# INPLASY PROTOCOL

To cite: Ribeiro et al. Methodological characteristics, physiological and physical effects and future directions for velocity-based training in soccer: A systematic review. Inplasy protocol 202160036. doi: 10.37766/inplasy2021.6.0036

Received: 11 June 2021

Published: 11 June 2021

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**Support:** **None.**

**Review Stage at time of this submission:** **Data analysis.**

**Conflicts of interest:**
**None declared.**

# Methodological characteristics, physiological and physical effects and future directions for velocity-based training in soccer: A systematic review

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**Review question / Objective:** **This systematic review was conducted to: (1) characterize the main elements of VBT studies (e.g., training protocols) conducted in soccer; (2) summarize the main physiological and physical effects of VBT on soccer players; and (3) provide future directions for research.**
**Condition being studied:** **Soccer players exposed to velocity-based training.**
**Information sources:** **Electronic databases (Cochrane Library, EBSCO, PubMed, Scielo, Scopus, SPORTDiscus and Web of Science) were searched for relevant publications on April 13, 2021 An additional search within the reference lists of the included records was conducted to retrieve additional relevant studies. An external expert was contacted in order to verify the final list of references included in this systematic review, in order to understand if there was any study that was not detected through our research. Possible errata for the included articles were considered.**

**INPLASY registration number:** This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 11 June 2021 and was last updated on 11 June 2021 (registration number INPLASY202160036).

## INTRODUCTION

**Review question / Objective:** **This systematic review was conducted to: (1) characterize the main elements of VBT studies (e.g., training protocols) conducted in soccer; (2) summarize the main physiological and physical effects of VBT on soccer players; and (3) provide future directions for research.**

**Condition being studied:** **Soccer players exposed to velocity-based training.**

## METHODS

**Search strategy:** Free text terms were entered in various combinations in the title or abstract: ("Soccer" OR "Football") AND ("velocity-based" OR "VBT"). In EBSCO and Scielo, the combination of title and abstract is not available. Instead of conducting multiple searches, the search was expanded to "all fields".

**Participant or population:** Healthy soccer players of any age, sex or competitive level.

**Intervention:** Intervention/exposure using VBT.

**Comparator:** Controls performing field-based soccer training, with or without additional non-VBT physical training. Alternatively, controls performing VBT with different velocity losses.

**Study designs to be included:** Multi-arm designs (randomized or non-randomized).

**Eligibility criteria:** Inclusion criteria: (i) Healthy soccer players of any age, sex or competitive level; (ii) Intervention/exposure using VBT; (iii) Controls performing field-based soccer training, with or without additional non-VBT physical training. Alternatively, controls performing VBT with different velocity losses; (iv) At least one pre-post acute and/or a chronic outcome (acute response: immediate response of a physical or physiological variable in response to the exercise; chronic response: adaptations promoted by the training intervention, consisting in permanent changes in physical or physiological variables) related to physiological (e.g., heart rate responses, blood lactate concentrations, oxygen uptake, rate of perceived exertion) and physical (e.g., strength and power, speed, change-of-direction, aerobic capacity) measures; (v) Multi-arm designs (randomized or non-randomized); (vi) Only original and full-text studies written in English, Portuguese, Spanish, Italian and French. Exclusion criteria: (i) Sports other than soccer; players with injuries, illness or disabilities; (ii) Non-VBT based training; (iii) No control groups; (iv) No pre-post data related to acute and/or chronic physiological and physical measures; (v) Descriptive studies or observational analytic; (vi) Written in languages other than English, Portuguese, Spanish, Italian and French. 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 (Cochrane Library, EBSCO, PubMed, Scielo, Scopus, SPORTDiscus and Web of Science) were searched for relevant publications on April 13, 2021 An additional search within the reference lists of the included records was conducted to retrieve additional relevant studies. An external expert was contacted in order to verify the final list of references included in this systematic review, in order to understand if there was any study that was not detected through our research. Possible errata for the included articles were considered.

**Main outcome(s):** At least one pre-post acute and/or a chronic outcome (acute response: immediate response of a physical or physiological variable in response to the exercise; chronic response: adaptations promoted by the training intervention, consisting in permanent changes in physical or physiological variables) related to physiological (e.g., heart rate responses, blood lactate concentrations, oxygen uptake, rate of perceived exertion) and physical (e.g., strength and power, speed, change-of-direction, aerobic capacity) measures.

**Quality assessment / Risk of bias analysis:** The version 2 of the Cochrane risk-of-bias tool for randomized trials (RoB2) (J. A. C. Sterne et al., 2019) was used to assess the risk of bias in the included randomized-controlled trials. Five dimensions are inspected in this assessment tool: (i) bias arising from the randomization process; (ii) bias due to deviations from intended interventions; (iii) bias due to missing outcome data; (iv) bias in measurement of

the outcome; and (v) bias in selection of the reported result. Using RoB2 a qualitative synthesis was performed. Two of the authors (JA and HS) independently assessed the risk of bias. Any disagreement in the rating was resolved through discussion and by a third author (FMC). The Cochrane risk of bias in non-randomized studies of interventions (ROBINS-I) was used to assess the risk of bias in included non-randomized intervention studies (J. A. Sterne et al., 2016). Three domains are analyzed in this assessment tool: (i) pre-intervention (bias due to confounding; bias in selection of participants into the study); (ii) at intervention (bias in classification of interventions); and (iii) post-intervention (bias due to deviations from intended interventions; bias due to missing data; bias in measurement of outcomes; bias in selection of the reported results). Two of the authors (JA and HS) independently assessed the risk of bias. Any disagreement in the rating was resolved through discussion and by a third author (FMC).

**Strategy of data synthesis:** The main outcomes defined for data extraction were: (i) acute or immediate effects related to VBT exposure (internal load, external load, hormonal responses and strength and power); and (ii) adaptations related to VBT interventions (pre-post differences in strength and power, muscle architecture, aerobic performance, sprinting, jumping, change-of-direction [COD] and repeated sprint ability [RSA]). The acute or immediate effects are related to immediate and transitory effects of VBT in internal load (e.g., psychophysiological responses (Impellizzeri, Marcora, & Coutts, 2019), e.g., heart rate, rate of perceived exertion [RPE], blood lactate), external load (e.g., physical demands related to the exercise (Impellizzeri et al., 2019), e.g., distances covered at different speed thresholds, accelerations, decelerations), hormonal responses (e.g., testosterone, growth hormone) and strength and power (e.g., vertical jump height using tests as squat, countermovement or drop jumps). The adaptations represent a structural change in fitness status in which the following measures were extracted: (i) strength and power (e.g., repetition maximum); (ii) muscle architecture (e.g., changes in fascicle angle, muscle thickness); (iii) aerobic performance (e.g., maximal oxygen uptake, distance in field-based tests); (iv) sprinting (e.g., time in specific distances, as 10-, 20-, 30-meters); (v) jumping (e.g., vertical jump in testes as squat, countermovement or drop jump; horizontal jumps); (vi) COD (e.g., time in tests as 5-0-5, pro-agility, T-test); and (vii) RSA (e.g., time or fatigue index in tests of repeated-sprints in different distances). In addition to the main outcomes, the following information was extracted: (i) type of study design, number of participants (n), age-group (youth, adults or both), sex (men, women or both), competitive level (if available), and type of original articles included (study design).

**Subgroup analysis:** None.

**Sensitivity analysis:** None.

**Language:** English.

**Country(ies) involved:** Portugal.

**Keywords:** football; athletic performance; strength training; resistance training; velocity-based training.

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