Tailored Dialogues with Large Language Models to Counter Health Misconceptions: A Randomised Controlled Trial

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Background and aims
Health misconceptions pose a major global public health challenge. Artificial Intelligence (AI) tools are emerging as promising assets to debunk pervasive health myths and misinformation. This randomised controlled trial (RCT) tested the efficacy of real-time, tailored dialogues with a large language model (LLM; Gemini 2.5 Flash) in countering health misconceptions.

Methods
Following CONSORT guidelines, we recruited a quota-sampled cohort of 292 UK or US residents (51% female; mean age = 30; aged 18–40). Participants were evenly randomised into two conditions: an intervention group (with three-round LLM dialogues addressing their chosen health misconceptions) and an active control group (with three-round LLM interactions discussing AI ethics in education).

Results
The intervention group showed a 47% reduction in agreement with their endorsed health misconceptions and a 37% decline in confidence of these beliefs ($ps < 0.001$, Cohen's $ds > 0.90$). Baseline predictors of these effects included trust in AI, a preference for effortful thinking, positive affect, and self-rated health ($\eta^2s > 0.04$, $ps < 0.05$). Traits such as AI acceptance, actively open-minded thinking, and agreeableness predicted the application and sharing of corrected knowledge post-intervention ($\eta^2s > 0.05$, $ps < 0.05$). Notably, positive affect moderated the likelihood of applying what participants learned about health literacy from AI in their lives ($\eta^2s = 0.07$, $p = 0.02$).

Discussion
This study establishes a novel paradigm for enhancing public health communication effectiveness, leveraging LLMs to effectively counter entrenched health misconceptions and foster evidence-based health perspectives.