

The benefits of physical exercises for mental health in the COVID-19 era: an indirect role for suicide prevention

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To the Editor,

Since the coronavirus disease 2019 (COVID-19) pandemic, the incidence of suicidal thoughts and attempts has increased because of the disease worldwide, as reported by previous literature (Ivbijaro *et al.* 2021). The reason for this is multi-factorial and can be attributed to mental illness (i.e., depression, anxiety, sleep deprivation), psycho-social stressors (i.e., social isolation and loneliness, social stigma, unemployment and financial problems, fear of death, and uncertainty of future), and neurobiological factors (i.e., ischemic attacks, headache) (Ivbijaro *et al.* 2021). Because of this, to plan effective suicide prevention strategies for COVID-19 survivors, which is a real challenge, a comprehensive and integrated multidisciplinary approach is required, as no single approach can have an impact on a complex issue like this. In this letter, the exercise-based approach for suicide prevention is highlighted, as other approaches are beyond the scope of this context.

Physical exercises not only improve physical health, but also have the potential to improve mental health during COVID-19 illness by relieving psychological stress, reducing depressive symptoms, and relieving anxiety associated with the disease (Hu *et al.* 2020), which possibly can reduce the incidence of suicidal ideation. Regular physical exercises were associated with better mental health and reduced suicidal attempts or self-harm in a dose-response manner. That is, the greater the exercise dose is, in terms of exercise frequency and duration but not intensity, the better is the mental health and the lower the suicidality (Grasdalsmoen *et al.* 2020). The therapeutic effects of physical exercises were

suggested to be comparable to psychotherapy (Kvam *et al.* 2016). Aerobic exercises are the most common physical exercises and include walking, jogging, cycling, swimming, and dancing. Aerobic exercises of moderate intensity such as brisk walking, 30–45 minutes/day, for at least 3 days/week, are recommended for better mood, stress relief, enhanced sleep quality, increased energy levels, and improvement in overall psychological well-being (Sharma *et al.* 2006). The underlying mechanisms can be attributed to exercise-induced physiological responses including an increase in plasma levels of endorphins; an increase in blood supply to the brain; improved functions of serotonin, dopamine, and noradrenaline in the brain, proper regulation of the hypothalamic-pituitary-adrenal (HPA) axis, an increased level of brain-derived neurotrophic factor (BDNF), improvements in neurogenesis and angiogenesis, as well as reduced levels of proinflammatory cytokines and C-reactive protein associated with anxiety (Hu *et al.* 2020; Grasdalsmoen *et al.* 2020; Sharma *et al.* 2006). A psychosocial mechanism has also been proposed, explained by distraction, self-efficacy, and social interaction theories (Sharma *et al.* 2006). The physiological and psychological adaptations to physical exercises could protect against the negative or the suicidal thoughts associated with depression and stress.

Interestingly, other forms of aerobic exercise such as video games or virtual reality-based exercises can also be proposed as an attractive tool for the exercise-based approaches to preventing suicide. Exercising with the use of video games or virtual reality during the COVID-19 quarantine has successfully reduced depression and anxiety

levels and had positive influences on mental and physical health (Viana *et al.* 2020; Siani and Marley 2021). Compared to traditional aerobic exercise intervention, video game and/or virtual reality-assisted exercises are more enjoyable and thus can lead to better patient motivation, adherence, and compliance to exercise (Viana *et al.* 2020; Siani and Marley 2021).

As can be seen, COVID-19 vaccination has widely increased and quarantine restrictions have been eased. This offers a good opportunity for COVID-19 survivors to start practicing supervised aerobic exercises to relieve psychological stress and boost their mood. Here, moderate-intensity exercises (i.e., 65-75% of peak heart rate) are preferable to either low- or high-intensity exercises. Although still unclear, there might be a U-shaped association between exercise intensity and suicidal behavior (Grasdalsmoen *et al.* 2020). For those who have limited access to exercise training facilities or have financial difficulties accessing these facilities, indoor workouts with/without equipment, home-based aerobic exercises combined with video games/virtual reality, or unsupervised outdoor physical activity at the appropriate intensity and duration appear to be suitable alternatives. In brief, complementary to psychotherapy, pharmacological therapy, and other approaches to prevent suicide, physical aerobic exercises could play an important role in reducing the risk of suicide in COVID-19 survivors owing to their anti-depressant and stress-relieving effects reported by numerous studies and explained based on neurophysiological and psychosocial mechanisms.

Conflict of interest

The author declares no conflict of interest.

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