REVIEW QUESTION / OBJECTIVE: This systematic review aimed to: (1) identify and summarize the studies that have examined the effects acute effects of re-warm-up protocols in physical performance of soccer players (vertical height jump, horizontal jump, sprinting time, change-of-direction); and (2) establish a meta-comparison between performing re-warm-up and not performing in the outcomes of the vertical height jump, horizontal jump, sprinting time, change-of-direction.

CONDITION BEING STUDIED: Physical performance of soccer players exposed to re-warm-up.

INPLASY REGISTRATION NUMBER: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 16 January 2021 and was last updated on 16 January 2021 (registration number INPLASY202110055).
the vertical height jump, horizontal jump, sprinting time, change-of-direction.

**Rationale:** Re-warm-up is used to prepare the players for return to match after a period of cool-down or rest. The use of re-warm-up aims to increase the performance in physical qualities that may allows to improve the overall performance in the match.

**Condition being studied:** Physical performance of soccer players exposed to re-warm-up.

**METHODS**

**Search strategy:** Keywords and synonyms were entered in various combinations in the title, abstract or keywords: (soccer OR football) AND (“re-warm-up” OR “post-warm-up” OR “warm-up” OR “pre-activity” OR “post-activation potentiation” OR “stretching”) AND (“jump*” OR “sprint*” OR “change-of-direction” OR “agility”).

**Participant or population:** Soccer players from any age or sex, with normal vision, no partial/chronic injury or illness and no history of neuropsychological impairment.

**Intervention:** Re-warm-up protocols (after warm-up before the match, or in between halves of the match).

**Comparator:** Control conditions (passive control).

**Study designs to be included:** Counterbalanced cross-over design. RCT and non-RCT.

**Eligibility criteria:** Inclusion criteria: (1) Soccer players from any age or sex with no injury or illness, with normal vision, no partial/chronic injury or illness and no history of neuropsychological impairment.; (2) Re-warm-up protocols (always performed after an initial warm-up) conducted in one of the two possible conditions: (i) after warm-up and before the match; and (ii) between halves of the match; (3) Passive control conditions; (4) Vertical height jump, horizontal jump, sprinting time and change-of-direction time; (5) Counterbalanced cross-over design (randomized and non-randomized can be included, since all revealing no significant differences in control conditions); (6) Only original and full-text studies written in English. Exclusion criteria: (1) Other population than soccer players or soccer population with special conditions (e.g., injury, treatment, illness, diseases); (2) Warm-up protocols; (3) Other intervention conditions than passive, namely active control (e.g., massage, foam roller); (4) Other physiological or physical conditions not related to the included outcomes; (5) Other study designs that do not allow comparisons within-subjects for the two conditions (control and re-warm-up); (6) Written in other language than English. Other article types than original (e.g., reviews, letters to editors, trial registrations, proposals for protocols, editorials, book chapters and conference abstracts).

**Information sources:** Electronic databases (PubMed, Scopus, SPORTDiscus, and Web of Science) were searched for relevant publications prior to 12 January 2021.

**Main outcome(s):** Vertical height jump, horizontal jump, sprinting time and change-of-direction time.

**Data management:** A data extraction was prepared in Microsoft Excel sheet (Microsoft Corporation, Redmond, WA, USA) in accordance with the Cochrane Consumers and Communication Review Group’s data extraction template . The Excel sheet was used to assess inclusion requirements and subsequently tested for all selected studies.

**Quality assessment / Risk of bias analysis:** The quality assessment standard for a cross-over study was used. This tool assesses nine items: (i) appropriate cross-over design; (ii) randomized treatment order; (iii) carry-over effect; (iv) unbiased data; (v) allocation concealment; (vi) blinding; (vii) incomplete outcome data; (viii) selective outcome reporting; and (ix) other bias. A possible scoring of low,
unclear, and high can be provided by each item.

**Strategy of data synthesis:** Although two studies can be used in meta-analyses, considering reduced sample sizes are common in the sports science literature, including in re-warm-up studies, analysis and interpretation of results in this systematic review and meta-analysis were only conducted in the case of at least three study groups provided baseline and mental fatigue-related data for the same measure.

**Subgroup analysis:** Fitness status; Age; Sex.

**Sensibility analysis:** To adjust for publication bias, a sensitivity analysis was conducted using the trim and fill method, with L0 as the default estimator for the number of missing studies.

**Language:** English.

**Country(ies) involved:** Portugal, Spain, Chile.

**Keywords:** football; performance; sports training; warm-up; neuromuscular.

**Contributions of each author:**
Author 1 - Francisco Tomás González Fernández - Lead the project, performed the search and methodological search and made the synthesis of results. Wrote and revised the manuscript.
Author 2 - Hugo Sarmento - Performed the methodological search. Wrote and revised the manuscript.
Author 3 - Rodrigo Ramirez-Campillo - Performed the statistical analysis and report. Wrote and revised the manuscript.
Author 4 - Álvaro Infantes-Paniagua - Performed the search and methodological search and made the synthesis of results. Wrote and revised the manuscript.
Author 5 - Sixto González-Villora - Wrote and revised the manuscript.
Author 6 - Filipe Manuel Clemente - Wrote and revised the manuscript.

**Conflicts of interest:** The authors declare that they have no conflicts of interest relevant to the content of this review.