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REPLY

Lack of Conceptual Clarity Impedes Progress in Cognitive Intervention Research: Reply to Kira (2022)

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In a commentary on Moreau (2022), Kira (2022) emphasizes the importance of clarifying the conceptual basis of cognitive interventions and discusses a number of adverse circumstances known to impair cognitive function. In this reply, I focus on three points of clarification. First, I contend that one needs to make a distinction between interventions focusing on healthy individuals and those targeting clinical populations, as the postulated mechanisms of improvement in typical settings may differ from those underlying impairment. I further argue that with this conceptual distinction in mind, evidence still suggests no plausible mechanistic explanation for the improvements discussed in Moreau (2022) and that the appeal of more holistic approaches remains. Finally, I propose that a lack of clarity around issues such as construct validity and measurement impedes progress in this research area and that important insight could be gained from a more systematic exploration of the mechanisms underlying cognitive improvement.

Keywords: cognitive improvements, brain plasticity, brain dynamics, academic achievement, construct validity

I thank Ibrahim Kira for his commentary on Moreau (2022). Kira (2022) makes a number of valuable points, especially in the context of clinical interventions, and I appreciate the opportunity to elaborate further on this topic. Here, I focus on three important aspects in the hope of providing clarification on potential points of contention.

The commentary emphasizes the well-documented impact of a number of factors such as discrimination, trauma, social isolation, and sleep deprivation on cognitive performance. Kira (2022) further proposes that "changes in the precognitive factors such as identity; motivation; and will to exist, live, survive, and fight may be another important strategy in optimizing executive functions" (p. 964). Here, a distinction is necessary between addressing impairment resulting from adverse circumstances or environments, which Kira concentrates on, and improvement above and beyond individual baseline in healthy individuals, which was the focus of Moreau (2022). This distinction is important because there is no reason to believe that the mechanisms underlying impairment in a clinical context are the same as those hypothesized to mediate improvements above baseline in more typical settings. It may be that they are, but this is an assertion that requires substantiation, and one that is challenged by extensive literature showing diverging findings for specific interventions depending on whether individuals with cognitive impairment are included or excluded (e.g., Young et al., 2015).

With this conceptual distinction in mind, evidence still suggests no plausible mechanistic explanation for the improvements reported in the specific literature discussed in Moreau (2022). As a result, the promise of brief interventions à la mindset, stereotype threat, brain training, and video gaming remains greatly overstated, and these interventions pale in comparison to those that address change in a more holistic—and often more ecological—manner. For example, physical exercise has been associated with cognitive improvements *in addition to* its well-documented physiological benefits (Moreau & Chou, 2019; Moreau & Conway, 2014).

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For individuals engaging in these activities with the goal of improving cognitive abilities, opportunity costs are therefore mitigated as positive outcomes in at least one domain are almost guaranteed (e.g., health, affect, mood, social connectedness). Similarly, education has been related to improvements in cognitive abilities (Ritchie & Tucker-Drob, 2018), yet the primary consequence of continued schooling is greater knowledge and expertise in various domains. In stark contrast with the popular brief interventions criticized in Moreau (2022), such meaningful development of individual aptitudes and abilities is a process that takes time and sustained effort.

Finally, a perhaps greater, overarching issue pertains to methodological standards, both with respect to construct validity and measurement of cognitive gains. Better, more robust methods need to be leveraged to investigate a phenomenon as complex as change in cognitive ability, especially given the lurking confounds inherent to field experiments. More challenging still, current disagreements about what constitutes cognitive improvement highlight difficulties in finding common epistemological grounds in a context within which it is not clear what gains on cognitive tasks truly mean (Moreau & Wiebels, 2021). Most cognitive tasks in psychology were designed to measure individual differences, not intraindividual dynamics over time—whether the latter is adequately measured with the tools currently at our disposal is an open question, but there is growing evidence to suggest cause for concern (e.g., Moreau, 2021). Importantly, these challenges come in addition to broader issues of construct and measurement validity in psychology (e.g., Moreau & Wiebels, 2022).

In conclusion, the perspective put forward in Moreau (2022) is supported by ample evidence and corroborating literature. The validity of popular brief interventions remains seriously questioned by large-scale replications (e.g., Owen et al., 2010), functional magnetic resonance imaging analyses (fMRI) analyses (e.g., Kable et al., 2017), reanalyses (e.g., Moreau, 2021), and meta-analyses (e.g., Sala & Gobet, 2019), and the lack of a mechanistic framework for the postulated improvements prevents cumulative knowledge building within and across subfields. Given the potential harm in inaccurately representing what interventions can achieve (Moreau et al., 2019), caution remains warranted when discussing their implications for policy, and effort needs to be put into building formal, falsifiable theories of cognitive improvement.

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