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Clinical Efficacy of Cognitive Bias Modification Interventions

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Clinical Efficacy of Cognitive Bias Modification Interventions

Reducing the health burden of depression and anxiety disorders requires improvement in both treatment outcomes and the accessibility of treatment approaches. Interventions based on cognitive bias modification (CBM)[1] have been suggested as one promising way to achieve these aims. CBM uses simple computerised cognitive training procedures to target biases in processes such as attention and interpretation. CBM methods were initially developed to probe cognitive mechanisms underlying psychopathology in experimental studies,[2,3] but the past decade has seen increasing interest in their potential clinical applications.[4] CBM procedures are appealing as clinical interventions, firstly because they might allow precise, direct, and efficient targeting of key cognitive mechanisms, and secondly because their simple computer-based format renders them inexpensive and easy to disseminate. Thus, CBM-based interventions could be an exciting treatment proposition, if they are in fact effective.

In this issue of The Lancet Psychiatry, Liviu Fodor and colleagues[5] evaluate the clinical efficacy of CBM interventions for depression and anxiety via a network meta-analysis. Their work provides a highly valuable synthesis of the current evidence, and a much-needed update to previous work.[6] The clearest results were for anxiety: CBM interventions targeting interpretation biases were superior to both waitlist (standardised mean difference [SMD] –0·55, 95% CI –0·91 to –0·19) and sham training (SMD –0·30, –0·50 to –0·10) controls, but those targeting attentional biases were not (SMD vs waitlist, –0·30, –0·68 to 0·08; and SMD vs sham –0·05, –0·22 to 0·12), unless post-traumatic stress disorder trials were excluded (SMD vs waitlist, –0·35, –0·59 to –0·12; and SMD vs sham –0·16, –0·28 to –0·04).

Although the meta-analysis effect size estimates provide a valuable overall perspective of the current evidence, their interpretation requires some caution. The studies

included were of variable quality, and many were somewhere between experiment and treatment trial in terms of their design. Furthermore, CBM research poses a challenge for the synthesis of data in metaanalyses. As reflected in table 1 of the Article[5], CBM interventions are highly heterogeneous, even within one subtype. A disappointing meta-analytic effect size might therefore mask a situation in which, for example, one specific CBM intervention was highly effective for one particular anxiety disorder. Additionally, many trials have continued the experimental tradition of a closely matched sham training control. Although at an individual study level such a control condition is very useful to test the specificity of intervention effects, the resulting heterogeneity in sham conditions across trials poses a problem in classing all controls as equivalent placebo conditions.[7] This issue might be magnified within a network meta-analysis. For instance, the performance of sham conditions for CBM interventions that target attentional biases might influence the efficacy estimates of unrelated CBM interventions that target interpretation biases. Of course, metaanalyses always require assumptions to be made, each of which might provoke discussion or debate. In fact, the complexity of the evidence and the effect of one or another assumption is in itself highly informative; in this particular study, the extensive appendix and data provided by the authors open up this complexity for further exploration, allowing valuable insights even beyond those from the detailed subanalyses done by the authors themselves.

Returning to the main results of this meta-analysis, should they be viewed as encouraging or disappointing? The finding that such minimal interventions can have any effect whatsoever is encouraging and noteworthy; however, the effect sizes are modest. This caveat is perhaps unsurprising: typical CBM interventions target only one cognitive process within a complex disorder, and might involve nothing more than two brief computer-based training sessions per week. As such, they are different in scope and intensity to multicomponent treatments such as cognitive behavioural therapy, for which even the

internet-delivered versions involve extensive between-session exercises, such as activity scheduling or behavioural experiments. Nevertheless, if the effects of CBM procedures on symptoms are indeed modest, do they have any use as clinical interventions?

CBM interventions are unlikely to be like-for-like replacements for established treatments, but they might have value as minimal intensity options to provide some symptom relief. Furthermore, the primary clinical use of CBM interventions is probably not as stand-alone treatments, but rather as mechanism-focused adjuncts to other approaches. For example, the largest CBM trial to date found that adding a CBM intervention to inpatient treatment for alcohol dependence reduced relapse rates 1 year later.[8]

Addressing questions about the clinical use of CBM interventions represents a major challenge for the field, and requires large, well powered, high-quality trials among individuals seeking treatment. However, most CBM interventions are probably not yet ready for such trials at present. Most interventions are still prototypes, with their operationalisation and delivery only slightly modified from their laboratory-based experimental precursors. For example, researchers often appear to expect generalisation of learning from CBM sessions to symptom reduction in everyday life based on infrequent (eg, twice a week) training and no instruction to practise applying the learning outside the training context, despite this approach running counter to the evidence base of almost every field of learning. Optimising CBM interventions, their delivery, and effects on symptoms requires a close interplay of experimental and clinical translational research. In turn, this approach will provide a firmer foundation for the next generation of trials to address the questions of how best, if at all, CBM interventions can contribute to reducing the burden of depression and anxiety disorders.

Conflict of Interest Disclosures

SEB does experimental and clinical research using cognitive bias modification paradigms, and continues to apply for funding for such research. SEB is employed by Ruhr-Universität Bochum, Bochum, Germany. SEB received no specific funding for this Comment.

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