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Review

The Impact of Lifestyle on Depression and Anxiety in Older Adults

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Abstract

Depression and anxiety are prevalent mental health issues in older adults, with various lifestyle habits serving as either protective factors or risk enhancers. This narrative review comprehensively examines the role of key lifestyle habits, including diet, physical activity, sleep, social engagement and relationships, cognitive engagement, and substance use, on mental health outcomes in older adults. The main findings indicate that positive habits, such as a balanced diet, regular exercise, quality sleep, strong social networks, mental stimulation, and limited substance use, are strongly associated with reduced risks of depression and anxiety. Conversely, poor diet, inactivity, sleep disturbances, social isolation, cognitive decline, and substance abuse significantly contribute to the onset and progression of these disorders. Ultimately, this review highlights the critical importance of holistic lifestyle modifications in preventing and managing depression and anxiety within older adult populations.

Keywords

Older adults, Depression, Anxiety, Lifestyle habits

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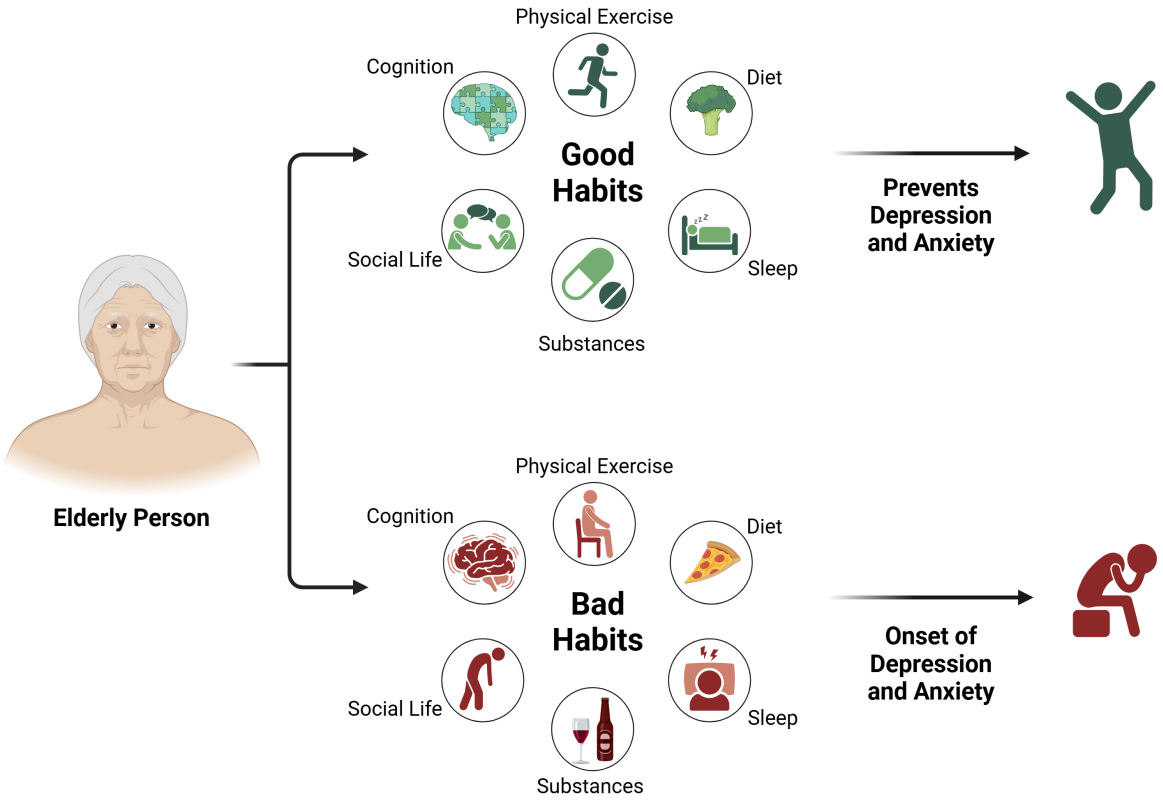
Graphical Abstract



1. Introduction

The aging process often brings various physical and psychological changes that can significantly impact an individual's well-being [1]. The geriatric population is particularly susceptible to depression, with incidence rates varying among studies between 29% [2] and 53,1% [3]. In a study with the incidence of depression among the older adults at 47.2%, higher rates were identified in females (53.25%) compared to males (27.5%) [4].

The annual cumulative incidence of depression and depressive symptoms in older adults aged 60 years or more is around 4.5% [5]. Unfortunately, a substantial portion of older adults with depression often go undiagnosed, with estimates suggesting that 50-70% of older adults with depression are not properly identified in primary care settings [6].

Another mental disorder highly prevalent in older adults is anxiety, with a prevalence of 28%, often comorbid with depression and medical illnesses, and is associated with increased disability and undertreatment [7]. Furthermore, anxiety disorders in older adults have high relapse rates and can progress to mixed anxiety depression and pure depressive mood episodes [8].

Beyond the physical health challenges associated with aging, social and psychological factors also contribute to the development and progression of depression and anxiety within the geriatric population [9]. Significant life events, such as the loss of a spouse, can contribute to feelings of loneliness, grief, and despair, further exacerbating mental health concerns [10]. Promoting beneficial habits can help address and prevent anxiety in the geriatric community [11].

Maintaining a healthy diet and regular exercise has positively impacted this population's mood and overall mental well-being [12]. Similarly, adequate sleep, active social engagement, and consistent cognitive stimulation are increasingly recognized for their protective roles against mental health challenges in older adults [13]. Conversely, unhealthy habits, such as poor dietary choices, sedentary lifestyles, smoking, and alcohol use, can contribute to the development and progression of depressive and anxiety-related symptoms in the geriatric population [14].

2. Methodology

This article presents a narrative review of the literature, focusing on the impact of lifestyle on depression and anxiety in older adults. The primary objective was to synthesize existing knowledge to provide a comprehensive understanding of the current evidence regarding this relationship. The literature search was conducted using basic keywords in various combinations (e.g., employing Boolean operators such as "AND" and "OR") to identify relevant articles. Key terms included "lifestyle," "older adults," "depression," "anxiety," "physical activity," "aging," "mental health," "diet," "mood

disorders," "sleep," and "social isolation," across prominent scientific databases such as PubMed/MEDLINE and Scopus. No specific time frame was applied to the search, allowing for a broad perspective on the topic.

In addition to the initial keyword search, a "snowballing" technique was employed, involving the careful examination of the reference lists of relevant review articles and highly cited studies. This approach ensured the inclusion of foundational works and significant contributions that were not captured by the initial keyword combinations. Articles were selected based on their direct relevance to the objective, with duplicates removed and full texts retrieved for in-depth analysis. The chosen articles were critically read and analyzed to identify recurring themes, key findings, and significant associations between lifestyle factors (such as physical activity, diet, sleep, and social engagement) and the incidence or exacerbation of depression and anxiety in the older adult population. The synthesis of information was performed narratively, integrating findings from various studies to construct a comprehensive overview, distinguishing between correlational and potential causal relationships where supported by the literature.

3. Habits and Their Impact on Mental Health in Older Adults

According to the World Health Organization [15], the global older adults population has significantly increased due to improved quality of life in developed and developing countries. Aging is a complex process influenced by various biological, psychological, and social factors, which can lead to mental health challenges such as depression and anxiety. Cognitive functions decline, as evidenced by reduced memory and attention [16]. Physical function also tends to change, with muscle mass loss and motor difficulties, potentially limiting daily activities and causing older adults to require support [17]. Bond et al. [18] state that losing independence in simple activities is a risk factor for developing depression and anxiety.

As Figure 1 shows, depression is characterized by symptoms persisting for at least two weeks, including depressed mood or loss of interest, alongside other indicators such as changes in appetite or weight, sleep disturbances, fatigue, and cognitive difficulties. These symptoms, which must cause significant distress or functional impairment and not be attributable to substance use or medical conditions, can vary in severity and presentation according to the Diagnostic and Statistical Manual of Mental Disorders [19].

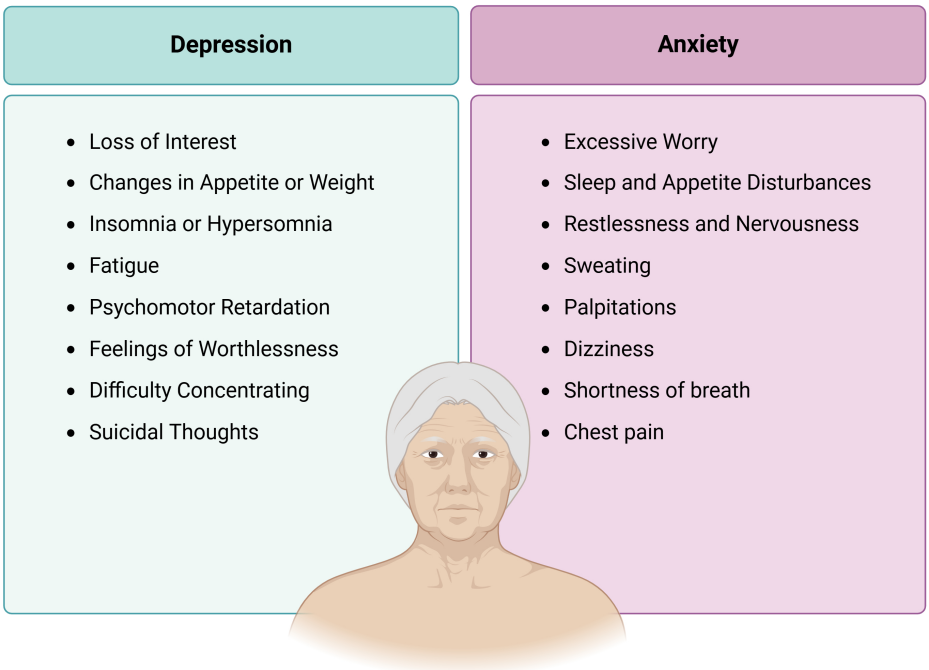


Figure 1. Symptoms of depression and anxiety in older adults. Figure 1 illustrates the distinct symptoms of depression and anxiety. Depression is characterized by a persistent loss of interest, fatigue, psychomotor retardation, and feelings of worthlessness, among other symptoms. In contrast, anxiety is marked by excessive worry, restlessness, palpitations, and other physical manifestations. While both conditions may present with sleep and appetite disturbances, their core features differ significantly.

On the other hand, anxiety disorders can manifest through excessive worry, sleep and appetite disturbances, restlessness, and nervousness. Physical symptoms may include sweating, palpitations, dizziness, shortness of breath, and chest pain [19], as shown in Figure 1. Additionally, studies reveal that aging is inherently associated with brain tissue atrophy, particularly in the hippocampus, a region involved in memory formation, learning, and emotions. Changes in neurotransmitter transmission have also been observed, including alterations in dopamine, which is linked to mood regulation, and a reduction in D1, D2, and D3 receptors [20]. Depression is associated with dysfunctions in dopaminergic circuits, particularly in the ventral tegmental area, nucleus accumbens, and medial prefrontal cortex. Low dopamine levels correlate with pathological patterns in depression, such as depressed mood and loss of pleasure [21].

Depression in older adults can present significant differences compared to younger adults, both in symptom manifestation and associated risk factors. Among older adults, depression often manifests through somatic complaints, such as physical pain, and cognitive symptoms, including memory difficulties, rather than explicitly expressed feelings of sadness or discouragement [22].

Habits influence biological mechanisms through neurological interactions, lifestyle, and environment. When a behavior is repeatedly performed, it becomes automatic and consolidated in the brain [23]. An observational study with 616 participants aged 50 to 90 found that depressive symptoms are associated with anxiety and lifestyle habits, with sleep and physical activity being the most impactful factors. While this study identifies a connection, it primarily indicates a correlation rather than direct causation, suggesting that these factors tend to occur together. The results showed that participants with and without depression exhibited significant differences in cognitive and executive functions [24].

Lifelong behaviors contribute to the quality of life in aging. Habit formation involves a neural network that includes subcortical nuclei and the prefrontal cortex, responsible for decision-making and social behavior. These nuclei operate within a circuit that incorporates behaviors into established routines through the reward system. As a habit is repeated, the brain adapts, automating the behavior. Dopamine is a crucial neurotransmitter and neuromodulator in the formation and execution of behaviors, acting as the neural substrate for the reward system, evaluating and associating executed behavior with received rewards [25].

Habit formation is closely linked to neuroplasticity, the brain’s adaptive capacity in response to new experiences [26]. While neuroplasticity declines with age, it does not disappear. This indicates that even in old age, forming new habits requires greater cognitive effort but remains possible at any stage of life [27].

Depression compromises older adults' health, limiting social and physical activities, and shapes a pessimistic worldview, leading to social withdrawal and reduced quality of life [28]. Researchers analyzed the effects of lifestyle factors and physical health on life satisfaction and the risk of depression in older adults using data from the China Health and Retirement Longitudinal Study (CHARLS). Their results indicated that alcohol consumption, insufficient sleep, and poor physical health were correlated with negative impacts on mental health and life satisfaction, and were associated with more severe depressive symptoms [29]. It is essential to note that observational studies, such as CHARLS, can identify associations and patterns, but typically do not establish a direct cause-and-effect relationship.

On the other hand, practicing healthy habits throughout life, even when adopted in old age, can help mitigate the negative effects of aging. Engaging in stimulating activities strengthens brain circuits, potentially reducing the risk of neurodegenerative diseases and mental disorders such as depression and anxiety in older adults [30].

Major depressive disorder and anxiety have multifactorial causes, including non-modifiable factors (such as genetics and disabilities) and modifiable factors (such as environment, lifestyle habits like physical inactivity, unbalanced diet, social isolation, and insufficient sleep [31]. In the following sections, we will explore in detail the impact of these habits on mood and anxiety disorders, considering both direct causal links where evidence supports them and correlational relationships that warrant further investigation.

3.1 Diet

The relationship between diet and mental health is becoming increasingly evident, especially among older adults. Studies show that a balanced diet rich in nutrients can play a crucial role in the prevention and treatment of depression and anxiety. Diets such as the Mediterranean and Dietary Approaches to Stop Hypertension (DASH), which are rich in anti-inflammatory foods, have been associated with lower rates of depression [32,33]. Additionally, dietary diversity, characterized by the intake of various foods, is also a protective factor against mental disorders [34].

The presence of micronutrients such as iron, zinc, and magnesium in the diet is essential for brain health and can prevent mood disorders [35]. On the other hand, diets high in processed foods, sugars, and saturated fats trigger inflammatory processes that increase the risk of depression and anxiety. Studies show that excessive consumption of ultra-processed foods is associated with a higher prevalence of depressive symptoms, especially in women [33].

Plant-based dietary patterns, such as Mediterranean and vegetarian diets, are associated with a lower prevalence of depression and anxiety symptoms [36]. In contrast, poor-quality diets, rich in ultra-processed foods and low in nutrients, increase the risk of mental disorders [37]. A study from an American country highlighted that adherence to unhealthy dietary patterns is associated with a higher prevalence of common mental disorders, including depression and anxiety [38].

Malnutrition, often associated with loss of appetite and difficulties in meal preparation, also contributes to the increase of depression and anxiety symptoms in older adults, especially those institutionalized. Studies in different populations demonstrate the relationship between malnutrition and the worsening of depressive symptoms [39].

Scientific evidence demonstrates the relationship between diet and mental health in older adults [40]. Adopting healthy dietary patterns, rich in fruits, vegetables, and whole grains and low in ultra-processed foods, can be an effective strategy to prevent and treat depression and anxiety [41]. Promoting healthy eating habits should be a priority in mental health care for older adults, complementing pharmacological and psychotherapeutic interventions [42].

3.2 Physical Activity

Physical activity refers to energy expenditure by skeletal muscles through body movements. It can occur in occupational, domestic, sports-related, and other activities. Exercise, on the other hand, is a subset of physical activity that is planned, structured, and repetitive [43]. Evidence shows that when performed routinely, aerobic and resistance exercises, such as weight training, positively affect the molecular structure of neural, cognitive, motor, cardiovascular, and metabolic functions [44].

Depression in older adults reduces quality of life and can compromise autonomy. While its cause is multifactorial, aging includes characteristics that increase its likelihood, such as chronic diseases impacting daily routines and independence. Psychotropic drugs can provide short-term relief, but prolonged use may lead to side effects. In this context, physical activity emerges as a therapeutic alternative [45], as it helps improve and prevent psychological disorders such as anxiety, depression, and stress [46,47].

While pharmacological treatments for depression and anxiety, such as antidepressants (e.g., SSRIs, SNRIs) and anxiolytics (e.g., benzodiazepines), target neurotransmitter systems to improve mood and reduce anxiety [48], as Figure 2 show, physical activity offers a complementary or alternative approach by influencing similar neurobiological pathways [49].

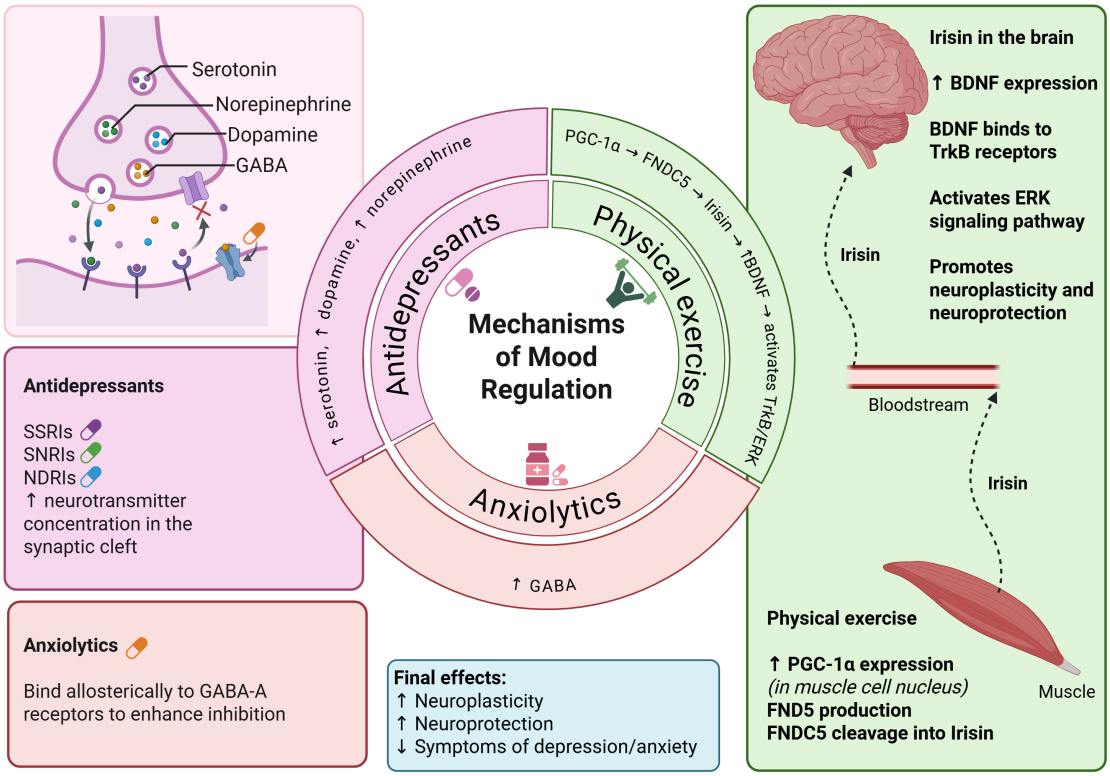


Figure 2. Mechanisms of mood regulation by antidepressants, anxiolytics, and physical exercise. The figure illustrates the biological pathways involved in mood regulation through three main strategies: antidepressants, anxiolytics, and physical activity. Antidepressants such as SSRIs, SNRIs, and NDRIs increase neurotransmitter concentrations (serotonin, norepinephrine, and dopamine) in the synaptic cleft. Anxiolytics act by allosterically binding to GABA-A receptors, enhancing neuronal inhibition. Physical exercise induces PGC-1α expression in muscle cells, leading to FNDC5 production and the release of irisin into the bloodstream. In the brain, irisin stimulates BDNF expression, which activates TrkB receptors and the ERK signaling pathway, promoting neuroplasticity and neuroprotection. The final effects of these interventions include enhanced neuroplasticity and neuroprotection, along with reduced symptoms of depression and anxiety.

Studies in mice have shown that Insulin-like Growth Factor I (IGF-I) has antidepressant properties and increases the expression of brain-derived neurotrophic factor (BDNF), which is essential for neuroplasticity and the effects of exercise on the brain [50]. According to Wang & Mao [41], studies in humans and animal models indicate that BDNF activates the TrkB receptor, which is associated with the extracellular signal-regulated kinase (ERK) pathway. A reduction in ERK activity in the hippocampus and prefrontal cortex has been linked to depression development.

Physical exercise promotes neuroplasticity and neuroprotection by increasing BDNF levels, partly through pathways involving PGC-1α and Irisin. These mechanisms modulate serotonergic and noradrenergic systems, aiding in depression treatment [51]. Studies in older adults have shown that consistent moderate-intensity aerobic exercises can improve depressive symptoms, though further research is needed on specific molecular adjustments [51].

As Figure 3 illustrates, physical activity also releases neurochemical substances, such as endorphins, which possess analgesic, anxiolytic, and sedative properties [52,53]. Endorphins modulate the hypothalamic-pituitary-adrenal (HPA) axis, helping to balance the stress response and promoting emotional resilience, thereby mitigating the risk of anxiety and depression associated with chronic stress [54].

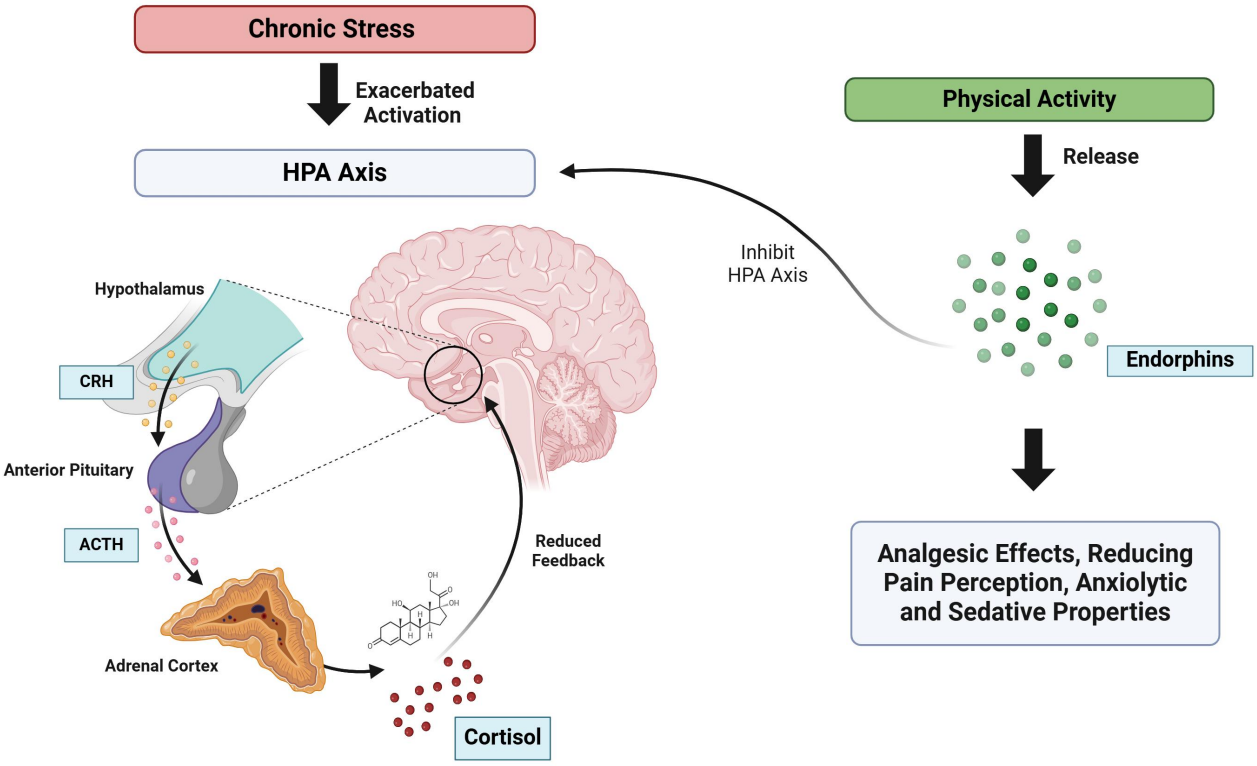


Figure 3. Effects of physical activity on chronic stress regulation through the hpa axis. Figure 3 illustrates the interaction between chronic stress, the hypothalamic-pituitary-adrenal (HPA) axis, and physical activity. Chronic stress exacerbates HPA axis activation, leading to increased cortisol release, which can contribute to anxiety and depression. Physical activity promotes the release of endorphins, which have analgesic, anxiolytic, and sedative properties. Additionally, endorphins help inhibit HPA axis hyperactivity by reducing the release of corticotropin-releasing hormone (CRH) and adrenocorticotropic hormone (ACTH), thereby restoring balance in the stress response and promoting emotional resilience.

A meta-analysis with over 260,000 participants showed that physical activity reduces the risk of depression, even when considering factors such as age, sex, and health status [55]. According to Chen et al. [56], in a cohort study spanning 11 years, it was estimated that 12% of depression cases could be prevented with at least one hour of weekly exercise. Furthermore, physically active older adults present lower levels of depressive symptoms. Exercise helps combat sedentary lifestyles and increases neurotransmitters such as endorphins, dopamine, and serotonin, contributing to emotional and physical well-being.

Therefore, physical exercise is a significant strategy for promoting brain, emotional, and psychological health in older adults, serving as both a preventive measure and a therapeutic option for depression and anxiety. Its benefits stem from acting on neural pathways similar to those targeted by psychotropic drugs, while also mitigating age-related brain structural changes. Crucially, physical activity interventions must be tailored to the older adult's physical condition and preferences [45,46,54].

3.3 Sleep

As individuals age, the need to maintain good mental health grows, and the impact of sleep on conditions like depression and anxiety is significant. Sleep disturbances are common among older adults, with changes in sleep architecture and the weakening of the circadian pacemaker contributing to these issues [57]. Factors such as medical and psychiatric comorbidities, medication use, and psychosocial factors can further exacerbate sleep problems in this population [58,59].

Interestingly, the relationship between sleep and mental health in older adults may follow a different trajectory than the general population. Depressed mood, a key symptom of mental health disorders, is strongly correlated with sleep disturbances in older adults, potentially due to factors such as intrusive thoughts and hyperarousal [60]. Additionally, the prevalence of mental health disorders, including depression and anxiety, is often underestimated in this age group, with one in four older adults experiencing significant psychiatric conditions [61].

The impact of sleep disturbances on mental health in older adults is complex and multifaceted. Chronic sleep issues can lead to increased vulnerability to mental health problems, while conversely, mental health disorders can further disrupt sleep patterns [62]. Poor sleep quality has been linked to increased functional connectivity in brain regions such as the left inferior parietal lobule, which mediates the relationship between anxiety, depression, and sleep disturbances, suggesting that specific neural pathways may be involved in how sleep affects mental health [63].

Poor sleep can also lead to dysregulation of the HPA axis, which is involved in the stress response. This can result in increased cortisol levels, contributing to symptoms of anxiety and depression [64]. Additionally, sleep disturbances may disrupt the balance of neurotransmitters such as serotonin, norepinephrine, and dopamine, which are crucial for mood regulation [65]. Conversely, mental health disorders can further exacerbate sleep problems through cognitive and physiological hyperarousal, as well as the emergence of intrusive thoughts and rumination [66,67].

On the other hand, a good night's sleep can improve mental health and reduce the risk of depression and anxiety. Adequate and quality sleep can help regulate the HPA axis, leading to balanced cortisol levels and improved mood. Moreover, restful sleep can promote the proper balance of neurotransmitters essential for emotional well-being. In contrast to the negative impacts of sleep disturbances, a healthy sleep routine can be a protective factor against the development of mental health disorders in the older adult population [68,69].

3.4 Social Engagement and Relationships

It is natural for social interactions to decrease with aging. However, regardless of the frequency of these contacts, the older adults remain active members of society, adapting to new social contexts [70]. Factors such as physical limitations and mobility difficulties can restrict their opportunities for socialization, increasing the risk of isolation and loneliness, conditions that, in turn, may contribute to the development of depression [71].

This context may lead an older adult to experience feelings of uselessness and perceive themselves as a burden to their family. As a result, they may adopt strategies such as isolation and avoid seeking help, even when facing health problems, to avoid interfering with their family's routine. Additionally, in some cases, family members may restrict their participation in social activities by considering them fragile, further accentuating the feeling of loneliness and isolation [71].

Social isolation and loneliness can result from widowhood or lack of a support network, posing a psychosocial risk that may lead to suicide. Moreover, maladaptive coping strategies may drive older adults toward a sedentary lifestyle, substance use, smoking, unbalanced diets, sleep disorders, and impaired physical health. An unhealthy lifestyle is linked to the onset and worsening of mental illnesses such as depression and generalized anxiety disorder [72].

Neuroimaging research suggests that lonely individuals exhibit less ventral striatum (VS) activity. This brain region is strongly influenced by dopamine and is associated with the reward system, motivation, pleasure, and positive reinforcement. It is activated in response to rewarding stimuli, such as positive social interactions, and its dysfunction is linked to disorders like depression and anxiety [73].

The prefrontal cortex (empathy and social decision-making), the amygdala (processes emotions and social signals, influencing approach or avoidance responses), the hippocampus (memory), and the ventral striatum (reward system) are structures involved in social interactions that promote psychological well-being and prevent mental disorders. Regarding neurotransmitters, oxytocin plays a central role in social interaction, empathy, and emotional regulation. Endorphins, in addition to alleviating physical and social pain, influence the structure of social networks by increasing engagement and the perceived value of social interactions. Social networks are also modulated by dopamine, influencing empathy, prosocial behavior, and attachment. These studies suggest that neurochemical factors are crucial in constructing and maintaining social networks [74].

Studies show that social engagement in middle-aged and older adult individuals is essential for preventing depression and significantly improving quality of life. Cultivating social relationships and maintaining strong connections with family and friends are key factors in enhancing mental health and preventing depression. Additionally, retirement can impact the quality of social relationships and increase psychological distress, making social engagement even more critical for mental health during this period. Participating in volunteer activities or pursuing new interests after retirement can significantly benefit emotional well-being [75].

Although older adult individuals may adopt isolating behaviors, this pattern can also be indicative of depressive symptoms [72]. Despite this ambiguity, pursuing social interactions and community involvement are inherent aspects of human nature [76], and social isolation increases vulnerability to illness. In this context, it is observed that the brain structures involved in depression and the associated neurotransmitters are stimulated by social interaction. Enhancing this activity, neuroplasticity occurs, reducing the risk of depression and anxiety in older adults [73,74,77].

3.5 Cognitive Engagement

Cognitive engagement refers to active participation in mentally stimulating activities. This type of engagement has been associated with various cognitive and mental health benefits. For older adults, cognitive engagement may involve

reading, puzzles, learning new skills, or engaging in social interactions that challenge the mind. By exercising the brain and maintaining cognitive abilities, cognitive engagement can help prevent or reduce the risk of depression and anxiety [78,79].

The impact of cognitive engagement on depression and anxiety in older adults has been extensively studied. Advances in neuroimaging technology have revealed structural and functional changes in the brains of older adults with depression, suggesting that cognitive engagement may play a role in maintaining brain health and preventing the onset of mood disorders [80,81].

Cognitive engagement may also have a protective effect against cognitive decline and dementia, which are often comorbid with depression and anxiety in older adults [82,83]. One theory is that cognitive engagement helps build a "cognitive reserve" by activating compensatory brain networks and neuroplasticity, allowing the brain to adapt to age-related changes and maintain cognitive function [84].

The biological mechanisms underlying the relationship between cognitive engagement and mental health in older adults are complex. One key mechanism may be the regulation of neurotransmitters, such as serotonin, dopamine, and norepinephrine, which play a crucial role in mood regulation. These neurotransmitters are essential for emotional stability, motivation, and coping with stress. Cognitive engagement, through activities like physical exercise and social interaction, which are forms of cognitive engagement, may enhance the availability and functionality of these neurotransmitters, supporting mood regulation and cognitive function. For instance, physical activity has increased dopamine release and serotonin production [85]. Similarly, social engagement may modulate norepinephrine levels linked to stress resilience and cognitive flexibility [86]. These neurochemical changes are thought to contribute to the protective effects of cognitive and social engagement on mental health in older adults [87].

Cognitive engagement enhances neuroplasticity, the brain's ability to reorganize and adapt to changes, mitigating the adverse effects of age-related cognitive decline and supporting emotional well-being. This process helps maintain cognitive reserve, which can delay cognitive decline and promote mental health, especially in aging adults [85,86]. Research has shown that engaging in cognitive activities can lead to brain structure and function changes, such as increased activity in specific regions like the right inferior frontal cortex, which is linked to better cognitive performance in older adults [88]. Moreover, cognitive engagement influences important brain areas, including the precentral cortex and hippocampus, which are essential for maintaining mental health [21].

In addition to cognitive engagement, lifestyle factors such as physical activity, diet, and social engagement significantly contribute to cognitive health. These factors influence neuroplasticity by modulating substrates like neurotrophic signaling and inflammation, both vital for brain health [85,86]. In particular, social activities and support networks have been shown to improve global cognition, executive functioning, and episodic memory, all of which are crucial for mental well-being [86].

Stress is a known risk factor for mental health issues in older adults. However, cognitive engagement can even enhance resilience, mitigating the negative effects of stress. Positive psychological traits, such as having strong social support, can further buffer the impact of stress, leading to improved mental health outcomes [87].

On the other hand, the lack of cognitive engagement in older adults can lead to anxiety and depression, which are closely linked to declines in cognitive function. Social isolation, often a result of reduced cognitive and social engagement, is associated with poorer cognitive performance, and although it does not always predict cognitive decline, improving mood can enhance cognitive function [89]. Depression and anxiety are directly linked to lower cognitive performance, including slower processing speeds and impaired decision-making abilities [79,90,91]. Furthermore, poor sleep quality, which is exacerbated by anxiety and depression, contributes to subjective cognitive decline, with mental health improvements potentially mitigating this decline [16,92].

Severe anxiety negatively impacts cognitive performance, particularly in processing speed and attention, while mild anxiety may provide some protective effect [90,91,93]. Additionally, cognitive impairment and functional disabilities are associated with higher rates of depression and anxiety, underscoring the importance of addressing both mental and physical health to improve overall well-being in older adults [94].

3.6 Substance Use

Substance use among older adults is a complex issue with significant implications for mental health. Studies demonstrate an association between the use of alcohol, tobacco, and other drugs and an increased risk of depression and anxiety in this population. This relationship is influenced by biological, social, and psychological factors specific to old age, making the issue even more relevant. Alcohol, in particular, stands out as a substance of great concern due to its high prevalence of consumption among older adults. Alcohol abuse can exacerbate depressive and anxious symptoms, and is a significant concern due to its potential for polypharmacy interactions, where it can dangerously interact with other prescribed medications, thereby increasing the risk of adverse side effects and severe health complications [95]. Furthermore, sex-specific differences in substance use outcomes are notable; women, for instance, often experience more rapid progression to dependence and greater health consequences from lower amounts of alcohol due to

physiological differences, such as lower body water content and different metabolic rates. These differences highlight the need for tailored prevention and treatment strategies [96].

On one hand, the therapeutic and medically supervised use of certain substances can offer symptomatic relief in cases of anxiety and depression. Prescription medications, such as anxiolytics and antidepressants, are often used as part of treatment to improve mental health [97]. According to Massoni [98], benzodiazepines, although widely prescribed, provide temporary relief from anxiety in older adults, especially in crises. However, the use of these prescribed substances requires strict medical supervision, as their improper use, self-medication, or abuse can lead to dependence and long-term worsening of symptoms.

On the other hand, substance abuse, such as alcohol and controlled medications used recreationally, without a prescription, or in inappropriate doses, can worsen mental health conditions. Alcohol, in particular, is widely consumed as an emotional coping strategy, but its depressive effect on the central nervous system often worsens symptoms of depression and anxiety [99]. According to Castro et al [100], older adult individuals who consume excessive alcohol have a higher risk of developing emotional and cognitive disorders and are more likely to experience falls, accidents, and social isolation. This pattern is also observed with the improper, recreational, or unsupervised use of opioids and other medications, which can lead to dependence and increased psychological vulnerability [101].

The prevalence of substance use disorders among older adults has increased in recent decades, partly due to the consumption habits of the baby boomer generation. This trend negatively impacts the physical and mental health of older adults, requiring special attention from healthcare professionals. Despite the growing concern about substance use in older adults, there is still a lack of appropriate research and treatment models for this population. The complexity of issues related to aging and substance use requires a multidisciplinary approach involving geriatrics, substance use dependency, and psychiatry [102].

Prevention and treatment of substance use in older adults are crucial to promote healthy aging and reduce the risk of depression and anxiety. Interventions aimed at reducing alcohol consumption and smoking cessation are fundamental [103]. In addition, therapeutic approaches such as cognitive-behavioral therapy and pharmacological treatment, when appropriately prescribed and supervised, can be effective in managing depressive and anxious symptoms associated with substance use. A stepped-care approach, which includes low-cost and highly accessible interventions such as bibliotherapy and problem-solving, has shown promise in preventing mental disorders in older adults with mild symptoms [104].

4. Discussion

The evidence presented in this review consistently highlights that aging introduces unique challenges to mental health, particularly an increased susceptibility to depression and anxiety (Table 1). This vulnerability is shaped by a complex interplay of biological factors, such as brain atrophy and neurotransmitter dysfunctions, and environmental influences, including lifestyle and social context. The distinct manifestations of depression in older adults, often presenting as somatic complaints or cognitive difficulties rather than overt sadness, underscore the diagnostic complexities in this population. The decline in physical and cognitive capacities, along with the potential loss of independence, further amplifies these risks.

However, a central theme emerging from this review is the profound protective capacity of healthy lifestyle habits, even when adopted in later life. As demonstrated, a balanced diet, regular physical activity, quality sleep, robust social engagement, and consistent cognitive stimulation collectively contribute to enhanced mental well-being and resilience against mood and anxiety disorders. These habits foster neuroplasticity, enabling the brain to adapt and form new neural circuits, which is crucial for mitigating age-related declines and promoting positive changes in older adults' quality of life.

Specifically, a nutritious diet, rich in anti-inflammatory foods and essential micronutrients, is associated with lower rates of depression and anxiety, while ultra-processed foods exacerbate these conditions. Regular physical activity, through its neurochemical and molecular effects, acts as a powerful therapeutic and preventive tool, influencing neurotransmitter systems and promoting neuroprotection. Adequate and quality sleep is fundamental for regulating stress responses and maintaining neurotransmitter balance, directly impacting mood and reducing vulnerability to mental health issues. Active social engagement, by stimulating brain regions associated with reward and influencing key neurotransmitters, is vital for combating loneliness and fostering psychological well-being. Lastly, consistent cognitive engagement, encompassing mentally stimulating activities, builds cognitive reserve and enhances neuroplasticity, offering protection against cognitive decline and comorbid mental health challenges.

The findings underscore the critical need for a holistic approach to mental health in aging and a need for a shift in public health and policy to prioritize comprehensive, integrated interventions. Community support programs, tailored primary care services, and specialized mental health services for older adults should actively promote lifestyle coaching, including nutritional counseling, personalized exercise regimens, sleep hygiene education, and strategies for social and cognitive stimulation. Intervention models, which provide accessible and scalable support, are emerging as practical approaches for addressing mild to moderate symptoms and preventing the progression to more severe disorders. By

recognizing the influential and interconnected roles of these lifestyle factors, healthcare systems and communities can empower older adults to proactively enhance their brain and emotional health, thereby fostering healthier and more fulfilling aging.

Table 1. Summary of lifestyle habits and their impact on depression and anxiety in older adults.

Lifestyle Habit	Impact on Depression and Anxiety	Key Findings/Mechanisms Summarized	References
Diet	Protective; or Risk Factor	Balanced diets (e.g., Mediterranean, DASH) are anti-inflammatory and rich in essential micronutrients (iron, zinc, magnesium), supporting brain health and reducing mood disorder risk. Poor diets increase inflammation, impacting brain function and neurotransmitter balance.	[32-34,40]
Physical Activity	Protective	Regular aerobic and resistance exercise improves mood, reduces depressive/anxiety symptoms, and acts similarly to antidepressants by increasing neurotransmitters (serotonin, norepinephrine, dopamine) and neurotrophic factors (BDNF, Irisin), promoting neuroplasticity and stress resilience.	[12,46,50,55]
Sleep	Protective; or Risk Factor	Good quality sleep regulates the HPA axis and neurotransmitter balance, supporting mood. Sleep disturbances, common in older adults, exacerbate depression and anxiety by disrupting these systems and increasing vulnerability to mental health issues, often underestimated in this population.	[57-59,62]
Social Engagement & Relationships	Protective	Active social interaction and strong networks stimulate brain areas (ventral striatum, prefrontal cortex, amygdala, hippocampus) and neurotransmitters (oxytocin, endorphins, dopamine) linked to reward, motivation, and emotional regulation. Isolation is a significant risk factor for depression, anxiety, and suicidal ideation.	[76,84,89]
Cognitive Engagement	Protective	Mentally stimulating activities build cognitive reserve, enhancing neuroplasticity and regulating neurotransmitters (serotonin, dopamine, norepinephrine). This strengthens resilience against stress and cognitive decline, which are often comorbid with depression and anxiety in older adults.	[27,93,103]
Substance Use	Risk Factor; or Symptomatic Relief	Abuse of alcohol, tobacco, and recreational drugs exacerbates depression and anxiety symptoms due to central nervous system depression and interactions with medications. Medically supervised use of prescribed anxiolytics/antidepressants can offer relief, but requires strict oversight to prevent dependence and worsening symptoms.	[95,96,102]

Note: BDNF, brain-derived neurotrophic factor; DASH, mediterranean and dietary approaches to stop hypertension; HPA, hypothalamic-pituitary-adrenal.

5. Conclusion

This review comprehensively summarizes how various lifestyle habits significantly influence the prevalence and progression of depression and anxiety in older adults, as shown in Figure 4. Adopting protective habits such as a balanced diet, regular physical activity, quality sleep, robust social engagement, and consistent cognitive stimulation is strongly associated with a reduced risk of these mental health disorders. Conversely, unhealthy dietary patterns, sedentary behavior, sleep disturbances, social isolation, and substance abuse exacerbate symptoms and increase vulnerability. A key finding is the reciprocal relationship between these habits and neuroplasticity, suggesting that positive lifestyle changes can foster adaptive brain changes, even in later life, enhancing resilience against mental health challenges.

The intricate interplay between these lifestyle factors and their impact on brain and emotional health in aging is visually represented in the diagram below, highlighting the multifaceted pathways through which daily habits contribute to mental well-being. The practical implications of these findings are substantial for both clinical care and public health. Healthcare professionals must incorporate comprehensive lifestyle assessments and recommendations into their routine geriatric care to effectively address the needs of older adults. This includes nutritional counseling, personalized exercise prescriptions, sleep hygiene education, and strategies to promote social and cognitive engagement. Furthermore, public health initiatives must prioritize educational campaigns and community programs that empower older adults to adopt and maintain these beneficial habits, thereby proactively reducing the burden of depression and anxiety across the population.

Lifestyle Factors	Effects on Mental Disorders Risk	Associated Neurobiological Mechanisms
Balanced Diet	✓ Protective	↑ BDNF, ↓ inflammation, modulation of serotonin/dopamine
Diet Rich in Ultra-processed Foods	✗ Detrimental	↑ inflammation, ↓ BDNF
Regular Physical Activity	✓ Protective	↑ endorphins, ↑ dopamine, ↑ BDNF, modulation of HPA axis
Sedentary Lifestyle	✗ Detrimental	↓ neuroplasticity, ↑ risk of hippocampal atrophy
Quality Sleep	✓ Protective	Regulation of HPA axis, ↑ serotonin and dopamin
Sleep Disturbances	✗ Detrimental	HPA axis hyperactivation, ↑ cortisol
Social Engagement	✓ Protective	↑ oxytocin, ↑ dopamine, activation of the ventral striatum
Social Isolation	✗ Detrimental	↓ social reward, ↑ risk of depression
Cognitive Stimulation	✓ Protective	↑ neuroplasticity, ↑ cognitive reserve
Nocive Substance use (alcohol/tobacco)	✗ Detrimental	↓ neurotransmitters, ↑ depressive/anxious risk

Figure 4. Effects of depression in older adults. The figure summarizes the multifactorial impact of depression in older adults, including cognitive decline, physical frailty, reduced social engagement, increased comorbidities, and higher mortality risk. It highlights the bidirectional relationship between depression and these outcomes, emphasizing the need for integrated and timely care.

Future research should focus on several key areas. Longitudinal studies are needed to establish clearer causal links between specific lifestyle interventions and long-term mental health outcomes, particularly randomized controlled trials. Further investigation into the precise molecular and cellular mechanisms by which lifestyle factors modulate neuroplasticity and neurotransmitter systems in the aging brain could yield novel therapeutic targets. Additionally, research on the effectiveness of integrated, multidisciplinary interventions that combine multiple lifestyle modifications tailored to individual needs and cultural contexts is crucial for developing more effective preventive and treatment strategies for depression and anxiety in older adults. By prioritizing these actions and continuing research, we can significantly enhance the mental well-being and overall quality of life for older adults worldwide.

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Data Availability Statement

The cited studies are publicly available.

Author contributions

Amanda Gollo Bertollo contributed to the study's conception and drafting of the article. Camila Ferreira Puntel, Maria Franciely Paz Araújo Albuquerque, and Rafael Narzetti contributed to drafting the article. Zuleide Maria Ignácio contributed to the study's conception and critically revised the article for important intellectual content. All authors gave final approval of the version to be submitted.

Conflict of interest

None.

Generative AI statement

The authors declare that no Gen AI was used in the creation of this manuscript.

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