Moving forward with questions of process and procedure in cognitive bias modification research: three points of consideration

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Abstract

There is ongoing debate surrounding the efficacy of Cognitive Bias Modification (CBM) for the reduction of emotional vulnerability. In part, the debate stems from researchers asking different questions of the existing research. Specifically, differences depend on whether researchers were interested in; the clinical effects of CBM procedures (did CBM reduce emotional vulnerability, irrespective of an assessment of bias change?), or the clinical effects of successfully modifying the cognitive bias process of interest via CBM (did CBM change the targeted bias, and did this change in bias predict reductions in emotional vulnerability?). Here, three considerations are raised that, regardless of the research question of interest, have yet to be fully addressed in moving forward with CBM research. First, the need for clarity in study designs to determine which question is being addressed. Second, CBM interventions that routinely produce the intended change in bias need to be developed before addressing whether there is any subsequent change in emotional vulnerability. Third, this relies on developing reliable assessments of bias as an essential foundation for addressing any further questions about processes or procedures.

Debate continues surrounding the efficacy of Cognitive Bias Modification (CBM) as a potential intervention for emotional vulnerability. Recently, a series of papers and replies has reinvigorated this debate. Cristea, Kok, & Cuijper's (2015) original meta-analysis examined the efficacy of Cognitive Bias Modification (CBM) as a potential intervention for anxiety and depression. The results suggest that little, if any, clinical benefit of CBM procedures, amongst problems with small samples and risk of publication bias. In response, Grafton and colleagues (2017) report a reanalysis of Cristea et al.'s data addressing a different question. Namely, does the process of modifying cognitive bias (i.e. if the CBM task is successful) have a positive impact on emotional vulnerability? This reanalysis sheds a more positive light on CBM research; the authors argue that studies in which bias was effectively changed also showed benefits to emotional vulnerability. Online and published responses (Ioana A Cristea, 2018; Ioana A Cristea, Kok, & Cuijpers, 2017; Grafton et al., 2018; Kruijt & Carlbring, 2018) have continued the discussion, with a particular focus on the sub-setting of studies, the calculation of effect sizes, and the validity of post hoc evaluation of studies to address the question of whether successfully shifting bias has a clinical benefit (Grafton et al., 2017).

A debate over which of these analyses is more appropriate to assess CBM research is unlikely to be productive, as each analysis addresses a different question. As noted by Kruijt & Carlbring (Kruijt & Carlbring, 2018), both analyses should be able to co-exist to address separate questions. This paper aims to further the discussion by raising three points that have yet to be fully explored in moving forward this discussion, and CBM research more broadly.

First, Grafton et al.'s (2017) conclusion that "the term 'cognitive bias modification' should be used to refer only to the process of cognitive bias change, rather than being employed as a label for any procedure intended to elicit this process regardless of whether

it successfully does so" could be interpreted as arguing that CBM is only CBM if it is successful. Indeed, this perspective has been reflected in several responses (Ioana A Cristea, 2018; Kruijt & Carlbring, 2018) and, in truth, was the impression of this author upon first read. More clearly, Grafton et al. (2018) describe their position as two-fold; a) evidence of modification of bias is needed to claim that cognitive bias has been modified, and b) studies that fail to modify bias cannot be used to evaluate the emotional impact of modifying cognitive bias (also see Clarke, Notebaert, & MacLeod, 2014; MacLeod & Grafton, 2016). This clarification supports an approach that can be adopted in future research to elucidate the potential benefits of changing cognitive bias on emotional vulnerability.

Retrospectively however, it is difficult to ascertain whether sufficient evidence exists to adequately address this question. Few studies make Grafton and colleagues' (2017) distinction between research questions, and often CBM studies read as an assessment of whether the CBM intervention improves emotional vulnerability. It is rarely made explicit in CBM research whether the study sought to examine the direct effect of CBM interventions, or the effect of shifting bias, on emotional vulnerability. Further, many studies do not include assessments of bias that allow for an examination of bias change. As such, if the question of interest were whether bias change leads to improvements in emotional vulnerability; at best, it is under the assumption that the procedure leads to a robust change in the process of cognitive bias change. In order to make progress in addressing either question; future CBM research must be explicit about the purpose of the study and ensure that the design allows for an examination of changes in bias.

Second, whilst one of the strengths of the experimental medicine approach is that we might draw conclusions about the relationship between changes in cognitive bias and emotional vulnerability, both Cristea et al. (2016) and Grafton et al. (2017) suggest that a change in approach is needed. Targeted effort must be invested in developing CBM interventions that robustly produce the desired change in bias. This is not a new recommendation (MacLeod & Grafton, 2016; Notebaert, Clarke, Grafton, & MacLeod, 2015) and research has committed to developing new interventions. However, large portions of CBM research continue to use tasks, such as dot-probe based CBM, that do not routinely produce the change in bias of interest. It appears that Cristea et al. and Grafton et al. broadly agree that; developing tasks that successfully shift bias routinely is necessary before CBM research turns again to testing the influence of CBM interventions on emotional vulnerability (whether directly or via changes in bias). Stated differently, the field might consider avoiding characterising CBM tasks as a new potential treatment for emotional disorders, until the tasks intended to produce a change in bias are routinely successful in doing so.

Third, we need reliable assessments of bias, otherwise, we cannot draw reliable inferences about any changes in bias. Again, this is a suggestion that has been made before (Kappenman, Farrens, Luck, & Proudfit, 2014; MacLeod & Grafton, 2016; Notebaert et al., 2015; Waechter & Stolz, 2015), but a shift towards measurement validation and reporting reliability as standard has not yet made it into standard practice (Parsons, Kruijt, & Fox, 2018). To examine whether changes in bias exist in the first instance we need assessment

procedures that yield reliable measurements. The correlational and/or mediation analyses required to support this hypothesis require very reliable (i.e. > .9) measures (Hoyle & Robinson, 1999; Rodebaugh et al., 2016). The reliability of cognitive bias measurements is typically either; sub-optimal, or goes unreported (Gawronski, Deutsch, & Banse, 2011; Parsons et al., 2018; Vasey, Dalgleish, & Silverman, 2003). This suggests, that; even before novel or improved CBM interventions are developed, research with a specific focus on developing measures that produce reliable assessments of cognitive bias is needed. Without a) routinely reporting measurement reliability, and b) developing tasks that measure cognitive bias reliably, it is difficult to picture how CBM research can provide robust answers to either of the important questions raised in the debate between Cristea, Grafton and colleagues.

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