

# Protocol v1.0 (for PRISMA)

Title: School Principals' Transformational Leadership and Student Academic Achievement in Chinese Middle Schools: A Systematic Review and Meta-analysis

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## 1) Research Questions

RQ1. Is principals' transformational leadership (TL) positively associated with students' academic achievement?

RQ2. Is this association moderated by (a) region (east/central/west; urban/rural), (b) measurement instrument (MLQ, TLQ, or other validated scales), (c) publication year, and (d) sample level (student/class/school)?

## 2) PICOS

Population (P). Chinese lower-secondary (junior middle) schools—students, teachers, or school-level data from the compulsory-education stage.

Intervention/Exposure (I/E). Principals' transformational leadership measured by MLQ, TLQ, or comparable, explicitly defined and quantifiable indicators.

Comparator (C). Lower TL levels, other leadership styles, or no explicit comparator (correlational and regression designs eligible).

Outcomes (O). Academic achievement (standardized test scores, GPA, pass rates, proportions of high achievers/top-tier rates, etc.).

Study design (S). Quantitative empirical studies, including correlational, regression, group comparison, panel/longitudinal, and quasi-experimental designs.

## 3) Eligibility Criteria

Inclusion

1. Target setting: Chinese junior middle schools.
2. Reports a quantitative association between TL and academic achievement, or provides convertible statistics (for example,  $r$ ,  $t$ ,  $F$ , beta, means/SDs, 2x2 tables).
3. Publication types: journal articles, theses/dissertations, conference papers, and grey literature.
4. Languages: Chinese or English.
5. Time frame: 2000–present.

Exclusion

1. Not set in Chinese junior middle schools.
2. Conceptual/theoretical or purely qualitative studies without convertible effect-size information.
3. Insufficient data for effect-size computation.
4. Duplicate datasets (retain the most complete report).

## 4) Information Sources and Search Strategies

Databases

- International: Web of Science, Scopus, ERIC, Google Scholar.
- Chinese: CNKI, Wanfang, VIP.
- Additional grey-literature sources as feasible.

English search string (example)

("principal\*" OR "school leader\*" OR headteacher\*) AND ("transformational leadership" OR MLQ OR "multifactor leadership questionnaire" OR TLQ) AND ("student achievement" OR "academic

achievement" OR "test score\*" OR GPA) AND ("middle school" OR "junior high" OR "lower secondary") AND (China OR Chinese)

CNKI advanced query (paste-ready; in Chinese)

SU=((([█ OR █ OR █]) AND ([█ OR █ OR MLQ OR TLQ]) AND ([█ OR █ OR █ OR █ OR █ OR GPA]) AND ([█ OR █ OR █])) AND NOT SU=(█ OR █ OR █))

Notes

- Record database, exact strings, dates, and hit counts.
- Apply language and year limits at the database level where permitted.
- Hand-search reference lists and relevant review papers.

## 5) Data Extraction and Risk of Bias

Data extraction (core fields)

- Study identifiers (authors, year), region (east/central/west; urban/rural), setting, sample sizes at each level, measurement instrument (MLQ/TLQ/other), design, outcome operationalization, effect-size statistics (prefer  $r$ ; retain convertible data), covariates/controls, sample level (student/class/school), and notes.

Risk of bias

- Non-randomized/observational designs: ROBINS-I.
- Cross-sectional designs: JBI checklists.
- Dual independent coding with reconciliation; report inter-rater reliability (Cohen's kappa).

## 6) Effect Sizes and Meta-analytic Models

Primary effect size

Pearson correlation ( $r$ ) transformed to Fisher's  $z$ ; standard error  $SE = 1/\sqrt{n-3}$ . Convert alternative statistics to  $r$  when needed. Use Hedges'  $g$  where only mean/SD group data are available; convert to  $r$  for synthesis when appropriate.

Synthesis model

Random-effects meta-analysis (REML preferred; DerSimonian–Laird as sensitivity). Report pooled effect with 95% confidence interval, heterogeneity ( $I^2$ ,  $\tau^2$ ), Cochran's  $Q$ , and 95% prediction interval.

Dependent effects / multiple effects per study

Address dependence using three-level meta-analysis or robust variance estimation with small-sample adjustments. Select one effect per study for specific sensitivity checks where advisable.

Moderator and subgroup analyses

Region, instrument (MLQ/TLQ/other), publication year (meta-regression), and sample level (student/class/school). Pre-specify coding rules for categories.

Publication bias and small-study effects

Funnel plots, Egger's regression test, and trim-and-fill procedures.

Sensitivity analyses

Leave-one-out diagnostics; influence analyses (DFBETAS, Cook's distance where applicable); alternative effect-size specifications (for example, using  $g$  versus  $r$ , alternative dependence structures).

## 7) Planned Outputs and Transparency

Figures: PRISMA flow diagram; overall forest plot; subgroup forests; funnel plot.

Tables: Search strategy details; eligibility criteria; study characteristics; risk-of-bias assessments (ROBINS-I/JBI); effect-size summary; moderator analyses.

Reproducibility: Deposit data, code, and outputs on OSF; include the PRISMA 2020 checklist.

Provide a project README describing directories, software versions, and analysis steps.

