## Protocol for 'Training Mental Toughness in Sport: A Systematic Review and Meta-analysis of Cross-sectional Designs and Pre- and Post-test Experiments.'[1]

ADMINISTRATIVE INFORMATION

- Update: No

- Registration: Not registered

- Authors:

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- Amendments: N/A

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[1] There were clarifications requested during the review process which prompted changes in the manuscript that may have resulted in some wording and phrasing differences between this protocol and the published version of record. Although those changes to the manuscript did not affect the systematic review process or the results thereof, for transparency purposes we note that there were no adjustments made to this protocol at any point after its inception.

- Support:

    o Sources: N/A

    o Sponsor: N/A

    o Role of sponsor/funder: N/A

INTRODUCTION

- Rationale: Several narrative reviews on mental toughness (MT) exist. Need for (a) systematic review that will combine both qualitative and quantitative research on MT training in sport and (b) a meta-analysis to estimate the efficacy of existing MT interventions.

- Objectives: To add on the current state of knowledge by (a) summarizing quantitative and qualitative evidence on training programs for developing MT in sport and (b) estimating treatment/intervention effects.

METHODS

Eligibility Criteria: Cross-sectional designs and pre- and post-test experiments studying the effects of MT training in sport. No publication date restriction will be applied, but a language (i.e., English only) restriction will be imposed. Any case studies will be excluded from the meta-analysis. Participants of any age, gender, sport, or level receiving MT training (physical and/or psychological) will be included. Scores of MT in sport will be the primary outcome measure of treatment effect.

- Information sources: Embase, Scopus, PubMed, and SPORTDiscus.

- Search strategy: Search terms: (a) Embase: 'mental toughness' OR 'mentally tough' AND ('sport'/exp OR sport OR 'sports') AND english/lim; (b) Scopus: ("mental* tough*" AND sport*) AND (LIMIT-TO (DOCTYPE , "ar") OR

LIMIT-TO (DOCTYPE, "re") OR LIMIT-TO (DOCTYPE, "ip")) AND (LIMIT-TO (Language, "English")); (c) PubMed: ((Mental* AND Tough* [Title/Abstract] AND sport* [Title/Abstract])) AND english[Language]; and (d) SPORTDiscus: TI ("mental* tough*" AND sport*) OR AB ("mental* tough*" AND sport*) OR ("mental* tough*" AND sport*). The last search will be run on November 22$^{nd}$, 2019.

- Study records:

  o Data management: Four phases: (a) Identification (initial results), (b) Screening (electronical and manual removal of duplicates), (c) Eligibility (results are assessed through the eligibility criteria), and (d) Included (final results in quantitative and qualitative syntheses).

  o Selection Process: Two reviewers will be involved. After identifying the databases and the keywords, one of the reviewers will perform the initial search and screening. Next, both reviewers will review the process, along with the set of records initially identified after screening. Lastly, both reviewers will perform eligibility assessment independently.

  o Data collection process: Each reviewer will perform data extraction independently. Original investigators will be contacted for additional information, if needed.

- Data items: (a) general characteristics of the publication: year, authors, organization, country, name of journal, and purpose of the study, (b) characteristics of the participants: number of participants, gender, age, sport, and level, (c) intervention: type and duration, (d) model/design, including number of

groups and number of participants per group, (e) MT instrument: instrument used and MT informant (e.g., self-report, other-report), and (f) results, including variables of primary interest.

- Outcomes of primary interest: Scores of MT in sport.

- Risk of bias in individual studies: Two reviewers will work independently using the Physiotherapy Evidence Database (PED*ro*) scale, the 'Before-After (Pre-Post) Studies With No Control Group' quality assessment tool, and the 'Quality Indicators' measure.

- Data synthesis: MT scores will be transformed into standardized variables. The intended summary effect estimate of each study will be the standardized mean difference (SMD). The meta-analysis will be completed using a random-effects model ($\theta_i = \mu + u_i$). Based on the number of papers that will meet the inclusion criteria, additional analyses may be proposed (e.g., sensitivity or subgroup analyses, meta-regression).