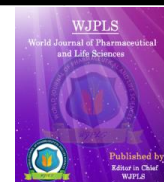




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THE ROLE OF MODERN LIFESTYLE FACTORS IN SHAPING PSYCHIATRIC DISEASE TRENDS: A COMPREHENSIVE REVIEW

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ABSTRACT

The accelerating pace of modernization has profoundly reshaped human behavior, physiology, and mental health. This review synthesizes evidence from recent epidemiological and mechanistic studies to examine how contemporary lifestyle factors contribute to the rising global burden of psychiatric disorders. Sleep disturbances, sedentary behavior, and excessive digital and social media exposure, nutritional transitions toward ultra-processed diets, substance use, and urban environmental stressors are key contributors to neuropsychiatric vulnerability. These factors exert biological effects via hypothalamic–pituitary–adrenal (HPA) axis dysregulation, neuroinflammation, circadian rhythm disruption, and altered dopaminergic and serotonergic signaling. The synthesis highlights bidirectional links between lifestyle modification and psychiatric outcomes—emphasizing the growing discipline of lifestyle psychiatry. Public health integration, including policy-level interventions, behavioral therapy frameworks, and digital lifestyle tracking, holds promise for scalable prevention. A socioecological model is proposed wherein modern lifestyle determinants interact with neurobiological systems to shape mental health trajectories. This comprehensive review underscores the urgent need for interdisciplinary strategies to mitigate the mental health toll of 21st-century living.

KEYWORDS: Lifestyle psychiatry; sleep disturbance; sedentary behavior; digital media; diet and nutrition; stress; neuroinflammation; HPA axis; psychiatric epidemiology; preventive mental health.

1. INTRODUCTION

Psychiatric disorders represent a leading cause of disability worldwide, contributing substantially to morbidity, mortality, and socioeconomic burden.^[1,2] Over the past two decades, psychiatric disease prevalence has increased dramatically, with depressive and anxiety disorders accounting for over 300 million and 250 million cases respectively across global populations.^[2] Modern society's transformation—marked by digital connectivity, urban congestion, 24-hour work cycles, and dietary industrialization—has introduced novel psychosocial and biological stressors fundamentally altering mental health determinants.^[1]

Traditional biomedical models often fail to adequately address these lifestyle-driven vulnerabilities. Although psychopharmacologic interventions remain foundational,

overreliance on medication has yielded modest long-term remission rates, motivating a paradigm shift toward integrative approaches that encompass behavioral and environmental dimensions. Lifestyle psychiatry has emerged to bridge this gap, positioning lifestyle factors such as sleep, nutrition, exercise, social connection, and stress resilience as biologically active, modifiable interventions capable of influencing neuroplasticity, inflammation, and emotional regulation.^[1]

Recent meta-analyses suggest strong associations between lifestyle patterns and mental health outcomes: for example, individuals with poor sleep quality or high sedentary time exhibit two- to threefold increased risk of depressive symptoms, while adherence to Mediterranean or whole-food diets correlates with improved mood stability and cognitive outcomes.^[1,2] Concurrently, the

ubiquity of digital technology and social media has introduced complex psychophysiological stressors that can both exacerbate and buffer psychiatric distress depending on usage patterns.^[2]

This review provides a comprehensive synthesis of modern lifestyle factors shaping psychiatric disease trends, articulating mechanistic pathways linking behavioral exposures to neural dysfunction. It critically examines epidemiologic trajectories, biological underpinnings, and emerging therapeutic frameworks, including lifestyle psychiatry and public health strategies aimed at prevention and resilience promotion.

2. Epidemiological Trends in Psychiatric Disorders

Mental health disorders remain among the foremost causes of global disease burden, with no evidence of reduction in prevalence or disability-adjusted life years (DALYs) over the past three decades.^[1-3] The Global Burden of Disease assessment indicated that mental disorders accounted for approximately 418 million DALYs—representing 16% of total global DALYs in 2019—highlighting a persistent and widespread challenge. Despite major advances in neuroscience and psychopharmacology, the worldwide incidence and burden of psychiatric disorders remain largely unchanged since 1990.^[3]

Epidemiological data reveal striking trends in both youth and adult populations. One in five adults experiences some form of mental illness each year, with approximately 6% meeting criteria for severe psychiatric conditions. Among adolescents, 1 in 6 individuals aged 6–17 experiences a diagnosable disorder annually, and half of all lifetime psychiatric illnesses begin before the age of 14. Suicide has become the second leading cause of death among adolescents aged 10–14, a trend exacerbated by sociocultural pressures, social media exposure, and academic burdens.^[3]

Geographically, the burden has shifted toward low- and middle-income countries (LMICs), where urbanization, socioeconomic disparity, and underdeveloped health infrastructure magnify mental illness risks.^[3] High-income regions such as North America also report rising rates due to stress, screen dependency, and chemical coping behaviors. These findings call for integrated models linking behavioral risk factors with underlying neurobiological and societal mechanisms.

3. Modern Lifestyle Factors and Mechanistic Links

Modern psychiatric epidemiology recognizes that the interplay between behavior, environment, and neurobiology forms the foundation of disease risk. Lifestyle patterns influence psychiatric vulnerability through stress physiology, circadian disruption, inflammation, and neural network remodeling.^[1,2]

Contemporary lifestyle modifications—characterized by poor sleep, physical inactivity, and continuous digital

connectivity, consumption of ultra-processed foods, substance misuse, and urban stress exposure—are correlated with increased risk for major depressive disorder, anxiety, bipolar spectrum illnesses, and cognitive impairment.^[1,2] These risk factors are modifiable and, importantly, exhibit bidirectional relationships with psychiatric symptoms, forming self-perpetuating cycles of stress and behavioral reinforcement.

The mechanistic pathways linking lifestyle and psychiatric disorders primarily involve neurobiological dysregulation. Chronic stress and sleep loss activate the hypothalamic–pituitary–adrenal (HPA) axis, promoting elevated cortisol levels and impairing feedback sensitivity. This leads to hippocampal atrophy and reduced serotonergic neurotransmission, key mediators in depression and anxiety pathogenesis. Parallel inflammatory cascades—mediated by interleukin-6 (IL-6), tumor necrosis factor- α (TNF- α), and C-reactive protein (CRP)—cause neuroinflammation and disruption of synaptic integrity.^[1,3]

Furthermore, behavioral disconnections in modern life, including sedentarism and digital isolation, reduce dopamine and oxytocin signaling, weakening reward processing and social bonding. Ultra-processed dietary patterns rich in sugar and saturated fats alter gut microbiota, enhance oxidative stress, and modulate tryptophan–kynurenine metabolism, affecting mood and cognitive function.^[2,3]

Lifestyle-related neurobiological dysregulation thus converges on three interconnected domains

- Stress-system hyperactivity (HPA axis and limbic circuits)
- Immune and metabolic dysregulation
- Neural plasticity impairment and monoaminergic imbalance

These domains constitute the central framework for lifestyle psychiatry, where targeted interventions such as structured exercise, improved diet, sleep hygiene, and digital exposure moderation can restore homeostatic neurobiological function.

SLEEP DISTURBANCE

Sleep disturbance represents one of the most powerful and bidirectional predictors of psychiatric morbidity. Mendelian randomization studies and longitudinal analyses demonstrate a causal relationship between insomnia and major depressive disorder (MDD), post-traumatic stress disorder (PTSD), and attention-deficit/hyperactivity disorder (ADHD), with odds ratios around 1.3–1.4 for each association.^[4] Genetic analyses confirm that insomnia is not merely a symptom but an upstream risk factor influencing psychiatric vulnerability. Conversely, psychiatric illness such as MDD and PTSD heightens insomnia risk via dysregulation of the hypothalamic–pituitary–adrenal (HPA) axis, serotonergic

signaling disruption, and inflammatory cytokine activation.

Sleep restriction and circadian misalignment amplify amygdala hyper-responsiveness and suppress prefrontal regulatory control, enhancing emotional volatility and anxiety traits. Chronic sleep loss elevates cortisol through persistent activation of corticotropin-releasing hormone (CRH) signaling, while circadian rhythm disturbances suppress neurotrophic factor expression, reduce hippocampal volume, and promote oxidative stress. The resulting cyclic interaction between insomnia and psychiatric symptoms constructs a self-reinforcing loop of neurobiological dysfunction and mood instability, a hallmark of modern psychiatric trajectories.^[4]

4. Sedentary Lifestyle

Sedentary behavior—marked by prolonged sitting time and reduced physical activity—has become pandemic with the advent of digitalized work and entertainment. Meta-analytic data consistently link sedentary time exceeding eight hours daily with double the risk of depressive and anxiety symptoms.^[1-3] Physical inactivity blunts dopaminergic and endorphinergic responses in the nucleus accumbens and prefrontal cortex, resulting in anhedonia and fatigue.^[3]

Mechanistically, inactivity alters peripheral metabolism, elevating inflammatory mediators like CRP and IL-6, which cross the blood-brain barrier to modulate

microglial activity and disrupt neurotransmission. Conversely, structured aerobic exercise increases brain-derived neurotrophic factor (BDNF) and hippocampal connectivity, promoting resilience against depressive relapse.^[1]

5. Digital & Social Media Exposure

The exponential rise of digital technology and social media engagement has transformed sociocognitive processing, particularly in youth populations. Globally, adolescents report average screen times exceeding six hours per day, with associations to emotional dysregulation, anxiety, attention deficits, and distorted body perception.^[5] Recent scoping reviews illustrate mixed outcomes: moderate use enhances social connectedness, whereas excessive or negative-content exposure precipitates stress, loneliness, sleep disturbances, and compulsive comparison aligned with depressive phenotypes.^[5]

Neurobiologically, the constant reward feedback of digital media activates dopaminergic reward circuits, fostering dependency analogous to behavioral addiction. Furthermore, blue light exposure and nighttime media engagement disrupt circadian melatonin secretion, causing delayed sleep onset and poor sleep quality.^[4-5] This neurophysiological imbalance culminates in heightened amygdala activity and diminished executive regulation, accelerating susceptibility to anxiety and depressive states.

Table 1: Lifestyle factors and psychiatric outcomes.

Lifestyle Factor	Principal Mechanistic Pathways	Linked Psychiatric Outcomes	Key Biological Markers
Sleep disturbance	HPA axis activation, serotonin dysregulation, oxidative stress	Depression, PTSD, ADHD, anxiety	Cortisol ↑, IL-6 ↑, BDNF ↓
Sedentary lifestyle	Reduced BDNF, inflammation, dopaminergic suppression	Depression, anxiety, mood instability	CRP ↑, IL-6 ↑, dopamine ↓
Digital & social media exposure	Dopamine reward loop dysregulation, circadian delay	Depression, anxiety, attention disorder	Melatonin ↓, dopamine receptor fatigue
Unhealthy diet	Gut microbiota imbalance, oxidative stress	Depression, bipolar disorder	TNF-α ↑, lipid peroxidation
Substance use	Neurotoxicity, dopaminergic depletion	Psychosis, anxiety, cognitive deficits	Dopamine ↓, glutamate imbalance
Urban stress	Cortisol hyperactivation, pollution-mediated inflammation	Anxiety, depression, schizophrenia	Cortisol ↑, cytokine activation

6. Dietary Changes

Dietary transformation in the 21st century has profoundly influenced psychiatric outcomes through metabolic, inflammatory, and neurochemical pathways. Increased consumption of ultra-processed foods (UPFs)—characterized by high glycemic load, added sugars, and saturated fats—is associated with greater risks of depressive and anxiety disorders.^[6] Diets deficient in omega-3 fatty acids, B vitamins, and antioxidant compounds impair neuronal membrane

integrity, neurotransmitter synthesis, and mitochondrial resilience.^[6]

Mechanistically, high-fat, high-sugar diets alter gut microbiota composition, decreasing diversity and favoring pro-inflammatory species. This dysbiosis influences the gut-brain axis through reduced short-chain fatty acid (SCFA) production, increased intestinal permeability, and elevated systemic lipopolysaccharide levels, which activate microglia and induce depressive-

like phenotypes.^[6] Conversely, adherence to anti-inflammatory dietary patterns—such as the Mediterranean, Japanese, and DASH diets—correlates with reduced depression incidence and amelioration of symptom severity in clinical trials. These diets enhance levels of serotonin precursors (tryptophan) and promote neurogenesis through elevation of brain-derived neurotrophic factor (BDNF).^[6]

7. Substance Use

Psychoactive substance use—including alcohol, cannabis, nicotine, and emerging synthetic drugs—remains a major modifiable contributor to psychiatric morbidity. Substance misuse engages mesolimbic dopaminergic pathways, promoting maladaptive reward learning and structural neurotoxicity. Chronic alcohol consumption, for example, leads to neuronal loss in the prefrontal cortex and hippocampus, impairing executive function and emotional regulation.^[1,3]

Furthermore, cannabis use during adolescence is implicated in psychosis onset, especially among individuals with genetic predispositions affecting dopamine D2 receptor signalling.^[1] Nicotine dependence interferes with cholinergic neurotransmission, worsening anxiety and depressive symptoms during withdrawal.

Emerging substances such as synthetic cannabinoids and novel stimulants generate unpredictable neuropsychiatric reactions, reinforcing addiction and increasing suicide risk.

8. Urbanization & Environmental Stress

Urbanization represents an evolving macro-lifestyle determinant of psychiatric disorders. While cities offer increased access to healthcare and education, they also intensify social competition, noise pollution, light exposure, and environmental toxins.^[1,3] Epidemiological studies show that individuals living in urban environments are 1.5–2 times more likely to develop schizophrenia and major depression than those in rural areas.^[3]

Theoretical models hypothesize that sensory overload and reduced exposure to green spaces elevate perceived social threat, activating the amygdala and anterior cingulate cortex. This amplified neural stress reactivity mediates HPA axis hyperactivity and cortisol overproduction, contributing to chronic anxiety and depressive behavior. Air pollution and heavy metal exposure further exacerbate oxidative stress and microvascular damage in the brain.

Table 2: Dietary patterns and psychiatric impact.

Dietary Pattern	Mechanistic Features	Neuropsychiatric Outcome	Key Nutritional Components
Mediterranean diet	Anti-inflammatory, antioxidant, promotes BDNF	Reduced depression & anxiety	Olive oil, fish, polyphenols
Western/ultra-processed diet	Pro-inflammatory, gut dysbiosis, oxidative stress	Increased depression & fatigue	Refined sugar, saturated fat
DASH diet	Improves vascular health, modulates inflammation	Lower cognitive decline & mood disorder risk	Whole grains, potassium
Vegetarian diet	Potential B12 deficiency, mixed microbiota impact	Variable — protective if balanced	Fiber, plant polyphenols
Low-glycemic diet	Enhances insulin sensitivity, stabilizes mood	Decreased irritability & anxiety	Whole grains, legumes

9. Vulnerable Populations

Certain populations experience disproportionately high psychiatric disease burdens due to intersecting social, economic, and biological vulnerabilities. Socioeconomically disadvantaged groups, ethnic minorities, migrants, refugees, and the homeless face chronic stressors including discrimination, poverty, and limited healthcare access that exacerbate mental illness risks. Youth and adolescents are especially vulnerable, with nearly half of all lifetime psychiatric disorders emerging before age 18, magnified by educational pressures, social media influences, and developmental neuroplasticity.

Gender disparities are noted, where females exhibit higher prevalence of anxiety, depressive, and eating disorders, linked to both biological sensitivity and social role demands. Additionally, individuals with chronic medical conditions, disabilities, or neurodevelopmental

disorders represent vulnerable groups due to compounded biological and psychosocial strain. Urban poor populations face intense environmental stress, housing instability, and pollutant exposure driving complex mental health challenges.

10. Public Health and Preventive Strategies (including Lifestyle Psychiatry)

Mental health promotion and prevention have become cornerstones of global public health agendas to address the rising psychiatric burden. Effective strategies integrate individual-focused interventions with broader socio-environmental measures, emphasizing cross-sector collaboration spanning education, labor, justice, housing, and health services.^[7]

Primary prevention includes early childhood developmental programs delivering stable, nurturing environments, social-emotional learning in schools, and

community-based mental health promotion.^[7] Digital and mobile health tools enable scalable access to therapy, psychoeducation, and lifestyle tracking, reducing stigma and treatment gaps.^[7]

Lifestyle psychiatry, embedding lifestyle modifications as first-line psychiatric treatments, targets key domains—physical activity, nutrition, sleep hygiene, social connection, and substance use reduction—to enhance resilience and neurobiological recovery.^[8] Behavioral health professionals play a pivotal role using motivational interviewing, personalized goal setting, and interdisciplinary collaboration to support sustained lifestyle change.^[1,8]

At the policy level, urban planning promoting green spaces, regulating harmful substance availability, and workplace mental health programs foster supportive environments.^[7] Suicide prevention remains a priority through media guidelines, restricting access to lethal means, and crisis intervention frameworks.

Future Directions

Despite advances, substantial treatment gaps persist globally, particularly in low-resource settings, necessitating innovative delivery models such as task-sharing with non-specialists and blended digital-therapeutic care.^[7] Investments in research and health system transformation are imperative to realize the potential of preventive and lifestyle-centered psychiatry.^[10] Research Gaps and Future Directions.

Despite recognition of lifestyle factors as critical determinants of psychiatric health, significant research gaps remain. Longitudinal studies with large, diverse cohorts are needed to elucidate causal pathways and interaction effects between lifestyle domains and genetic susceptibility. The heterogeneity of psychiatric disorders challenges precise phenotyping and demands refined biomarkers integrating neuroimaging, immune profiling, and digital phenotyping.

Innovative intervention trials should explore scalability, adherence, and cost-effectiveness of lifestyle psychiatry models across different healthcare systems and cultures. The emerging field of digital mental health requires rigorous evaluation of algorithms for personalized lifestyle recommendations and automated monitoring while safeguarding privacy and reducing digital divides.

Environmental research must further clarify urbanization effects, pollution neurotoxicity, and socioecological buffers like green space exposure. Finally, vulnerable populations demand targeted inclusion in research, ensuring interventions are culturally congruent and equitable.

Fostering interdisciplinary collaborations spanning psychiatry, public health, neuroscience, and technology

will accelerate innovations addressing modern lifestyle-induced psychiatric morbidity.

11. CONCLUSION

This comprehensive review highlights the transformative role of modern lifestyle factors in shaping psychiatric disease trends. Sleep disruption, sedentary behavior, digital media exposure, dietary transitions, substance use, and urban environmental stress converge on dysregulated neurobiological systems including the HPA axis, inflammatory pathways, and neurotransmitter networks. Such lifestyle-driven biological perturbations contribute substantially to the global mental health burden across all demographics, with pronounced impacts in vulnerable populations.

The emergent discipline of lifestyle psychiatry offers promising integrative frameworks for prevention and intervention, emphasizing modifiable behaviors alongside traditional therapies. Public health initiatives targeting systemic social determinants and incorporating digital innovations are essential to curb rising psychiatric morbidity. Continued research and investment are paramount to filling knowledge gaps and realizing scalable, culturally sensitive solutions. Addressing the multifaceted challenges of 21st-century living presents an urgent imperative for advancing psychiatric wellbeing worldwide.

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