Umbrella Review of Meta-Analyses on the Benefits and Risks of Computerised Adaptive Testing

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Objective. To synthesise meta-analytic evidence on the benefits and risks of computerised adaptive testing (CAT).

Main findings

- Small positive effects on **motivation** (d = 0.08) and **positive emotions** (d = 0.13).
- Higher **anxiety** overall (d = 0.08), particularly relative to self-adapted testing (d = 0.19).
- Slightly lower **test scores** (median d = −0.08; range −0.14 to 0.03).

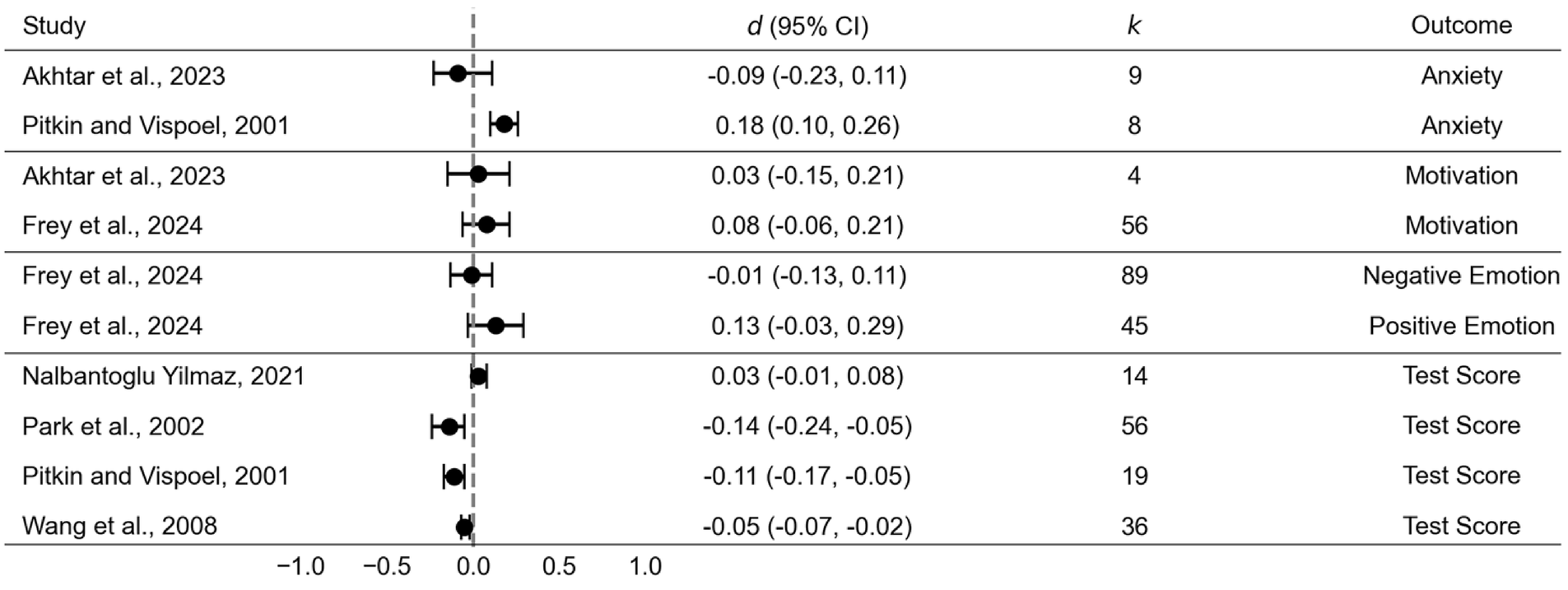


Figure 1. Associations between CAT and test-taker outcomes. Cohen's d and 95% confidence intervals; k denotes the number of effect sizes.

Methods and evidence

Four databases searched through **9 November 2025**: PubMed, ProQuest PsycINFO, Scopus and Web of Science.

Independent dual screening and JBI quality appraisal. Publication overlap assessed using corrected covered area.

6 reports; 10 meta-analyses. JBI scores: 5–10/11 (median 7).

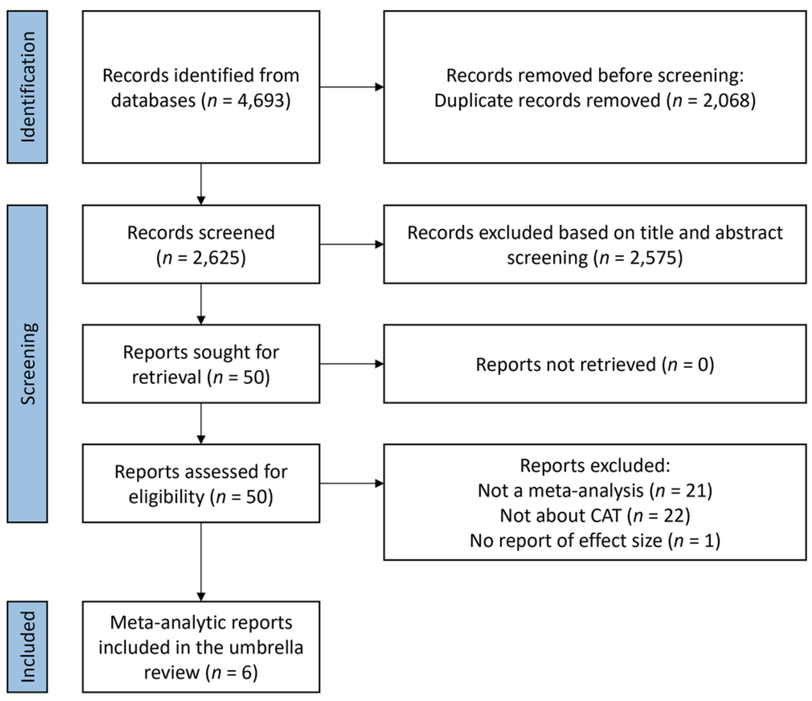


Figure 2. PRISMA flowchart of study identification and selection.

Anxiety: re-analysis of primary studies

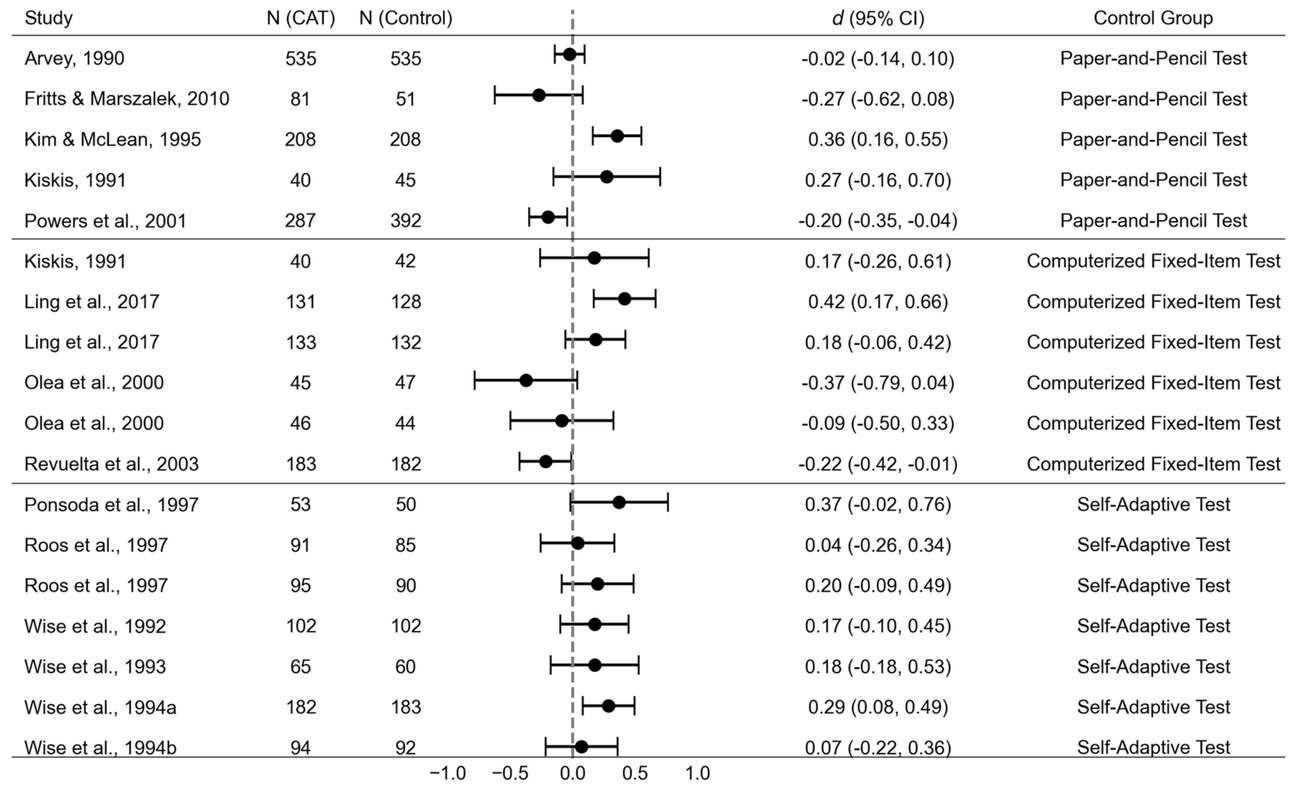


Figure 3. Anxiety effects from 14 studies (18 effect sizes), grouped by comparator. Positive values indicate higher anxiety with CAT.

Overall anxiety: d = 0.08 (95% CI −0.03 to 0.19). Compared with **self-adapted testing**, anxiety was higher: d = 0.19 (95% CI 0.08 to 0.30; I^2 = 0%).

Implications

- **Examinee control:** Test whether limited choice of item difficulty reduces anxiety while preserving measurement precision.
- **Score interpretation:** Use format-independent criteria to determine whether lower CAT scores reflect greater accuracy or systematic error.
- **Evidence synthesis:** Separate adaptivity from computer delivery, and evaluate outcomes such as cognitive load and engagement.

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