# POSTSCRIPT

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The ambitious goal of this handbook is to provide a comprehensive, state-of-the-science, balanced, and accessible overview of the evidence on physical activity and mental health. As discussed in the introductory chapter, evaluating this literature has become immensely challenging due to numerous contradictory statements, the technical complexity of the methods involved, and, by several indications, the growing influence of bias, both in favor of and against physical activity. The combination of these factors has resulted in confusion and a large number of clinical professionals reporting limited awareness of the evidence linking physical activity to mental health outcomes. The chapters in this landmark volume will hopefully help alleviate most of the confusion and usher in a new era of intensified research efforts and more evidence-based clinical application. On the basis of the data summarized herein, the following proposals for facilitating future progress can be made.

**Promote the standardization and transparency of systematic reviews**. As noted in the introductory chapter, the discrepant conclusions reached in systematic reviews and meta-analyses on the effects of physical activity on the various aspects of mental health indicate a systemic dysfunction. Of course, subjectivity will always be an inextricable part of any review process that includes evaluation of evidence. However, for readers to be able to make sense of the evidence, it is important to ensure that the reasons for any discrepancies are fully transparent. If certain types of evidence are excluded (e.g., from observational, smaller-scale experimental, or neuroscientific and neuroimaging studies), the reasons should be stated. If individual studies are dismissed due to methodological weaknesses, these should be specified on a study-by-study basis; condemning an entire literature because some studies are weak seems arbitrary. Finally, it should be clear that the evaluation of methodological quality cannot be reduced to simply checking for allocation concealment, intention-to-treat, and assessor blinding; bias comes in many forms and detecting it requires considerably more scrutiny, critical thought, experience, and expertise. For these reasons, moving toward the standardization of the methodology of systematic reviews and adhering to established reporting standards seems to hold promise.

Prominent examples of standardized systems include the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA; Moher, Liberati, Tetzlaff, & Altman, 2009) and the Grading of Recommendations Assessment, Development, and Evaluation (GRADE; Guyatt, Oxman, Schünemann, Tugwell, & Knottnerus, 2011; Guyatt et al., 2008). According to PRISMA, for example, "authors should specify the methodological components that they

assessed" and "if authors exclude studies from the review, or any subsequent analyses on the basis of the risk of bias, they should tell readers which studies they excluded and explain the reasons for those exclusions" (Liberati et al., 2009, p. W76). Similarly, according to GRADE, "including a risk of bias table that summarizes key criteria used to assess study limitations for each outcome for each study helps ensure transparency" (Guyatt, Oxman, Vist, et al., 2011, p. 414).

**Raise visibility and adhere to reporting standards**. Researchers investigating the relationship between physical activity and mental health should be encouraged to adopt a more extraverted attitude, actively raising the visibility of their work in fields like psychiatry, clinical psychology, primary care, and public health. The publication of studies solely in "specialty" journals in the field of exercise science may be one of the factors that have contributed to the low level of awareness of the evidence among many mental health researchers and clinicians. Furthermore, even when this is not mandated by journal policies, authors are encouraged to adhere closely to reporting guidelines such as the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE; von Elm et al., 2007) and the Consolidated Standards of Reporting Trials (CONSORT; Boutron, Moher, Altman, Schulz, & Ravaud, 2008).

**Focus on methodological rigor and establishing causation.**. There are still indications of inadequate efforts to eliminate sources of bias, particularly in observational and small-scale experimental trials. It should be clear that, at this stage of knowledge development, the continued accumulation of data from studies with serious methodological weaknesses is likely to be appraised as weakening, rather than strengthening, the evidence base. While both internal and external validity should be considered, establishing cause and effect must remain a top priority. In recent years, the first empirical evidence of genetic pleiotropy has emerged, suggesting that, at the population level, observed associations between physical activity and positive mental health might be explained by common genetic variation (de Geus & de Moor, 2008, 2011; de Moor, Boomsma, Stubbe, Willemsen, & de Geus, 2008):

> [W]e should consider the alternative possibility that the association between exercise behavior and mental health reflects the effects of genes that influence the propensity to exercise as well as a disposition for well-being or, framed inversely, that genes preventing people [from exercising] are also involved in the risk for anxious and depressive symptoms.
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> *(de Geus & de Moor, 2008, pp. 55–56)*

**Intensify efforts to understand motivational processes**. The transition from research evidence to effective clinical practice will be impossible unless dramatic progress is made in understanding the psychological and psychobiological processes underlying the motivation for physical activity participation. Unfortunately, on this issue there has been very little substantive progress, despite the investment of considerable research funds and the accumulation of a voluminous literature. Whether physical activity can benefit mental health or not can become a purely academic exercise unless research can answer the two "most vexing questions in the field of exercise intervention: why exercisers exercise, and why non-exercisers do not" (de Geus & de Moor, 2008, p. 57). The development of physical activity interventions that maximize adherence and minimize dropout, especially among individuals facing mental health challenges, should be considered an absolute prerequisite for the successful application of physical activity in clinical practice.

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