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Can lifestyle medicine improve global mental health?

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Abstract

Rationale: The global impact of mental health, specifically depression, is expected to be a top concern by 2030. Despite the growing number of medications and interventions, access to resources for well-being, psychiatric medications, and psychotherapy continues to be a long-standing barrier, regardless of a person's socioeconomic position or wealth of their country. Objectives: This article will review the relevance of the lifestyle psychiatry pillars for treating depression and will also include a review of their impact on climate health. Methods: A systematic review was undertaken using predefined search criteria on PubMed and Google Scholar. Results: There is a bidirectionality between mental health and physical illness as individuals with poor mental health have higher comorbid medical conditions and vice versa, which further supports a common theory to chronic illness (both physical and mental). Lifestyle interventions show increased efficacy in the treatment of chronic illness, and the same interventions positively support climate health. Conclusions: The benefits of lifestyle interventions are often overlooked, but they are scientifically significant, well-tolerated by patients, and can address modalities of illness. Lifestyle psychiatry can become an integral tool for global mental health providers.

Keywords: *lifestyle psychiatry, mental health, global health, lifestyle pillars, climate health, lifestyle medicine*

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1. Introduction

Due to the significant global burden of mental health, the World Health Organization (WHO) has warned that "there can be no health without mental health" [1]. Despite the growing number of medications and therapeutic interventions, the negative impact of depression continues to increase [2], as noted by the growing negative impact in disability-adjusted life years (DALYs), years lived with disability (YLDs), and years of life lost (YLLs) [3]. Furthermore, depression is projected to be one of the top health concerns by 2030 [4, 5]. Access to resources for well-being, psychiatric medications, and psychotherapy continues to be a long-standing barrier, regardless of a person's socioeconomic position (SEP) or wealth of their country.

Lifestyle interventions have been adopted by many medical societies as first-line therapy and/or adjunct therapy for treating chronic medical conditions such as diabetes, hypertension, heart disease, and cancer [6]. There is a growing literature which shows that lifestyle interventions show high efficacy because they address a common pathway and that these metabolic illnesses are end-state manifestations of these common pathways. For example, a common proposed pathway is inflammation due to the effects of heightened chronic cortisol effects [7]. As such processes or common pathways have been proposed for mental health disorders [8]. Likewise, neuroinflammation has been proposed as an underlying neuropathological pathway which is mediated by cytokines, chemokines, and reactive oxygen species within the brain [9]. Subsequently, compelling data points to the efficacy of incorporating lifestyle interventions to improve overall health by capitalizing on the bidirectionality between physical and mental health [10, 11]. Overall, the lifestyle psychiatry approach refocuses the importance of the brain as the organ of mental illness and reprioritizes brain health as often the center of mental health while acknowledging the interplay of many factors, e.g., gut microbiota [12].

As the lifestyle medicine field expands, affiliated organizations are standing up in every continent. The Lifestyle Medicine Global Alliance and the World Lifestyle Medicine Organization certify those who are trained in evidence-based lifestyle interventions. Incorporating lifestyle interventions into the therapy for improving mental health has led to the development of accessible, inexpensive, evidence-based tools that are often a preferred form of treatment [13]. In fact, in 2023, the Australasian Society of Lifestyle Medicine, in partnership with the World Federation of Societies for Biological Psychiatry, published the first guidelines for lifestyle psychiatric interventions for major depressive disorders [10], which expanded the traditional disease formulation to a biopsychosocial-*lifestyle* model [14].

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More importantly, this new biopsychosocial-*lifestyle* lens, or transdiagnostic process, turns the focus on contextual, social-environmental, and SEP factors as they govern lifestyle behaviors [15]. One's SEP greatly affects their immediate living environment, their access to green space, their ability to exercise in safe areas, their ability to have healthy social connections, or their ability to have access to whole foods (not processed) [16, 17]. Furthermore, people with lower SEP are at increased risk for mental and physical illnesses and worsening brain health over the course of their lifetime [18]. Addressing SEP inequalities may improve health outcomes and promote well-being to a greater extent than pharmaceutical interventions [19].

Another aspect is to assess for a trauma history and personality tolerance, which should not be confused with personality disorders. When unregulated, they both can act as barriers, countering potential gains from lifestyle intervention. Individuals with a trauma history are oftentimes reluctant to trust others, quick to perceive shame or experience shame triggers activated [20, 21], and have limited emotional resilience for change behaviors [22]. Personalities have been historically divided into five categories according to the Big 5 or Five-Factor Model: neuroticism, agreeableness, conscientiousness, extraversion, and openness (see Williams and Carlson's study [23] for a more thorough review) [24]. The unique blend of the categories for every individual can impact their emotional regulation, which in turn affects their mental and behavioral health [15].

2. The pillars of lifestyle psychiatry

Lifestyle psychiatry divides the evidence into six pillars: physical activity, nutrition, restorative sleep, decreased stress (e.g., mental well-being practices), improved social connectedness, and substance use harm reduction. This article will review the significance of these traditional pillars in the treatment of depression and their impact on climate health.

2.1. Physical activity

Historically, individuals experiencing depression and other mental illnesses are less likely to achieve the WHO-recommended amounts of aerobic (150 minutes/week), stretching, and strength training (two times weekly) activity [25, 26]. Physical activity does not need to be extensive. Individuals who undergo strength training, cardiovascular exercise, flexibility conditioning, balance training, and improved endurance have been shown to have fewer mental health symptoms and improved resilience [26, 27]. The WHO notes that the global fitness level has stagnated since 2001 [25]. In fact, insufficient activity increased by 5% (from 31.6% to 36.8%) in high-income countries between 2001 and 2016 [25]. Patients frequently cite mental health disease symptomatology, psychotropic medication side effects, or comorbid physical conditions as barriers to exercising [28].

Individuals with mental health disorders experience higher rates of cardiovascular, respiratory, metabolic, and endocrine disorders compared to the general public [13]. Physical activity improves cardio aerobic fitness, endothelial health, metabolic health, and body composition with improved lean muscle mass to visceral adiposity ratio and subsequent anti-inflammatory myokine and adipokine responses. Additionally, exercise improves overall brain health as it increases the release of neurotrophic factors, like brain-derived neurotropic factor (BDNF) or serotonin, which has been linked with improved hippocampal function [29, 30]. Likewise, exercise decreases neuroinflammation as it down-regulates cortisol, epinephrine, and norepinephrine and modulates microglial activity and phenotype [31]. Exercise has also been linked with improved mitochondria energy utilization, which is believed to delay the development of central fatigue [32]. Finally, regular exercise helps improve sleep quality by reducing sleep latency and increasing slow-wave sleep [33].

A meta-analysis by Yu et al. of 30 randomized control studies comparing depression and exercise ranked the effectiveness of specific exercises and the improvement of depressive symptoms. They determined that multimodal exercising (combination of two exercise modalities) was the most effective in improving depressive symptoms. This was followed by resistance training (weights, bands, etc.) and aerobics (forms of cardiovascular exercise) [26]. A recent randomized control trial by Hyvönen et al. also noted the mental health benefits of social dancing for the treatment of depression [34]. Additional studies note the cardiac benefits of walking, household tasks, and physical activities that are not classified as cardiovascular exercise [35]. Heissel et al. evaluated 41 randomized clinical trials that looked at the benefits of exercise and depression and calculated the number needed to treat at 2 (95% CI 1.68–2.59) [23]. Finally, a meta-analysis by Lahart et al. suggests that green exercise is more beneficial than indoor exercise, but the authors highlight the need for higher-quality studies [36].

2.2. Nutrition

There is a growing body of literature connecting the bidirectionality between food and mental and physical health [12]. A systematic analysis of the Global Burden of Disease Study assessing the health effects of dietary risks in 195 countries from 1990 to 2017 found that diet-related risk factors were responsible for approximately one-fourth of all global deaths among adults [37]. The Western Diet, also known as the Standard American Diet, is high in saturated fats, refined carbohydrates, ultra-processed foods (UPF), and low fiber content, and it has become the new standard diet. Before the COVID-19 pandemic, the typical U.S. diet consisted of about 60% UPF, and these consumption patterns were consistent between gender and race [38]. The UPF consumption pattern has increased globally in the post-pandemic era [39]. Additionally, individuals experiencing depression and other mental illnesses tend to have poor-quality diets [25], consuming the majority of their calories from UPF [40]. Although it is not the scope of this article, changes in mental health have been noted in diets deficient in essential vitamins and minerals [41-45].

Furthermore, a meta-analysis by Lane et al. shows that greater UPF intake was associated with an increased risk of subsequent depression (hazard ratio: 1.22, 95%CI 1.16–1.28) [46]. The authors have suggested that UPF may impact neuroinflammation, gut microbiota, neuroendocrine, and neuroimmune pathways [12, 47]. Meanwhile, Jacka et al. conducted the Supporting the Modification of Lifestyle In Lowered Emotional States (SMILES) study, a randomized control study, where study participants consumed a Mediterranean diet and avoided UPF and fast food. The study showed that the number needed to improve depressive symptoms was 4.1 [48]. Additionally, a meta-analysis from 2018 of epidemiological studies showed that every increase in 100 g of whole fruits or vegetables corresponded with a 5% reduction risk of depressive symptoms. Yet, the majority of

international nutritional guidelines focus on the quantity of nutrients but not on the level of processing [49], which may help improve overall nutrition content, but it does not necessarily improve depressive symptoms.

Communities living in food deserts where they experience food insecurity and lack essential vitamins, minerals, proteins, and fiber in their diets can significantly benefit from nutrition education. There is also a correlation between individuals living in food deserts and changes in their gut microbiota, leading to dysbiosis [50]. Alternatively, communal kitchens or home-cooked meals, where meals are prepared and eaten together, tend to be more nutritious [51], and the experience promotes resiliency and social connections [52].

2.3. Restorative sleep

Underappreciated are the consequences of inadequate sleep's impact on mental health and resilience. Although sleep disturbances are included in the criteria for depression, those with insomnia are twice as likely to develop depression [53, 54]. Additionally, individuals with poor sleep patterns are likely to develop impulsive behaviors, which include worsening substance use and consumption of UPFs [42, 55]. Sleep quality improves with increased social connections, exercise, and mindfulness practice. Additionally, the long-term restoration of sleep has been linked with increased hippocampal volume and function and improved cognition [56]. Cognitive behavioral therapy-insomnia (CBT-i) is emerging as the first-line therapy for insomnia [57, 58]. Additionally, in a meta-analysis, Selvanathan et al. showed that CBT-i was effective in treating insomnia and depression simultaneously [59].

2.4. Decreased stress

Stress is inevitable. Whereas acute stress may sharpen and focus concentration, chronic stress maintains heightened cortisol levels, disrupts sleep, promotes neuroinflammation, and disrupts the gut microbiota [22]. Perceived stress has been linked with epigenetic changes in key depression target genes [60]. Additionally, perceived stress has been linked with increased loneliness and depression [61]. Heighten or chronic stress is associated with heightened activation of the hypothalamic-pituitary-adrenal (HPA) axis and the chronic release of cortisol, epinephrine, norepinephrine, and other stress factors. No longer considered adaptive or protective, the heightened level of stress hormones within the prefrontal cortex (PFC) reduces cognitive abilities [62] and may be linked with PFC atrophy [63].

A growing body of literature shows mindfulness as a tool that ameliorates stress. Many of these approaches include, but are not limited to, the following: mindfulness-based stress reduction and mindfulness-based cognitive therapy, relaxation and deep-breathing exercises, and psychological therapies (dialectical behavioral therapy, acceptance and commitment therapy, cognitive behavioral therapy, etc.) [10]. Mindfulness, particularly mindfulness-based cognitive therapy and other metacognitive practices, decreases chronic cortisol's effects by working in a top-down approach by increasing the function of the parietal lobe, posterior and anterior cingulate cortex, and the PFC [64]. Mindfulness practices help improve sleep quality and can improve personal and community connections [65]. A growing body of literature also shows how green spaces, especially in urban environments, can lead to healthier emotions, improved mindfulness, and relaxation [66].

2.5. Social Connectedness

In 2023, the U.S. Surgeon General, Vivek Murthy, released the landmark document "Our Epidemic of Loneliness and Isolation." He summarizes that individuals who experience isolation have an increased mental health burden, increased mistrust of the community, an overreliance on social media, decreased physical activity, unpredictable food patterns, and poorer sleep [67]. As a result, individuals may experience loneliness and aloneness, and may carry a burden of disease greater than smoking 15 cigarettes daily [68]. Additionally, individuals with depression experience a wide range of social and behavioral challenges that limit their ability to form and maintain healthy relationships [69]. Bowlby first presented the notion of attachment and infants' need to develop healthy relationships with adults in the post-World War II era [70]. Ainsworth further observed that if relationships were inconsistent, inattentive, or demonstrated patterns of rejection, that could lead to insecure attachment patterns [71], consisting of distancing oneself [72]. A meta-analysis by Dagan et al. showed how these patterns could continue into adulthood and correlate with depressive symptoms [69]. Furthermore, this lack of attachment may be an underlying principle of substance use [73], which will be explored next.

There is a growing social trend that relationships or attachments with pets are an adequate replacement for relationships with fellow humans. Frequently, individuals cite that their pet does not judge them, that their pet is more reliable, and that their mental health is better. However, recent literature does not support this claim [74]. In his review, Herzog, a noted pet enthusiast, concluded that pet ownership could negatively impact mental health and called for further research [75]. In Lass-Henneman et al.'s cross-sectional online survey of 610 participants, the authors noted that a higher reliance on pets indicated a higher fear of being rejected, worse anxiety, and a higher mental health burden [74]. As such, clinicians may use this as a gauge or assessment. Pet ownership, however, provides other health benefits, as it frequently increases the owner's physical activity and a sense of purpose [76] and may help owners develop healthier gut microbiota [77]. These changes in microbiota could modify the risk of metabolic disorders [78].

Societies that promote members to develop compassion for individuals and others are healthier. Individuals experience less loneliness, suffer fewer consequences from mental health, and are more resilient [79]. These communities may include support groups [80], spiritual or religious organizations [81, 82], gardening or conservation [83], community, sports or recreation, or work. They can promote attachment, connection, mentorship, and healthy identity [67], especially as they help a community reconnect to its cultural identity [84]. As Vicktor Frankl championed with the development of logotherapy, the goal of connectedness is to increase one's basic need for attachment to a purpose [85]. Studies have shown how healthier connectedness improves mental and physical health [86].

2.6. Harm reduction of substance use

The incidence of substance use and behavioral addictions continues to increase throughout the world. The Global Burden of Disease Study shows a growing impact in DALYs due to

substance use [87]. Substance use impacts families, communities, healthcare, and legal systems, yet the vast majority of individuals with substance use disorders (SUDs) do not seek treatment. According to the National Institute on Drug Abuse (NIDA), in 2019, over 20.4 million individuals in the U.S. were diagnosed with an SUD, yet only 10.3% received treatment [88]. There is a growing literature describing the ever-increasing impact of behavioral addictions. Gambling is positively associated with SUDs, mental disorders like generalized anxiety and major depressive disorder, and may have substantial legal consequences [89]. Social media and digital technological use have increased during COVID-19, and the use patterns are correlated to worsening mental health symptoms, particularly depression and anxiety among teenagers [90–92]. The increasing use of technology has been linked to worsening depression [93], loneliness, and disconnectedness [67, 94]. As mentioned earlier, a growing body of literature shows how UPF consumption negatively impacts physical and mental health. The literature also notes how UPF may bind mu-opioid receptors at the nucleus accumbens and may act to prime the dopamine reward system for worsening addictive behaviors [42, 94, 95].

Unhealthy substance use and addictive behaviors may have self-perceived benefits of escaping or improving social interactions, yet sustained behavior activates the dopamine reward pathway [96]. Individuals with long-term substance use and addictive behavior patterns have a higher rate of mental illness. Additionally, individuals with SUD have significantly higher rates of medical comorbidities [97]. Meanwhile, individuals with SUD may seek activities or a combination of stimuli that increase dopamine release in an attempt to avoid withdrawal symptoms [98]. They may also lose the ability to like and seek novel activities [99, 100], making it hard to change their behavior patterns. Individuals with SUDs tend to experience higher levels of loneliness [101], worse sleep patterns [102], and often experience food scarcity [42]. Lifestyle tools have been proposed as a viable first-line treatment or adjunct treatment for SUD and addictive behaviors [88, 103], especially as lifestyle changes promote neuroplastic growth, which may modulate some of the effects of SUD [95].

2.7. Climate health

When this article is being written, 2023 recorded the hottest average global temperature on record (1.32°C above pre-industrial baseline), with 2022 being the sixth hottest on record [104]. Experts predict worsening climate disasters, worsening mental and physical health, and loss of resources when the earth surpasses an average global temperature rise of 1.5°C above the pre-industrial baseline [105]. Climate experts often overlook the importance of nutrition via a whole-food, plant-predominated (WFPP) diet in their all-hands-on-deck approach [106]. Not only will WFPP improve mental health, but it may also help reduce greenhouse gases (GHG) as much, if not more, than any other commonly used sustainability intervention [107, 108].

Poore and Nemecek, in 2018, noted that food supply chains create approximately 13.7 billion metric tons of carbon dioxide equivalent (CO_2eq) annually (roughly 26% of the world's global GHG emissions) [108]. An additional 2.8 billion metric tons of CO_2eq is caused annually by deforestation [108], which is one of the most significant contributors to GHG emissions. When the distribution and production of food products are taken into consideration, the total of the world's annual GHG is closer to 34%. For example, harvesting one kilogram of beef requires 60 kg of CO_2eq (including land use, farming, processing, and transportation) [108]. Poore and Nemeck further note that moving away from an animal diet "has transformative potential, reducing food's land use by 3.1 (2.8–3.3) billion hectare (a 76% reduction), including a 19% reduction in arable land; food's GHG emissions by 6.6 (5.5–7.4) billion metric tons of CO_2eq (a 49% reduction); acidification by 50% (45–54%); eutrophication by 49% (37–56%); and scarcity-weighted freshwater withdrawals by 19% (−5 to 32%) for a 2010 reference year" [108].

Theurl et al.'s computer modeling analysis of 520 scenarios based on agricultural GHG shows that the models with the highest composition of livestock and livestock feed produced the worst GHG [107]. Furthermore, Farchi et al. evaluated the impact of GHG reduction in Italy if all Italians adopted a full Mediterranean diet. They calculated that the per capita reduction would be 263 kg CO_2eq/year/person, with higher reductions in Northwestern and Central areas of Italy [109]. A growing area of interest is regenerative agriculture, which regenerates land through improved local ecologies and rehabilitating soil-eroded landscapes [110]. These low-cost, low-tech natural methods align with the IPCC's Special Report on Climate Change and Land, which stated that "options with large potential for mitigation in livestock systems include better grazing land management, with increased net primary production and soil carbon stocks" [111]. While this is a growing area of interest, more large-scale practices with published evidence are required.

Likewise, the production of UPF and significant food waste negatively impact the environment through over-utilization of monoculture crops, high energy demands for processing and manufacturing food products, long transportation, and complex packaging [112]. UPF significantly impacts land use, water use, and the release of GHG [113], and its impact is significantly greater than that of WFPP diets [113]. The diets that are healthiest for individuals and their mental health are also the most beneficial for the planet [114].

3. Conclusion

The intricate relationship between physical and mental health has been a focus of recent research. For example, in multiple studies, the analysis has shown that lifestyle interventions are just as efficacious, if not more, than psychotropic medications for mild to moderate depression and anxiety [2, 10, 14, 23, 48]. In the current post-COVID-pandemic world, many individuals are reporting symptoms of sadness, anxiety, loneliness, and increased substance use, though they may not have a formal mental health diagnosis [5, 67]. Lifestyle treatment modalities can be beneficial whether a person wants to focus on well-being, use lifestyle as an adjunct treatment for diagnosed psychiatric disorders, or a primary modality for mental health disorders when they are mild to moderate without safety concerns. Adding lifestyle approaches to treatment allows clinicians to partner with patients, thereby increasing patient agency.

There are growing challenges to global health, particularly the continued rise in noncommunicable diseases (which includes mental health) that account for 74% of the world's annual deaths [115]. Furthermore, the majority of these deaths occur in low- and middle-income countries, contributing to their economic burden [116]. Due to the global lack of providers and traditional medical

therapeutics, multiple organizations have encouraged healthcare providers to adopt a universal preventative approach [117]. Eriksson et al. showed over three years how a lifestyle approach improved quality of life, decreased pain, and was cost-effective compared to standard care [118]. As such, lifestyle interventions are well positioned to help shift healthcare to a preventative model and to reduce inequities [117].

A significant barrier to implementing these interventions is often clinicians, who need educational resources to prescribe practical lifestyle interventions to their patients across the SEP axis. This is especially important within populations with limited SEP resources as lifestyle interventions are more cost-effective and lead to an improved quality of life than medication or chronic disease burden [118]. Global populations should be encouraged to go back to their traditional roots with whole-food, plant-predominant diets, and community cooking instead of adopting UPF-based and fast-food diets. Additionally, encouraging communities to engage with traditional or familiar support networks can help bolster the benefits of connectedness. These are patterns of behaviors within five blue-zone communities of the world (Loma Linda, CA, USA; Nicoya, Costa Rica; Sardinia, Italy; Ikaria, Greece; and Okinawa, Japan), which have shown increased longevity and decreased mental and physical health disorders [119]. When blue-zone planners worked with city planners in Los Angeles, CA and in Cedar Falls, Mason City, Spencer, and Waterloo, IA to change the city infrastructure (changing streets to walking corridors, increasing access to food, etc.), the rate of smoking decreased by 30%, BMI decreased by 14%, and healthy eating increased by 10.5% [119].

Finally, training providers in lifestyle psychiatry can play an essential role in improving both the individual and the overall planetary health. By empowering an individual to partner with their clinician for their overall health, a positive health lens can foster resiliency in a community and decrease the global burden of mental health disorders.

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The authors declare no conflict of interest.

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