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Effect of physical exercise on cognitive function in people with epilepsy: Commentary on Alexander and Allendorfer (2023)

To the Editor

We would like to commend Alexander and Allendorfer [1] on their paper "The relationship between physical activity and cognitive function in people with epilepsy: A systematic review". Given recent syntheses on the effects of physical exercise on cognitive function in healthy populations [2,3], including work in our group about the hypothesized mechanisms mediating these effects [4], we were particularly interested in applications to epilepsy. We were, however, surprised by some of the conceptual and methodological decisions made by the authors, particularly those related to the search and inclusion criteria, which we believe should invite caution in interpreting their findings.

First, the search performed was surprisingly reductive: the authors only searched four databases (PubMed, Cochrane Library, Embase, and PsychINFO), and chose to exclude gray literature without providing justification for doing so. This restrictive approach departs from current best practices in systematic reviews [5]—identifying all evidence relevant to a research question is a fundamental component of systematic reviews, and efforts to include gray literature are critical to reduce publication bias (e.g., [6]). We re-run the search to include MEDLINE, SPORTDiscus, Web of Science, Scopus, ProQuest, Science Direct, Google Scholar, medRxiv, bioRxiv, medRxiv, and PsyArXiv (for gray literature), in addition to the four databases queried by Alexander and Allendorfer [1]. Our more inclusive search yielded an important number of studies that appear to fit the authors' original inclusion criteria but were not included in their review (see online repository for full procedure; https://osf.io/p37jn).

Second, the authors restricted their search to the terms "epilepsy," "seizures" or "epileptic" to cover the population of interest (i.e., people with epilepsy); "physical activity," "exercise," or "fitness" as their independent variable; and "cognition", "cognitive function", "cognitive performance", "cognitive abilities", or "cognitive ability" as their outcome. Limiting results in this way appears at odds with recently published reviews on the association between physical exercise and cognitive function (e.g., [2,7,8]), which all used more encompassing terms to capture the richness and diversity of both exercise modalities and assessments of cognitive function. Widening the search to cover additional relevant search terms —including "aerobic exercise", "physical", "exercise", "movement", "sport", "active", "fit", "motor activity", "exertion", or "training" and "memory", "attention", "brain", "executive function", "perception", "learning", or "mental processes"—yielded an important number of studies that appear to fit the original inclusion criteria but were not part of Alexander and Allendorfer [1].

Instead of the 275 papers the authors found, from which they retained six studies in their final sample, our search yielded over 1M results, including at least six studies that appear to meet the criteria outlined in [1] but were missing from their synthesis (see online repository for full procedure). These included a randomized controlled trial by Kumar and colleagues [9] on the effects of physical exercise on cognition—among other variables linked to quality of life—in people with epilepsy. Given that inclusion of these additional studies at least doubles the number sample reported in Alexander and Allendorfer [1], and considering that a recent systematic review by Duñabeitia and colleagues [10] on the effects of physical exercise on various neurocognitive outcomes in people with epilepsy contained relevant studies—for example, [11] and [12]—that were not included in Alexander and Allendorfer's systematic review, we believe the search performed was unnecessarily restrictive and inadequate given their initial research question.

Contrary to the original authors' claim that "there is a significant lack of studies investigating the relationship between physical activity and cognition in people with epilepsy" [1], our more inclusive search indicates that there is ample and reliable evidence for the positive impact of exercise on individuals with epilepsy, consistently demonstrated across a variety of research designs, intervention modalities, research groups, and population characteristics (for details, see https://osf.io/p37jn). Given their substantial side benefits and mitigated opportunity costs [13], exercise interventions should be prioritized when practical, and used in combination with other effective approaches. We hope future research will help build on these findings to determine for whom and under which conditions physical exercise can help benefit cognitive function in the rich, multifaceted context of epilepsy.

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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