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Unlocking the power of physical activity in easing psychological distress

Liu XQ *et al.* Unlocking the power of physical activity

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Abstract

The severity of the current global mental health situation and the importance of maintaining psychological well-being call for more powerful, convenient, and efficient solutions for addressing psychological issues and relieving mental stress. Physical activity not only effectively improves physical fitness and reduces negative emotions such as anxiety and depression but also increases the improvement of psychological health and sense of well-being. At the same time, physical activity interventions for mental health have unique advantages, including reducing the side effects of psychological interventions and increasing necessity, convenience, and cost-effectiveness, as well as flexible adaptability across multiple methods, groups, and age ranges, providing stronger support for relieving psychological stress and addressing psychological issues. Although physical activity is an important intervention measure in relieving psychological stress, its value and role in mental health care seem to have not yet received sufficient attention, and its potential remains to be further revealed. Given the significant advantages and effectiveness of physical activity in mental health intervention practices, it is necessary to stimulate its potential in relieving psychological stress through various means in future studies to better safeguard the public's physical and mental health. Developing guidelines for physical activity for improved mental health, enhancing organic integration with other intervention measures, and providing necessary respect, encouragement, and support are important directions to consider.

Key Words: Physical activity; Psychological distress; Mental health; Artificial intelligence; Guidance

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Core Tip: As a nonstigmatized, highly effective, convenient, and cost-effective nonpharmacological intervention for mental health, physical activity holds enormous potential in relieving psychological stress and improving overall well-being. To further reveal the potential of physical activity and benefit a larger population with mental health issues, it is necessary to provide scientific guidelines for physical activity and enhance its adaptability and practicality based on respect for patient preferences.

INTRODUCTION

In recent years, there has been a proliferation of research on mental health, with an increasing number of scholars emphasizing the important value of mental health. People are increasingly recognizing the significant role of mental health in maintaining global well-being. For example, recent research by Luo *et al*^[1] focused on the mental health of stroke patients, and they suggested that physical exercise may play a role in the efficacy of treatment and rehabilitation strategies for patients. Mental health is defined as a favorable or normal state of an individual in various psychological aspects and activities. Being in a healthy mental state can help individuals recognize their capabilities, cope with normal life stress, work productively, and contribute to their communities^[2]. However, as a driving force for individual growth and development, mental health faces certain real constraints and challenges^[3-5]. **One in every eight people in the world has a mental disorder**, causing 1 in 5 years lived with disability due to mental health conditions, and depression and anxiety disorders result in global economic losses of \$1 trillion each year^[6,7]. The continuous deterioration of global mental health and the ongoing loss of collective mental wealth not only present real challenges to achieving the goals of global mental well-being but also result in tragedy for humanity and the economy^[8]. On the one hand, the emergence of mental health conditions often accompanies the violation of human rights, discrimination, and stigma,

disturbing the normal order of individuals' lives and significantly affecting various aspects of daily life, including academic or work performance and intimate relationships^[9]. On the other hand, mental health conditions are often associated with poor physical and mental health, problematic substance use, and risks such as suicide and death. The population with severe mental illness not only experiences both physical and mental harm while fighting the disease but also bears heavy financial burdens and may even die 20 years earlier due to preventable physical conditions^[10].

The widespread transmission of coronavirus disease 2019 (COVID-19) worldwide has further threatened the global mental health situation^[11], leading to a range of mental issues, including panic, anxiety, depression, posttraumatic stress disorder, and suspiciousness^[12]. A cross-sectional study from Germany showed that the pandemic caused severe psychological burdens for the German population, with prevalence rates of generalized anxiety, depression, psychological distress, and COVID-19-related fears of 44.9%, 14.3%, 65.2%, and 59.0%, respectively, with women and young people showing higher mental burdens^[13]. Pregnant and postpartum women were also affected by COVID-19-related stress, with 36.4%, 22.7%, and 10.3% of 1123 perinatal women from the United States of America respondents reporting clinically significant levels of depression, generalized anxiety, and posttraumatic stress disorder during the pandemic^[14]. Despite the significant efforts made by various sectors to address mental health crises in recent decades, mental health remains a pressing global public health priority^[15-17]. The severity of the current global mental health situation and the importance of maintaining psychological well-being call for more powerful, convenient, and efficient solutions for addressing psychological issues and relieving mental stress. Intervention measures, including education/school-based interventions^[18], workplace interventions^[19], community/family interventions^[20], medication interventions^[21], policy interventions^[22], and digital interventions^[23-25], are widely used in mental health practice. As an important intervention measure in the process of addressing psychological issues, exercise can effectively enhance cognitive function, reduce anxiety, depression, and negative emotions, and improve psychological health and

sense of well-being, but its value and role in mental health care seem to have not been fully emphasized^[26], and its potential remains to be further explored.

PHYSICAL ACTIVITY AS AN IMPORTANT MEANS OF STRESS RELIEF

As the saying goes, “life is in motion”. Physical exercise is often associated with positive mental health effects, including the reduction of psychological burdens and improvement of mental health conditions^[27,28]. Endorphins and mitochondria are important physiological mechanisms in the process of altering mental states. Endorphins, as endogenous opioid peptides secreted by the pituitary gland, can produce analgesic and pleasurable effects by binding to opioid receptors, helping the body endure pain during prolonged periods of pain and stress^[29] and serving as a natural analgesic. Moderate exercise can promote the secretion of endorphins, thereby regulating an individual’s emotional state through pain relief, increasing the sense of happiness, and enhancing the sense of achievement, which exerts a positive impact on mental health. Mitochondrial dysfunction is associated with a variety of mental illnesses, including major depressive disorder, generalized anxiety disorder, posttraumatic stress disorder, and bipolar disorder^[30]. As a potent mediator of the relationship between exercise and a reduced risk of weakness and mental illness, mitochondria’s role in mental health has drawn extensive attention from researchers^[31]. Moderate exercise can aid in promoting mitochondrial biogenesis, thereby enhancing physical function and improving mental health conditions, and is becoming a key factor in addressing psychological stress and mental health problems.

Physical activity (PA) has distinct advantages in mental health interventions, providing stronger support for relieving psychological stress and addressing psychological issues (Figure 1). First, physical activity reduces the side effects of psychological interventions. Drug therapy, as a traditional mental health intervention, has the potential to identify psychological problems, improve adverse psychological symptoms, and relieve psychological stress in a short period, receiving widespread attention and being applied in mental health practices^[32,33]. However, while drug

therapy brings benefits in relieving psychological stress, it also leads to certain adverse reactions^[34], including increased risks of drug dependence and abuse, the potential for suicidal behavior, and side effects such as dry mouth, insomnia, nausea, vomiting, weight gain, increased heart rate, and gastrointestinal discomfort. If these issues occur, drug therapy not only fails to achieve the original intention of addressing psychological problems but may even have a detrimental effect, causing secondary harm to individuals affected by psychological issues. PA, as a nonpharmacological psychological intervention measure, has the advantage of not causing adverse reactions^[31]. Proper, scientific, and regular physical exercise can help to reduce the side effects of psychological interventions, assisting in the relief of psychological stress and the improvement of overall well-being (Figure 1).

Furthermore, there is a high level of necessity, convenience, and cost-effectiveness. On the one hand, a significant portion of premature deaths due to physical health conditions in people with mental illness is preventable^[35]. Targeted early intervention through physical activity plays a particularly important role in mental health practice. Scientific and reasonable early physical intervention can not only effectively relieve the psychological stress of patients and improve their mental state but also reduce their likelihood of premature death, to some extent, achieving the goal of extending the lifespan of patients. On the other hand, compared to traditional mental health intervention measures that require facilities, venues, funding, personnel, and environmental factors, physical activity can address the limitations of the external environment and material conditions. Whether by playing soccer, basketball, or walking, and whether physical activity is performed in the office, at home, or on a sports field, the public can choose the most appropriate form of physical activity based on their current physical and mental conditions, material conditions, physical activity foundation, and interests, and engage in physical exercise anytime, anywhere, and according to their preferences. At the same time, the relatively low cost of physical activity^[36] also significantly reduces the economic burden on the public, providing a

practical, accessible, and easily manageable method for relieving psychological stress, particularly for disadvantaged or economically challenged groups.

Finally, there is flexible adaptability across multiple methods, multiple groups, and multiple age ranges. In the relief of psychological stress, physical activity not only demonstrates a high level of necessity, convenience, and cost-effectiveness, reducing the side effects of psychological interventions but also exhibiting strong adaptability in the comprehensive integration of multiple methods in mental health interventions. Exercise prescriptions can be used not only independently but also organically by being integrated with various intervention methods, including school-based interventions, workplace interventions, community interventions, medication interventions, and digital interventions, becoming a valuable supplementary resource in the process of relieving psychological stress and enhancing the comprehensiveness of mental health interventions. For example, physical activity can embrace new electronic information technology combined with the latest digital intervention methods to provide web-based exercise intervention prescriptions for patients with depression or anxiety^[37]. Additionally, the combined use of physical exercise and antidepressant medication is considered a feasible adjunctive treatment method^[38]. Furthermore, physical activity also demonstrates significant advantages in adaptation to patient groups and age ranges. Whether patients are children, adolescents, elderly individuals^[39,40], students, health care professionals, or freelancers, all can benefit from physical activity and achieve effective improvement in their mental state through proper and scientifically guided exercises.

CONCLUSION

PA, as an important means of relieving psychological stress and improving mental well-being, has been widely acknowledged for its efficacy in research. A meta-analysis indicated that exercise, as a destigmatized intervention, has a positive impact on mental health symptoms, alleviating depression symptoms in children, adults, and older adults and serving as a beneficial complement to medication and psychological

interventions^[41]. Another meta-analysis suggested that individuals with ² higher levels of physical activity had a lower risk of depression than those with lower physical activity levels, and higher levels of physical exercise also ¹ had a protective effect against the development of future depression^[42]. Additionally, physical activity can effectively reduce the risk of anxiety disorders. Compared to individuals with low levels of self-reported PA, those who report high levels of self-reported PA have a lower likelihood of developing anxiety disorders, and higher PA levels can also prevent the onset of agoraphobia and posttraumatic stress disorder^[43]. Engaging in moderate to vigorous exercise for approximately 90 min per week can significantly alleviate mental symptoms^[44]. In the grand scheme of things, some exercise is better than no exercise^[45]. Given the distinct advantages and effectiveness of physical activity in mental health intervention practices, we need to take more robust measures in the future to stimulate its potential in relieving psychological stress, thereby better safeguarding the physical and mental well-being of the public.

First, physical activity guidelines should be established for mental health, providing a framework for overall health and well-being improvement^[46]. To fully unleash the potential of physical activity in relieving psychological stress, it is imperative to clearly define the key elements and considerations in the implementation process of physical activity or exercise prescriptions. Stakeholders should work together to develop or update physical activity guidelines based on the latest developments in psychological research and mental health practice, providing scientific, reasonable, and comprehensive explanations and guidance on various aspects of physical activity as an exercise prescription, including types, intensity, frequency, procedures, and considerations. Additionally, the characteristics and needs of different populations should receive careful attention and be clearly described in the guidelines. Specifically, the preferences and suitable types of physical activity may differ for children, adolescents, adults, and elderly individuals. Therefore, the guidelines should present specific recommendations on the types, intensity, and focus of physical activity based on the physical capabilities, medical history, and health conditions of different age

groups. The specific needs of special groups such as pregnant women and people with disabilities should be fully addressed, for instance, by providing targeted recommendations for the types and intensity of exercise suitable for pregnant women at different stages of pregnancy.

Furthermore, physical activity should be organically integrated with other mental health interventions to further enhance the comprehensiveness and effectiveness of relieving psychological stress. The development of times and advancements in technology provide the potential for further stimulation of the medical benefits of physical activity. On the one hand, the further integration of physical activity with traditional medication and clinical treatment should be promoted and physical activity should be used as a supplemental treatment for patients with serious mental health issues who require medication, achieving improvements in both the physical and mental conditions of patients. On the other hand, internet-based physical activity intervention programs should be provided. The continuous emergence of electronic information technology and the global COVID-19 pandemic have made digitally based exercise interventions *via* the internet the latest trend in relieving psychological stress. Research indicates that internet-based exercise interventions have a relieving effect on depression and anxiety in patients with neurological disorders^[47]. In the future, there should be further promotion of the deep integration of physical activity and emerging information technology to provide support for the relief of psychological stress. Specifically, internet-based applications or mini-programs for mental health-related physical activity could be further developed. Additionally, artificial intelligence models such as ChatGPT can serve as important tools to provide real-time physical health monitoring and guidance for physical activity during the process of addressing psychological issues.

Finally, the necessary respect, motivation, and support should be provided. Groups experiencing psychological issues or significant psychological stress often have fragile mental states and delicate psychological conditions. Therefore, in the process of prescribing exercise, it is essential to fully respect the personal wishes of the patients.

For patients who are willing, motivated, and physically healthy enough to engage in exercise, appropriate physical exercise can be recommended^[48]. For patients who lack the intention to exercise, we should fully respect their thoughts and provide alternative treatment options that are more suited to their needs. Additionally, during the implementation of the exercise prescription, it is important to select exercise activities that the patients are interested in, skilled at, have confidence in, and have the ability to perform well and to provide necessary encouragement when patients reach their interim physical activity goals. This helps patients experience enjoyment and a sense of accomplishment from physical activity, thereby enhancing the effectiveness and sustainability of exercise interventions. At the same time, government and other authorities, as well as professional organizations, should effectively strengthen the construction of physical activity support groups, exercise facilities, and sports venues such as basketball courts and soccer fields. This ensures that individuals facing psychological issues receive comprehensive support for physical activity and enjoy a harmonious environment for exercise.

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Figure Legends

Figure 1 Benefits of physical activity in mental health interventions.

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