Standalone Apps for Anxiety and Depression Show Promising Early Efficacy:

A Synthesis of Meta-Analytic Results

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Given the high incidence of anxiety and depressive disorders and the very few persons who receive treatment for these disorders (Wilhelm et al., 2019), researchers have become increasingly interested in standalone treatments for anxiety and depression. As the ubiquity of smartphones has grown across the globe, both academia and industry alike are increasingly developing and testing standalone interventions which might treat anxiety and depressive symptoms. In a recent meta-analysis, Weisel et al. (2019) summarized and concluded that apps contribute to significant reductions in depressive symptoms (Hedges’ $g = 0.33$) but no significant reductions in anxiety symptoms. The paper concludes that “smartphone apps as standalone psychological interventions cannot be recommended based on the current level of evidence”. The current comment further evaluates the evidence base for making these summary claims.

**Strength and Efficacy when Including Transdiagnostic Treatment Impacts.** Despite the substantial literature which has developed in the last decade surrounding the effectiveness of transdiagnostic digital interventions in treating anxiety and depressive disorders (Păsărele u et al., 2017; Wilhelm et al., 2019), the abstract and conclusions are only based on disorders in which anxiety or depressive symptoms were the only target. This decision is unjustified within the current study. Moreover, it results in a substantial decrease in the potential evidence base of the targeted $N$, as well as a substantial decrease in the confidence bounds surrounding the estimates. This effect on confidence bounds was particularly large for anxiety for which the confidence intervals ranged from -0.1 to 0.7. Moreover, for both anxiety and depression, not only do the effect size of confidence intervals decrease when transdiagnostic interventions are included, but also the estimated effect sizes increase.

**Two Published Meta-Analyses with More Studies and More Trials Suggest Strong Efficacy.** Additionally, Weisel et al. (2019) conclusions about the limited evidence base were
likely principally based on the overly restrictive inclusion criteria. Two prior meta-analyses have been published on treating anxiety and depressive symptoms using smartphone-based methods (Firth, Torous, Nicholas, Carney, Pratap, et al., 2017; Firth, Torous, Nicholas, Carney, Rosenbaum, et al., 2017). Weisel et al. (2019) based their conclusions about depression on four studies, all of which were included in another meta-analysis (Firth, Torous, Nicholas, Carney, Pratap, et al., 2017). The prior meta-analysis included a total of 3,414 participants (Firth, Torous, Nicholas, Carney, Pratap, et al., 2017) and included an additional randomized controlled trial targeting primary depression not contained within the Weisel et al. study (Watts et al., 2013). This study found significant symptom reduction in both standalone mobile and computer intervention groups with non-significant means favoring the mobile group over the computer group (Watts et al., 2013). Within anxiety, a prior meta-analysis included more participants and an additional study testing the standalone efficacy of an app-based intervention (Firth, Torous, Nicholas, Carney, Rosenbaum, et al., 2017). This study found a significant reduction in trait anxiety after four weeks for the app-based experimental group but not for the control group ($g = 0.156$), as well as significant reduction in state anxiety after each usage of the app-based intervention which was significantly greater than the control group (average $g = 0.755$) (Villani et al., 2013).

**High Heterogeneity Studies.** Notably, Weisel et al. describe the importance of doing the current meta-analysis in part because prior meta-analyses included apps which targeted “attentional control”. Unfortunately, the same weakness is found in the current review, given that attention bias modification was present in two of the four comparisons conditions included in the evaluated anxiety studies which informed the primary study conclusions. We agree with Weisel et al.’s own concerns about including these types of articles as they differ substantially from the
other types of treatment offered in applications (Weisel et al., 2019). However, the decision to include this study while simultaneously excluding many other studies which evaluated the treatment impact on anxiety symptoms leads to very imprecise parameter estimates. Here we believe the inclusion of attentional bias modification studies, including Enock et al. and Clarke et al., are so qualitatively different that the pooled comparison loses potential meaning (Clarke et al., 2016; Enock et al., 2014).

**Appropriate Comparison Condition for Standalone Technology-Based Treatments**

**Is No Treatment At All.** The evidence base suggests that app-based interventions lead to significant and superior reductions in anxiety and depressive symptoms in app interventions broadly. However, the authors conclude that “standalone smartphone apps cannot be recommended” (Weisel et al., 2019). These recommendations appear to be outside the scope of the meta-analysis itself and based on one of two reasons: (1) the interventions may not have the effect sizes of traditional interventions or (2) the interventions, when evaluated qualitatively, do not appear to reach the magnitude achieved in internet interventions. Both these premises are overreaching and do not appear to reflect the evidence base. Firstly, most persons do not receive any mental health treatment when they have an anxiety or depressive disorder (Wang et al., 2005); furthermore, even when they do engage in health seeking behavior, in-person treatment is often delayed for weeks or months (Trusler et al., 2006). Consequently, the idea that standalone treatment apps for anxiety and depression should inherently match traditional in-person treatment is not a valid comparison. In contrast, apps offer immediate treatment to afflicted individuals who are awaiting an in-person appointment. The alternative, suggested by those who criticize technology-based treatment, is no treatment at all. In regard to the direct qualitative comparisons made in the discussion by the authors, the claim that internet-based interventions
appear to have a stronger efficacy than apps based on the reported effect sizes is misguided because the only studies which have directly compared the effects of app-based treatments with internet-based treatments for anxiety and depression have found either no significant differences between the two or significant differences favoring apps (Dagöö et al., 2014; Watts et al., 2013). There is even some evidence that adding an app to internet based treatment may aid internet-based treatments (Boettcher et al., 2018). Ivanova et al. (2016) found no large differences between an unguided app-based internet intervention compared to a therapist guided app-based internet intervention. Thus, contrary to the authors’ summaries, apps for anxiety and depressive disorders significantly reduce anxiety and depressive symptoms with a medium effect size when compared to no treatment at all, and the current evidence suggests similar or marginally superior performance of apps to internet based interventions. However, conclusions here are quite premature as very few studies have been conducted.

Conclusions from the Body of Evidence Amassed Across the Three Meta-Analyses as Well as Other Standalone Studies. Given that the meta-analysis only included one new study while simultaneously excluding several studies included in two other meta-analyses on this topic, it is important to interpret the totality of the evidence. The totality of the evidence clearly suggests that the typical standalone intervention which has been tested to treat anxiety and depressive symptoms in randomized controlled trials demonstrates significant and superior efficacy compared to waitlist control conditions, that app-based interventions appear to be approximately or marginally superior to internet-based applications, and that the type of the design of the smartphone application has a large impact on the efficacy with more traditional cognitive-behavioral interventions demonstrating promising early efficacy in apps. We recommend the need for further research before drawing definitive conclusions, but the current
evidence base suggests that apps show promising early efficacy in treating anxiety and depressive symptoms.
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