Cross-sectional associations between regular physical activity engagement and domains of mental health in a global sample of ~~43,227 young adults~~

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Estimating the treatment effect of regular exercise with propensity score weighting using generalized boosted models

Mental health conditions have proven to be a significant burden on the global population. Approximately 29% of individuals have experienced a common mental disorder during their lifetime, with a 9.6%, 12.9%, and 10.7% lifetime prevalence for mood, anxiety, and substance-use disorders, respectively (Steel 2014). Global burden of mental disorders in 2019 is estimated at 125.3 million disability-adjusted life-years (DALY) – an increase from 80.8 million DALYs in 1990 (Lancet 2022). Moreover, lost productivity due to poor mental health is estimated to cost the global economy $2.5T annually and is projected to more than double over the next decade, reaching $6T by 2030 (Health, 2020).

Recent epidemiological reviews of global samples indicates stagnation in the overall prevalence of mental disorders (Ritcher 2019), despite an increase in the prevalence of depression (Moreno-Agostino 2021). Together, these studies suggest that current strategies which seek to prevent and/or reduce mental problems are ineffective (Jorm 2017). The COVID-19 pandemic may also have conferred a toll on population mental health and wellbeing worldwide. Evidence from reviews is somewhat mixed, suggesting there has been an increase in depressive and anxiety symptoms most consistently in younger cohorts, with other studies finding evidence for psychological resilience (Samji 2022; Patel et al., 2022; Panchal 2021; Prati & Mancini, 2021; Robinson et al., 2022).

Emerging evidence suggests certain age cohorts across the adult lifespan may be at greater risk for poor mental health and wellbeing than others (Oswalt 2020. For example, a recent report showed that younger adults living in the US consistently report the lowest scores on all six domains of well-being, including happiness, health, meaning and purpose, character, social relationships, and financial stability, with a linear pattern of improvements in wellbeing observed with increased age (Chen et al., 2022). These findings are in contrast to previous work that had demonstrated an inverted-U relationship between age and mental wellbeing in which mental wellbeing was lowest in middle adulthood (Blanchflower & Oswald 2008). Evidently, more research is needed to better understand these trends from a global perspective, including a focus on protective factors that may moderate the relationship between age and mental health and wellbeing.

An increasing body of literature continues to establish effects of physical activity on mental health as well. Observational and experimental evidence consistently shows a relationship between higher levels of physical activity and benefits across various mental health outcomes,

[For depression see Kvam2016, Schuch et al 2016a,2016b,2017, Gordon2018, Pearce 2022

Anxiety see Aylett 2018, Biddle 2019, McDowell2019,

General mental health see Rodriguiz-Ayllon 2019, Firth2020, Marquez2020),

For example, using non-parametric matching in a large cross-sectional dataset, Chekroud et al. (2018) showed that reporting having exercised in the past month was associated with 43.2% lower self-reported days with poor mental health.

Despite these robust findings, particularly for depression and anxiety, physical activity remains an underutilized treatment tool among clinical practitioners (Ekkekakis 2020)

While this evidence further supports the importance of physical activity for preventing and/or reducing a range of mental health problems and improving overall wellbeing, certain mental health disorders and symptoms have received limited attention to date. For some other mental disorders and symptoms, the evidence is less suggestive of benefits, or remains unclear (Firth 2015; Dauwan 2016; Brokmeier 2020; Brondino 2017; Ashdown-Franks 2019; Melo 2016).

Recent work has also suggested that mental health is a complex and heterogenous construct in which there is considerable overlap in symptomology across the most commonly classified disorders (Borsboom 2011;; Newson et al., 2021 poor-sep). Novel measures such as the Mental Health Quotient (MHQ) have been developed to address these considerations, but due to their recency, have received limited attention. There is also a paucity of literature on the specific aspects of mental health that physical activity may especially favor, which only one previous study to our knowledge investigating symptom-level effects (Murri 2018). Improved precision in the treatment target may have important implications for clinical outcomes (Uher 2012; Iniesta 2016; Fried&Nesse2015). Physical activity may be associated with differential effects across the lifespan, particularly as it relates to certain aspects of mental wellbeing.

The purpose of the present study was to estimate a treatment effect of physical activity on overall mental wellbeing, as well as various aspects of mental health, while statistically accounting for a range of observed covariates in a large global sample.

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