Effectiveness of Mental Health Chatbots in Depression and Anxiety for Adolescents and Young Adults: A meta-analysis of Randomized Controlled Trials

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Background:

The mental health chatbot represents an innovative online-based intervention designed for adolescents and young adults. This digital assistant is dedicated to providing assistance and guidance to individuals grappling with the complexities of depression and anxiety.

Objective:

The study objective was to evaluate the effectiveness of the mental health chatbot in alleviating symptoms of depression and anxiety among adolescents and young adults.

Methods:

A systematic review framework was employed with a protocol pre-registered on Prospero (CRD42023418877). Databases were systematically searched, including PubMed, ACM Digital Library, Embase, Cochrane and IEEE. The data extraction process adhered to a predefined framework. The studies quality was appraised using the Critical Appraisal Skills Programme questionnaire. Data synthesis was conducted narratively, and meta-analysis was performed by pooling data from the original studies.
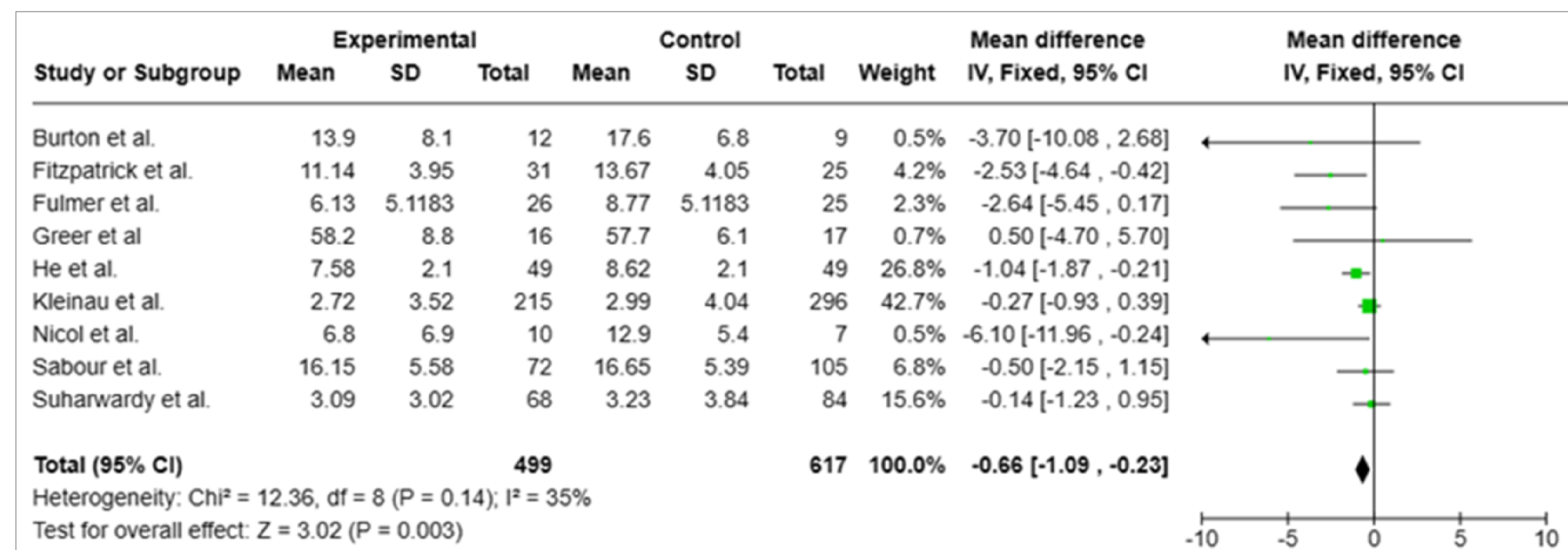

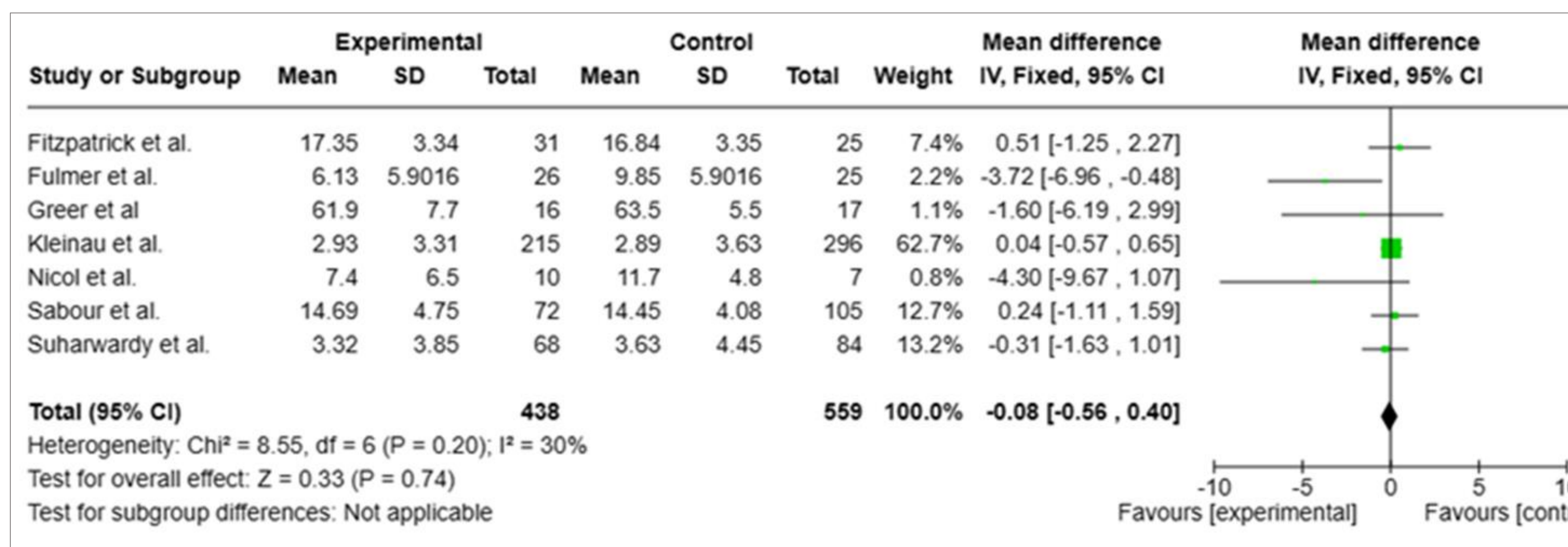Figure a. Forest plot for the mental health chatbot interventions on depressive symptoms

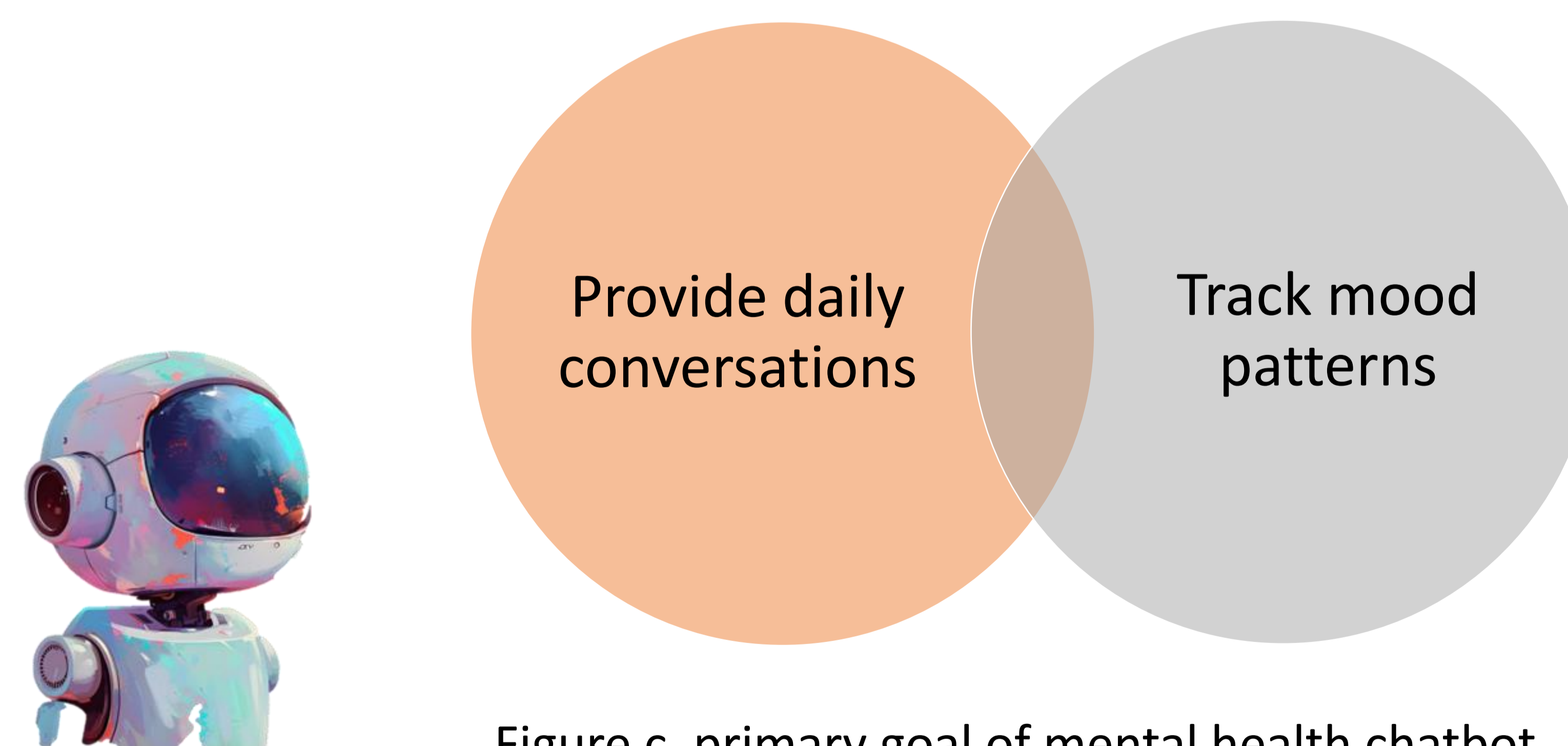Figure b. Forest plot for the mental health chatbot interventions on anxiety symptoms

Figure c. primary goal of mental health chatbot.

Data analysis:

All meta-analyses were performed in RevMan Version: 6.1 (Nordic Cochrane Center, Cochrane Collaboration, Copenhagen, Denmark) for outcomes that were evaluated in at least 2 of the included RCTs. As all extracted data were continuous, the standard mean difference and weighted mean difference with a 95% confidence interval were calculated to summarize the effect estimates for continuity data.

Results:

Ten randomized controlled trials focused on an acute population, mainly females and university students. The majority studies were predominantly targeting female participant university students. Chatbots designed for daily conversations and mood monitoring, using cognitive behavioral therapy techniques, showed efficacy in treating depression (95% CI = -1.09 to -0.23; p = .003). However, it is essential to highlight that these interventions utilizing chatbots for mental health were not found to be efficacious in managing symptoms of anxiety (95% CI = -0.56 to 0.4; p = .74).

Conclusions:

Evidence supports the effectiveness of mental health chatbots in treating depression, but further exploration and refinement are needed to optimize their efficacy in managing anxiety.

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