



Letter to the Editor

Issues with inclusion and interpretation; a cause for concern in mHealth reviews?*



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To the editors,

We read with interest the systematic review by Wang et al. (2018) on “the effectiveness of mobile apps for monitoring and management of mental health symptoms or disorders”; which sought to identify all studies of mobile apps for ‘mental health in all ages’, across a broad range of outcomes (including mood disorders, psychotic disorders, along with sleep, substance use and suicidal behaviours), including both single-arm studies and randomized controlled trials (RCTs). Given this very broad scope, we were surprised to see the authors included just 16 apps, only 5 from RCTs - particularly given that recent meta-analyses of smartphone interventions focused on single mental health outcomes, such as anxiety (Firth et al., 2017a) and depression (Firth et al., 2017b) identified 9 and 18 RCTs, respectively, for these outcomes alone.

In particular, we were concerned about the omission of app studies which have shown negative or null findings. Wang et al. (2018)'s conclusions were broadly positive, purporting that “fourteen [of 16] apps were proven to have clinical validation in reducing mental health symptoms or disorders”. However, certain key studies were omitted from the review, particularly ones which have produced results in direct contrast with the authors findings. For instance, an RCT of the MONARCA app conducted in 78 people with bipolar disorder (Faurholt-Jepsen et al., 2015) showed that daily mood monitoring using smartphones actually showed a tendency towards increased depressive symptoms. However, this rigorous study was not included in Wang et al. (2018)'s review. The omission of such studies from a systematic review claiming to capture all relevant information clearly urges some caution in the positive interpretation of the literature as a whole.

Additionally, some interpretation of individual studies included in the review brings further cause for concern. For instance, the authors included a study of an ‘attention bias modification training’ (ABMT) app for anxiety called *Personal Zen* (Dennis-Tiwary et al., 2017) as among their ‘14 studies proven to have clinical validation in reducing mental health symptoms or disorder’. Wang et al. (2018) summarised

this study's findings as showing that “usage of ABMT App could improve efficient allocation of attention to threat and facilitate reduction in stress”; although failing to mention anywhere in their review that in fact the app produced no significant effects on symptoms of anxiety beyond that of a control condition (which was a placebo ABMT app with no active component). The lack of symptomatic effects observed in the *Personal Zen* study are also in line with two other recent trials of app-based ABMT for anxiety (Enock et al., 2014; Yang et al., 2017) – although again these null findings were not included in Wang et al. (2018)'s review.

Furthermore, the authors have based their conclusions primarily on the findings of non-randomized studies; in which demand characteristics and other factors are likely to be driving positive results. In particular, the concept of a ‘digital placebo’ has been overlooked – whereby participants' deep connection to their smartphone devices may bring about significant changes in the reporting of mental health symptoms following an app-based intervention, even without any ‘psychologically active’ components of the app taking effect (Torous and Firth, 2016). This ‘digital placebo’ is best demonstrated by ABMT trials above (Dennis-Tiwary et al., 2017; Enock et al., 2014; Yang et al., 2017), along with a recent study of the Headspace mindfulness app, showing equal benefits from a sham-meditation control condition (Noone and Hogan, 2018). Furthermore, the multitude of app trials showing a general equivalence of positive findings from almost every ‘psychological intervention’ delivered via smartphone platforms, regardless of the underlying theory (examples include Areal et al. (2016); Bakker et al. (2018); Roepke et al. (2015)) indicates that the reported ‘beneficial effects’ observed in these studies may indeed be due to other factors than active psychological components of the apps themselves.

In conclusion, the rapid advances in digital technologies (including smartphone apps), could indeed present a range of new and promising interventions for mental health. Currently however, there is increasing pressure (largely from researchers) for commercial mHealth industries to improve their standards, particularly with regards to the efficacy claims which are made for mental health apps (Bhugra et al., 2017;

* Comment on: A systematic review of the effectiveness of mobile apps for monitoring and management of mental health symptoms or disorders (Wang et al., 2018).

Torous and Firth, 2018). Clearly, it is of utmost importance that researchers themselves adhere to these standards for objective and accurate presentation of data (Torous et al., 2018). The scepticism which currently surrounds the field will only be overcome when faced with rigorous and unbiased evidence. Systematic reviews provide a practical and concise method for appraising the evidence within a specific field, and are particularly important for updating clinicians and academics on rapidly growing fields, such as mHealth in mental health. Thus, further rigor is required for future efforts to (i) include all eligible information, especially null trials, (ii) present the available evidence with precision and accuracy, and (iii) interpret overall findings in the context of potential biases, such as placebo effects.

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