

Integrating Physical Therapy and Exercise in Mental Health: A Novel Framework for Suicide Prevention and Depression Management

Jayeshkumar Kanani *, Shraddha Baldania, Dyana Nasif

Department of Forensic Medicine and Toxicology, Surat Municipal Institute of Medical Education and Research Umarvada, Surat, 395010, Gujarat, India.

***Corresponding Author:** Jayeshkumar Kanani, Department of Forensic Medicine and Toxicology, Surat Municipal Institute of Medical Education and Research Umarvada, Surat, 395010, Gujarat, India.

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Abstract

Mental health represents a critical public health challenge, with rising suicide rates demanding innovative intervention strategies. The research synthesizes evidence from multiple domains, demonstrating that physical therapy offers more than traditional rehabilitation and provides a sophisticated, personalized intervention addressing psychological and physiological needs. Key findings highlight the potential of exercise to trigger neurogenesis, regulate neurotransmitters, and promote emotional resilience. Technological innovations, including digital mental health interventions and internet-based cognitive behavioral therapy, further enhance the potential for comprehensive mental health support.

Categories: Psychology, Integrative/Complementary Medicine, Physical Medicine & Rehabilitation

Keywords: suicide and prevention; suicide prevention; exercise intervention; physical therapy rehabilitation; mental health

Introduction

The mental health landscape in the United States reveals a profound and urgent crisis. In 2021, the scale of psychological distress was staggering: Suicide emerged as a critical public health challenge, ranking as the second leading cause of death for people ages 10-14 and 20-34. The national suicide rate has increased 36% since 2000, with preliminary data showing an additional two percent increase between 2021 and 2022 [1].

According to demographic insights from the CDC, suicide risks reveal a complex landscape of vulnerability. Nearly 47% of suicides occur in adults aged 35-64, with men experiencing suicide rates 3-4.5 times higher than women. Veterans represent a significant proportion, accounting for 13.9% of adult suicides. The CDC identifies four primary risk factor categories [1,2] (Figure 1, 2).

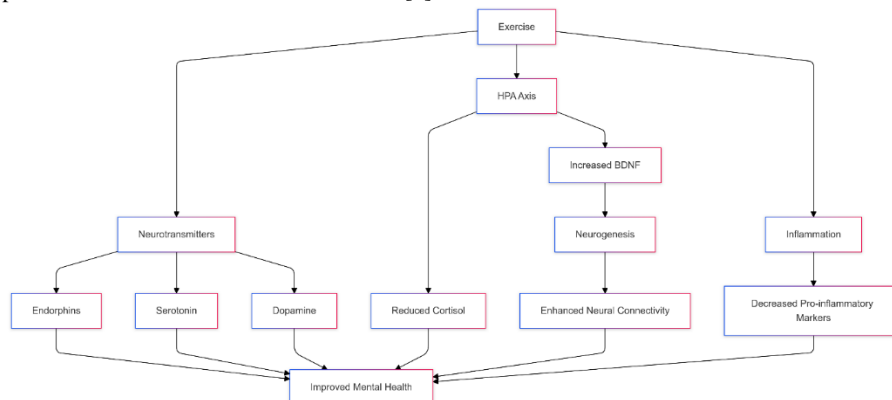


Figure 1: Suicide Risk factors

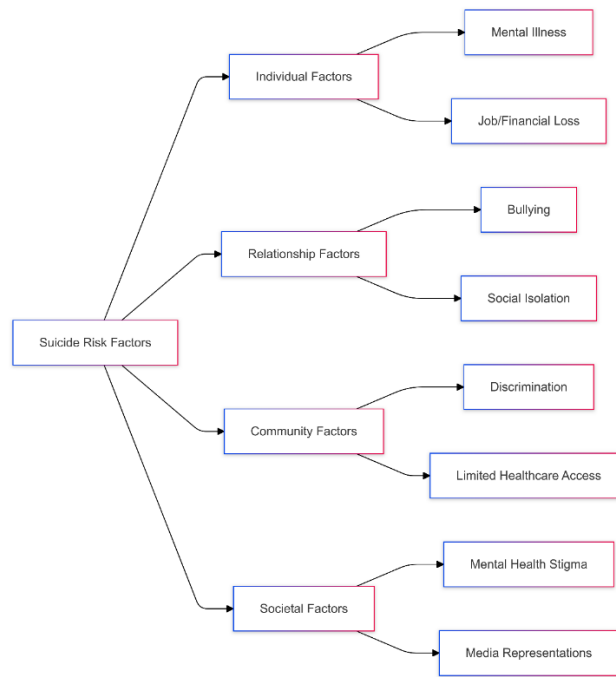


Figure 2: Mechanism of exercise and physiotherapy in mental health improvement.

Suicides are more likely to happen after midnight, according to research. According to a study, the hourly suicide rate increases to 10.27% after midnight and reaches a peak of 16.27% between 2 AM and 3 AM. On the

other hand, the hourly mean suicide rate between 6 AM and midnight is much lower, at 2.13%. This implies that increased suicidality during the night may be caused by circadian factors and sleep disturbances like insomnia and nightmares [3-5].

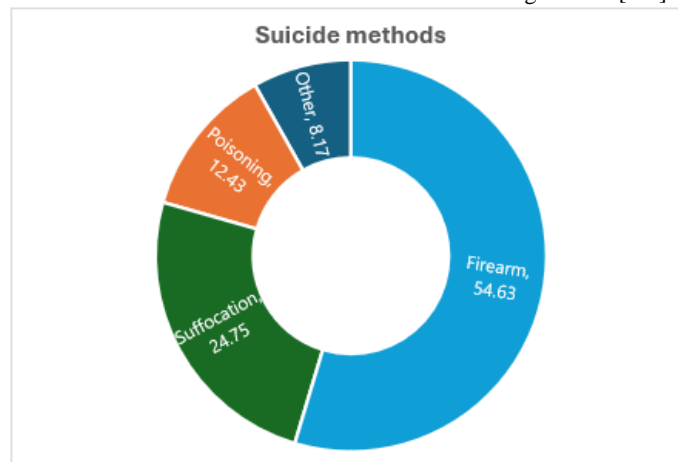


Figure 3: Distribution of different suicide methods

These statistics demand a transformative approach to mental health that addresses psychological challenges through comprehensive, integrative strategies. This paper presents a groundbreaking model: a holistic intervention strategy integrating physical therapy, targeted exercise, and comprehensive mental health support. This approach recognizes mental health as a dynamic interplay of physiological, psychological, and social factors. It has been proven that adolescents with first-episode psychosis have a high tendency of smoking tobacco, using alcohol and cannabis, possessing selective dietary habits, having lower physical activity, as well as lower level of activity during leisure time.

Review

Physical therapy as a comprehensive mental health intervention

It has been repeatedly demonstrated that physical activity has mitigated depressive symptoms in those suffering from various mental illnesses, including schizophrenia. Thereby, by engaging in such activity, enhancements in anthropometric measures, aerobic capacity, and quality of life were observed. Physical activity triggers profound neurochemical transformations directly impacting mental health by modulating critical brain systems [6]. When an individual exercises, the body releases neurotransmitters like endorphins, serotonin, and dopamine, which play pivotal roles in mood regulation and emotional resilience. The hypothalamic-pituitary-adrenal (HPA) axis responds by reducing cortisol levels, the primary stress hormone, while promoting Brain-Derived Neurotrophic Factor (BDNF) production. This complex biological mechanism supports neuronal growth, enhances neural connectivity, and potentially mitigates neurological impacts of depression and anxiety. By

decreasing pro-inflammatory markers and supporting neurogenesis, physical movement emerges as a sophisticated intervention that reshapes the brain's structural and functional landscape, demonstrating that exercise is not just a supplementary treatment, but a fundamental biological pathway to psychological well-being [7,8].

Therapeutic Movement Strategies

Physical therapy offers a nuanced, personalized approach to mental health intervention by designing targeted exercise prescriptions that address individual psychological and physiological needs. After participating in physical activity interventions, reviews consistently show medium-to-large improvements in mood, stress, anxiety, and depression [9,10].

Clinical interventions focus on comprehensive rehabilitation techniques that integrate pain management, body awareness, and trauma-informed movement approaches. These strategies go beyond traditional physical rehabilitation, recognizing the intricate connections between bodily movement and emotional processing, and allowing therapists to create holistic treatment plans that address both physical limitations and psychological barriers [11,12].

Physical therapy, particularly through exercise, has been shown to significantly improve mental health outcomes in patients with anxiety and depression. The underlying mechanisms are complex and multifaceted, involving neurobiological, psychological, and physiological factors (Figure 3). Neurologically, regular physical activity promotes neurogenesis, increases brain-derived neurotrophic factor (BDNF), and modulates the serotonergic system, which helps regulate mood and reduce stress [13,14]. Psychologically, exercise fosters self-regulation skills and provides opportunities for social interaction, which can alleviate symptoms of mental health disorders [15]. Physiologically, studies have demonstrated that physical activity can be as effective as psychotherapy or antidepressants for mild to moderate depression. While these benefits are well-documented, individual responses to exercise vary, highlighting the importance of personalized treatment approaches to optimize mental health outcomes.

While elderly populations face heightened risks of social isolation and depression, group physical therapy interventions provide critical opportunities for social interaction and mental health support. Studies show that combining mobility improvement with social engagement through group exercises can significantly reduce depressive symptoms and suicidal ideation in older adults [16].

Targeted intervention strategies for high-risk periods

Targeted physical therapy interventions offer a promising approach to suicide risk management, particularly for individuals who may not seek traditional mental health support.

Physical Therapy Engagement

Physical therapists can be uniquely positioned to recognize and address suicide risk, with research highlighting several key strategies for intervention. McGrath et al. [17] emphasize the importance of training physical therapists to identify signs of suicidal ideation and provide crisis support, especially for underserved populations like men in rural areas.

Exercise-Based Interventions

Exercise-based interventions have shown significant potential in mental health intervention. A compelling study by Sturm et al. [18] demonstrated that endurance training, specifically mountain hiking, could substantially reduce hopelessness in high-risk suicide patients. Regular physical activity has been consistently linked to mood improvement and reduction

of depressive symptoms, which are closely associated with suicidal ideation. There is literature demonstrating that behavioral lifestyle interventions aid patients with serious mental illnesses to motivate them to lose weight and also to reduce their cigarette smoking. Behavioural lifestyle alterations also assisted patients taking antipsychotic medications to reach and maintain better glycaemic control, thereby decreasing the chances of developing certain medical conditions and indirectly reducing the risk of suicide.

Brief Intervention Strategies

Brief intervention strategies have emerged as another critical approach. The Attempted Suicide Short Intervention Program (ASSIP), as discussed by Wang and Hungerbühler [19] and Menon and Vijayakumar [20], has shown promise in reducing suicide reattempts. These interventions can be effectively integrated into physical therapy settings, providing a holistic approach to patient care that addresses physical and mental health needs.

However, researchers caution that these strategies are not universal. While targeted physical therapy interventions show significant promise, individual responses vary, and some patients may require more intensive mental health support. The approach underscores the importance of a comprehensive, personalized strategy in suicide prevention that considers both physical and psychological dimensions of patient care.

Technological and innovative intervention approaches

Technological interventions in physical therapy have emerged as a promising approach to reducing suicidal ideation (SI), offering innovative solutions for mental health support and suicide prevention. These interventions leverage digital technologies to provide scalable and accessible mental health interventions.

Digital Mental Health Interventions

Nelson et al. (2023) conducted a groundbreaking study revealing remarkable outcomes in therapist-supported digital mental health interventions. The research demonstrated a significant increase in participants reporting no suicidal ideation, rising from 78.02% to 91.00% post-treatment. Notably, the interventions were associated with a 30.49% reduction in suicide attempts and deaths, highlighting their potential to save lives [21].

While technology offers transformative benefits for mental health support and healthcare delivery, careful consideration must be given to potential drawbacks like reduced face-to-face interactions and digital overwhelm, necessitating a balanced approach that maximizes therapeutic benefits while maintaining human connection. [22] For example, Jaspr Health's software platform can be accessed on a tablet or PC by ED patients while waiting to be seen. This interactive, easily accessible tool guides patients in forming coping strategies and collects data that gets transferred to the electronic health record (EHR) to allow clinicians to monitor the progress and encourage it. Jaspr also has a video library of real-life individuals who dealt with and conquered their suicidal thoughts, ensuring evidence-based support. Jaspr's digital assistant stores comprehensive data on suicide risk-assessment and can guide the patient to draft a crisis stability plan to manage and decrease access to dangerous weapons/means.

Internet-Based Cognitive Behavioral Therapy

Büscher et al. (2022) investigated internet-based cognitive behavioral therapy (iCBT), finding compelling evidence of its effectiveness in managing suicidal ideation. The study revealed a reliable improvement rate of 40.5% among participants using iCBT, compared to 27.3% in control groups. Importantly, the intervention demonstrated consistent

effectiveness across various demographic groups, suggesting broad applicability in diverse populations [23].

Repetitive Transcranial Magnetic Stimulation

Research by Chen et al. explored repetitive transcranial magnetic stimulation (rTMS) as a technological intervention for reducing suicidal ideation. The treatment showed significant mean changes in scores across multiple studies and was notably well-tolerated, with no major adverse events reported. This makes rTMS a potentially viable option for patients with major mental disorders [24].

While these technological interventions show considerable promise, researchers like Kreuze et al. [25] caution that further research is needed to establish long-term impacts and cost-effectiveness across diverse populations. The variability in outcomes underscores the importance of continued investigation and personalized approaches in suicide prevention strategies.

Evidence-based research validation and future direction

Evidence-based research suggests that physical therapy, particularly through physical activity, shows promising potential in reducing suicidal ideation, especially in low-resource settings.

Effectiveness of Physical Activity

A groundbreaking study in Uganda by Vancampfort et al. [26] demonstrated remarkable results, with physical activity counseling reducing suicidal ideation from 100% to 9.8% among participants after an eight-week intervention, highlighting a direct correlation between physical engagement and mental health improvement. According to a study of 29,067 Finnish adults by Koivumaa-Honkanen et al. [27,28] it was found that an increased risk of suicide was contributed to by "unhappiness." This group also discovered that unhappiness was linked with male gender, older age, sickness, living alone, smoking, heavy alcohol consumption, physical inactivity, and being part of an intermediate social class. A systematic review of some adolescents also portrayed compelling evidence proving a robust relationship between psychological distress, sedentarism, depressive symptomatology, and suicidal ideation. Therefore, sports involvement was shown to reduce suicidal ideation [27, 29, 30].

Role of Physical Therapists

There is a strong association between physical activity and cardiometabolic health, as there is also an established link between different lifestyle factors such as sedentary behavior, poor cardiometabolic health and mental illness. As a result, there is an increasing trend of effective integration of clinical physical activity programs within mental health treatment facilities. Physical therapists are uniquely positioned to contribute to suicide prevention strategies. McGrath et al. [17] emphasize their critical role in accessing diverse at-risk populations, particularly in pain management settings. By training physical therapists to recognize and respond to suicidal ideation, they could potentially reach individuals who might not seek traditional mental health support.

Need for Further Research

While the findings are promising, researchers stress the need for further validation. Vancampfort et al. [26] and Mann et al. [31] advocate for more randomized controlled trials to establish the effectiveness of physical therapy interventions. They recommend integrating physical therapy as part of a broader, multi-faceted approach to suicide prevention that includes comprehensive mental health training and support.

Importantly, traditional mental health interventions like cognitive-behavioral therapy, as highlighted by Rudd & Perez-Munoz [32] and Kothgassner et al. [33], have established efficacy in reducing suicidal behavior. Therefore, combining physical therapy and traditional mental health strategies may provide the most comprehensive care.

Conclusions

The integration of physical therapy and exercise emerges as a transformative strategy in suicide prevention and mental health management. While demonstrating significant potential in reducing suicidal ideation and improving psychological resilience, the research emphasizes the necessity of personalized, multi-dimensional approaches that combine physical interventions with traditional mental health support, highlighting the need for continued investigation and holistic treatment strategies. Key findings demonstrate that physical activity is a supplementary treatment and a fundamental biological pathway to psychological health. By triggering neurochemical transformations, reducing stress hormones, and promoting neural connectivity, targeted exercise interventions offer significant potential in managing mental health challenges.

Additional Information

Disclosures

Conflicts of interest: In compliance with the ICMJE uniform disclosure form, all authors declare the following: Payment/services info: All authors have declared that no financial support was received from any organization for the submitted work. Financial relationships: All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. Other relationships: All authors have declared that no other relationships or activities could appear to have influenced the submitted work.

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