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**Does Strength or Power Have Stronger Associations to Performance Indicators in the Rugby Codes? A Systematic Review and Meta-Analysis.**

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**ADMINISTRATIVE INFORMATION**

**Support** - None.  
**Review Stage at time of this submission** - Formal screening of search results against eligibility criteria.  
**Conflicts of interest** - None declared.  
**INPLASY registration number:** INPLASY2024120031  
**Amendments** - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 8 December 2024 and was last updated on 8 December 2024.

**INTRODUCTION**

**Review question / Objective** The objective of this investigation is to systematically review and meta-analyse the literature to determine whether maximal strength with respect to power measures have stronger associations to within game KPIs in rugby union and league.  
  
**Rationale** To inform resistance training interventions it is important to more clearly establish whether strength versus power has stronger links to key aspects of rugby union and rugby league performance.  
  
**Condition being studied** Strength and power levels within rugby league and union players with respect to within game key performance indicators.

**METHODS**

**Search strategy** A systematic search of the following databases will be undertaken:  
Web of Science  
PubMed  
SportDiscus  
  
Using the following search terms:  
“performance indicators” OR “KPI” OR “match-play” OR “game-play” OR “outcomes” OR “match” AND  
“strength” AND  
“Rugby” OR “Australian Football” OR “Australian Rules Football” OR “American football” OR “gridiron” OR “NFL” OR “National football league”.

**Participant or population** Competitive rugby union and rugby league players.

**Intervention** NA.

**Comparator** NA.

**Study designs to be included** Cross sectional.

**Eligibility criteria** Studies that have compared measures of lower body muscle strength and power to within game performance indicators in rugby union and rugby league.

**Information sources** Web of Science; PubMed; SportDiscus; Contact with authors.

**Main outcome(s)** Whether maximal strength or maximal power have stronger relationships to on field performance in the rugby codes. Such information can inform strength and conditioning and technical training.

**Quality assessment / Risk of bias analysis** A modified version of the Downs and Black Quality Index tool.

**Strategy of data synthesis** To examine the relationship between study effect sizes and their moderators, we will conduct a multivariate meta-analysis using the metafor package in R (Viechtbauer, 2010). Effect sizes for each study will be calculated as Fisher's z-transformed correlation coefficients (ZCOR) using the escalc function. Fisher's z-transformation will be chosen because it standardizes the correlation coefficients, allowing for the combination of both Pearson and Spearman correlations, which are expected to be reported across the included studies. For each effect size, we will use the reported correlation coefficients ( $r_i$ ) and sample sizes ( $n_i$ ) extracted from the studies.

To account for the dependency among multiple effect sizes reported within the same study, we will estimate a block-diagonal variance-covariance matrix using the clubSandwich package in R (Pustejovsky, 2003). A conservative average correlation of 0.5 among effect sizes within each study will be assumed.

A random-effects multivariate meta-analysis model will then be fitted, which will include a random intercept for each study and nested random effects for each effect size within the studies. This model will allow us to estimate the variability both between studies and within studies (i.e., the variability of effect sizes within each study). The

moderator variable Type (categorizing effects into either Strength or Power) will be included as a fixed effect to examine its influence on the study effect sizes. The overall model results, including the estimated variance components and moderator effects, will be interpreted to understand the factors contributing to the variation in effect sizes across studies.

### **Subgroup analysis**

Subgroup will include:

Tackles  
Rucks  
Carries  
Line Breaks  
Errors  
Miscellaneous.

**Sensitivity analysis** We will conduct sensitivity analyses to evaluate the robustness of the findings. These will include excluding studies with a high risk of bias, testing alternative assumptions about within-study correlations, examining the impact of outliers and small studies, and using alternative statistical models. Leave-one-out analyses and subgroup analyses will also be performed to assess the consistency of results across different conditions.

**Country(ies) involved** Australia.

**Keywords** performance analysis; physical preparation; sport; strength and conditioning.

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