsistencies in reliability and validity reporting.

Data management Records will be imported into Rayyan (new.rayyan.ai) for deduplication and blinded screening. Data will be charted using a pilot-tested standardised extraction form and stored in Microsoft Excel. Version control will be maintained throughout.

Quality assessment / Risk of bias analysis Formal risk-of-bias appraisal will not be used as an eligibility gate because the primary aim is evidence mapping rather than effect estimation. Methodological quality indicators will be charted descriptively, including contest-sampling procedures, operational definitions, timing precision, coder training, software, inter-rater and intra-rater agreement, validity evidence, and reporting transparency.

Strategy of data synthesis Narrative synthesis using descriptive numerical summaries, organised across the four evidence domains. No meta-analysis is planned due to expected heterogeneity in study aims, units of analysis, and operational definitions. Results will be stratified descriptively by sex, weight category, competition round, competition level, rule epoch, and score status where possible.

Subgroup analysis Descriptive subgroup comparisons by: sex; weight category; rule epoch (pre-2017 vs 2017-2024 vs 2025 cycle); competition level; and whether variables refer to regular time, Golden Score, or both.

Sensitivity analysis The evidence map will be re-examined after restricting to studies reporting explicit event-level timing data to assess the robustness of conclusions regarding the scarcity of inter-attack interval evidence.

Language restriction English only.

Country(ies) involved Poland - Gdansk University of Physical Education and Sport (AWFiS), Gdansk, Poland.

Other relevant information This scoping review constitutes Study 1 of a three-study doctoral thesis at AWFiS Gdansk. Study 2 will apply recurrent-event survival analysis (PWP gap-time or shared-frailty Cox model) to IJF World Championship attack timing data (2022-2024 primary epoch; 2025 as external validation). Study 3 will apply multilevel modelling to Golden Score rhythm stability. The review will be reported in accordance with PRISMA-ScR and PRISMA-S.

Keywords judo; elite judo; scoping review; temporal structure; attack timing; Golden Score; time-motion analysis; observational methodology; performanceanalysis.

Dissemination plans Submission to a peer-reviewed sport-science journal (target: Journal of Sports Sciences or European Journal of Sport Science). Findings will also be incorporated into the doctoral thesis at AWFiS Gdansk.

Contributions of each author

Author 1 - Yue Ren - Conceptualisation, search strategy design, study selection, data charting, manuscript drafting. Supervisory input, critical revision of protocol, final approval for submission.

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