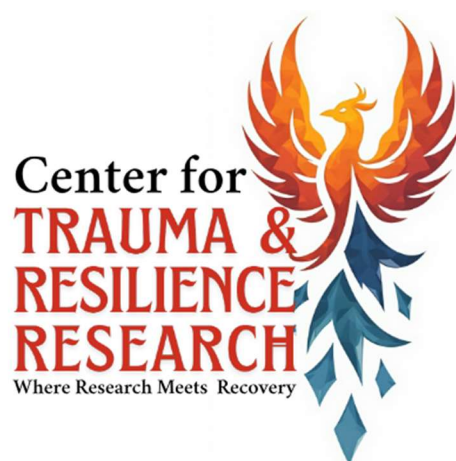


Coping with Anxiety

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I have no known conflict of interest to disclose.

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Abstract

Anxiety is a multidimensional phenomenon encompassing physiological, cognitive, emotional, and behavioral dimensions. As one of the most prevalent mental health concerns globally, anxiety disorders affect nearly one-third of the population over a lifetime. This paper provides an interdisciplinary review of anxiety, incorporating neurobiological, psychological, and sociocultural perspectives. It synthesizes empirical findings related to prevalence, symptomatology, comorbidities, and treatment modalities, including pharmacotherapy, cognitive-behavioral therapy (CBT), and innovative interventions such as digital psychoeducation and virtual exposure. Special attention is paid to recent developments in neuroimaging, the role of trait anxiety in neural connectivity, and the psychosocial consequences of collective trauma, including war and pandemic-related stress. The review also explores less conventional contributors such as eco-anxiety, customer service environments, and comorbid conditions like hereditary angioedema. Findings emphasize the need for personalized, integrative treatment approaches and highlight avenues for future research and policy development.

Keywords: anxiety disorders, panic attacks, trait anxiety, cognitive behavioral therapy, neurobiology, social support, treatment resistance, PTSD, digital interventions, emotion regulation

Coping with Anxiety

Anxiety, as both a clinical condition and a universal human experience, reflects the complex interplay between our cognitive appraisals, neurobiological mechanisms, and social environments. Defined by persistent and excessive worry, fear, or avoidance behaviors, anxiety can range from adaptive responses to perceived threats to maladaptive, debilitating disorders (Szuhany & Simon, 2022; Penninx et al., 2021). The Diagnostic and Statistical Manual of Mental Disorders (DSM-5-TR) classifies a spectrum of anxiety-related conditions including generalized anxiety disorder (GAD), panic disorder, social anxiety disorder (SAD), and specific phobias. These disorders are highly prevalent, with lifetime estimates approaching 34% in the United States alone (Szuhany & Simon, 2022).

In addition to its psychological burden, anxiety contributes to substantial physical, occupational, and social dysfunction. Its multifactorial etiology includes genetic, epigenetic, neurochemical, and environmental factors (Kenwood, Kalin, & Barbas, 2022). Recent studies suggest that neural circuits involving the amygdala, prefrontal cortex, hippocampus, and insula are critical to the processing and regulation of anxiety-related responses (Liu et al., 2024; Kenwood et al., 2022). Meanwhile, psychosocial stressors such as trauma, relational disruption, systemic instability, and ecological crises have increasingly been recognized as triggers and sustaining factors in anxiety pathology (Pihkala, 2020; Barel et al., 2025).

The complexity of anxiety demands an integrative understanding across disciplines. This paper presents a comprehensive literature review of the scientific, psychological, and sociocultural dimensions of anxiety. It critically evaluates empirical research on the neurobiology of anxiety, explores cognitive-behavioral models and intervention outcomes, and synthesizes contemporary findings on treatment efficacy, including emerging digital and pharmacological

therapies. The goal is to inform both clinical practice and public health policy through a nuanced, evidence-based examination of anxiety in the modern world.

Definition and Classification of Anxiety Disorders

Anxiety is fundamentally defined as a future-oriented state involving cognitive, emotional, and physiological arousal in anticipation of a perceived threat. It becomes clinically significant when it is excessive, persistent, and interferes with daily functioning (Lack, 2024). The American Psychiatric Association (2013) categorizes anxiety disorders as distinct from normative fear or worry due to their intensity, chronicity, and associated impairments.

The DSM-5-TR (American Psychiatric Association, 2022) delineates several primary anxiety disorders:

Generalized Anxiety Disorder (GAD) involves excessive worry about various life domains, often accompanied by restlessness, muscle tension, and sleep disturbances.

Panic Disorder is characterized by recurrent, unexpected panic attacks—sudden surges of fear or discomfort with symptoms like palpitations, dizziness, and fear of dying (Szuhany & Simon, 2022).

Social Anxiety Disorder (SAD) entails marked fear of scrutiny or humiliation in social or performance situations.

Specific Phobias are persistent fears of particular objects or situations (e.g., heights, spiders).

Separation Anxiety Disorder and Selective Mutism, while more common in childhood, are also recognized in adult forms.

The International Classification of Diseases (ICD-11) proposes a less stigmatizing and more dimensional framework, categorizing anxiety as a spectrum of disorders with shared and divergent characteristics (Grzech et al., 2025).

Importantly, anxiety disorders often present comorbidly with depressive disorders, obsessive-compulsive spectrum disorders, and somatic symptom disorders (Penninx et al., 2021). They also occur within diverse medical contexts, such as narcolepsy, hereditary angioedema, and vestibular disorders, necessitating collaborative medical-psychiatric interventions (Martinez et al., 2021; Özden & Bankir, 2021; Brandt & Dieterich, 2020).

A nuanced understanding of anxiety subtypes—whether anticipatory, situational, somatic, or existential—is essential for accurate diagnosis and tailored intervention.

Prevalence and Epidemiology of Anxiety Disorders

Anxiety disorders represent the most prevalent class of mental health conditions globally. Epidemiological data suggest a lifetime prevalence of approximately 34% in the United States alone (Szuhany & Simon, 2022). Globally, the World Health Organization (2021) estimated that nearly 301 million people were living with an anxiety disorder in 2019, making it a leading contributor to disability-adjusted life years (DALYs) related to mental health.

Age and Gender Disparities

Anxiety disorders typically emerge during adolescence or early adulthood, with many individuals reporting the onset of symptoms before age 25 (Penninx et al., 2021). Women are twice as likely as men to experience an anxiety disorder, a disparity often attributed to hormonal fluctuations, increased rumination, social roles, and trauma exposure (Lack, 2024). In contrast, older adults are frequently underdiagnosed due to overlapping somatic symptoms and stigma around mental illness. However, studies show that anxiety in later life, especially post-trauma or displacement, is significantly higher than often assumed (Ulke et al., 2021).

Cultural and Sociopolitical Factors

Prevalence rates also vary by cultural, environmental, and geopolitical contexts. Research in conflict zones, such as Iraq (Chung & Freh, 2022), Israel (Ben-David et al., 2025), and the Turkish-Syrian border (Şahpolat & Ayar, 2020), reveals dramatically increased rates of anxiety, PTSD, and panic symptoms following war, terrorism, and natural disasters. Furthermore, global events such as the COVID-19 pandemic have exacerbated underlying anxiety symptoms across age groups (Munk et al., 2020; Korkut & Altıntaş, 2024).

Populations at Risk

Certain groups show disproportionately high anxiety rates, including:

- First responders and military veterans exposed to mass trauma (Pijnenburg et al., 2024).
- College students, whose rates of anxiety have escalated sharply in the past decade (Hoefflich et al., 2023).
- Healthcare professionals and caregivers, often subjected to chronic stress and secondary trauma.
- Individuals experiencing chronic illness, neurodivergent conditions, or reproductive transitions (e.g., postpartum anxiety).

The Healthy Minds Study revealed a rising trend in anxiety diagnosis and treatment utilization among U.S. college students between 2013 and 2019 (Hoefflich et al., 2023), suggesting not only greater symptom presence but also increasing help-seeking behavior, which may reflect a growing mental health awareness movement.

Etiology and Risk Factors of Anxiety Disorders

Understanding the causes of anxiety disorders requires an interdisciplinary approach, incorporating biological, psychological, environmental, and sociocultural perspectives. Anxiety is a multifactorial condition, arising from a confluence of vulnerability factors and triggering events.

Biological and Neurophysiological Factors

Genetics and Heritability

Anxiety disorders tend to run in families, suggesting a genetic predisposition. Twin studies estimate heritability at 30–50% for generalized anxiety disorder (GAD), panic disorder, and social anxiety disorder (Penninx et al., 2021). Genetic polymorphisms affecting serotonin, dopamine, and norepinephrine pathways have been implicated in anxiety vulnerability.

Brain Structures and Neurocircuitry

Research highlights the centrality of the amygdala, prefrontal cortex (PFC), hippocampus, and insula in anxiety regulation. The amygdala processes fear and threat cues, while the PFC modulates emotional response via top-down regulation. Dysfunction in these circuits—such as hyperactivity in the amygdala and hypoactivity in the medial PFC—is associated with heightened anxiety (Kenwood et al., 2022; Liu et al., 2024).

A notable study by Liu et al. (2024) revealed increased hippocampal–insula connectivity in GAD patients, with trait anxiety mediating the severity of symptoms. This suggests that neurofunctional abnormalities, even without structural brain changes, can influence anxiety severity.

Neurochemistry

Abnormalities in GABA, serotonin (5-HT), and norepinephrine systems are well-documented in anxiety disorders. The success of selective serotonin reuptake inhibitors (SSRIs) and serotonin-norepinephrine reuptake inhibitors (SNRIs) in treating anxiety lends support to monoaminergic theories of anxiety (Bandelow et al., 2023).

Autophagy and Amygdala Function

Recent findings also implicate autophagy dysregulation in the amygdala in withdrawal-induced anxiety. Han et al. (2025) demonstrated that inhibiting autophagy in this region reduced morphine withdrawal-induced anxiety-like behaviors in mice, suggesting a novel neurobiological target for intervention.

Psychological and Cognitive Factors

Trait Anxiety and Anxiety Sensitivity

Trait anxiety reflects a stable tendency to perceive situations as threatening and respond with heightened worry. High trait anxiety is a robust predictor of anxiety disorders (Knowles & Olatunji, 2020). Anxiety sensitivity—the fear of anxiety symptoms themselves—also predicts panic disorder and GAD (Schiele et al., 2021).

Cognitive Biases and Negative Affectivity

Individuals with anxiety tend to overestimate threats and underestimate coping resources, a pattern reinforced by negative cognitive schemas. The State-Trait Anxiety Inventory (STAI) often reveals overlapping traits with depression, blurring diagnostic boundaries and supporting the notion that anxiety is linked to general negative affectivity (Knowles & Olatunji, 2020).

Sociocultural and Environmental Factors

Early Adversity and Trauma

Experiences of childhood abuse, neglect, parental separation, or attachment disruptions significantly increase the risk of anxiety in adulthood (Szuhany & Simon, 2022). Rejection sensitivity has also emerged as a potent vulnerability factor, especially in relation to anxious-depressive attacks and treatment-resistant depression (Kaiya, 2024).

Stressful Life Events and Displacement

Events such as war, displacement, pandemics, and natural disasters can trigger or exacerbate anxiety symptoms. Displaced older adults in East Germany reported significantly higher anxiety and depressive symptoms compared to their non-displaced peers (Ulke et al., 2021). Similar effects were seen in Israeli civilians and first responders following terrorist attacks (Ben-David et al., 2025; Pijnenburg et al., 2024).

Technology and Social Isolation

Digital environments may both buffer and exacerbate anxiety. While online psychoeducation has shown efficacy in reducing panic symptoms (Miqdadi et al., 2024), excessive screen time and social media use are correlated with increased anxiety in youth (Hoeflich et al., 2023).

Comorbid Conditions and Somatic Sensitivity

Anxiety disorders frequently co-occur with:

- Depression (shared neurobiology and symptomatology)
- Tinnitus (especially during COVID-19, where comorbid health anxiety spiked; Korkut & Altıntaş, 2024)

- Chronic pain and autoimmune disorders, including hereditary angioedema (Özden & Bankir, 2021)

Vestibular dysfunction has also been linked with vertigo-related anxiety, demonstrating a bidirectional relationship between physical and psychological symptoms (Brandt & Dieterich, 2020).

Symptomatology and Diagnostic Classification of Anxiety Disorders

Anxiety disorders are among the most prevalent psychiatric conditions, yet they encompass a wide spectrum of symptoms, triggers, and clinical presentations. Accurate classification and identification of anxiety symptoms are crucial for diagnosis, treatment planning, and research consistency. This section explores the key symptoms, diagnostic frameworks, and subtype classifications recognized in modern psychiatric practice.

Core Symptoms of Anxiety Disorders

While anxiety presents in a variety of forms, common symptoms include:

- Excessive worry and anticipatory dread
- Restlessness or feeling keyed up/on edge
- Irritability and difficulty concentrating
- Muscle tension
- Sleep disturbances (difficulty falling or staying asleep)
- Somatic complaints, such as palpitations, shortness of breath, dizziness, or gastrointestinal discomfort
- Avoidance behaviors associated with perceived threats or situations

These symptoms may appear across multiple types of anxiety disorders, often leading to diagnostic overlap (Szuhany & Simon, 2022; Penninx et al., 2021).

DSM-5 and ICD-11 Diagnostic Criteria

DSM-5 Classification

The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) categorizes anxiety disorders into the following:

- Generalized Anxiety Disorder (GAD): Persistent, excessive anxiety and worry occurring more days than not for at least 6 months.
- Panic Disorder: Recurrent, unexpected panic attacks and concern about having additional attacks.
- Agoraphobia: Fear or avoidance of places where escape might be difficult.
- Social Anxiety Disorder (SAD): Marked fear of social situations and scrutiny.
- Specific Phobias: Excessive fear of specific objects or situations.
- Separation Anxiety Disorder (SAD): Excessive fear regarding separation from attachment figures.
- Selective Mutism: Failure to speak in specific social situations despite speaking in others.

Obsessive-compulsive disorder (OCD) and posttraumatic stress disorder (PTSD), previously included among anxiety disorders, have now been placed in separate DSM-5 categories.

ICD-11 Classification

The International Classification of Diseases, 11th Revision (ICD-11) uses a broader, less stigmatizing structure. It introduces the umbrella term "anxiety and fear-related disorders", dividing them into subtypes without the "neurotic" label used in earlier editions (Grzech et al., 2025).

Panic Attacks: A Distinct Phenomenon

Panic attacks, while a key feature of panic disorder, may also occur in social anxiety, PTSD, phobias, and depression. The DSM-5 defines a panic attack as a sudden surge of intense fear peaking within minutes, with symptoms including:

- Pounding heart, chest pain
- Shortness of breath, choking sensations
- Derealization or depersonalization
- Fear of losing control or dying

Some research suggests panic attacks may not always be disorder-specific but instead indicate heightened anxiety sensitivity (Lee & Bottomley, 2023; Miqdadi et al., 2024).

A novel term—anxious-depressive attack (ADA)—has been proposed to characterize coexisting symptoms of panic and depressive agitation (Kaiya, 2024; Noda et al., 2022).

Subtypes and Special Presentations

Anxious-Depressive Attacks

ADA is marked by a sudden surge of anxiety, intense rumination, and agitation often accompanied by acting-out behaviors such as self-harm. It is hypothesized to stem from rejection sensitivity, a vulnerability factor for both anxiety and depression (Kaiya, 2024).

Eco-Anxiety and Health Anxiety

Modern forms of anxiety include eco-anxiety—a response to ecological threat and climate instability—and health anxiety, which surged during the COVID-19 pandemic. These may be situational yet debilitating, sharing features with GAD and somatic symptom disorder (Pihkala, 2020; Korkut & Altıntaş, 2024).

Context-Specific Anxiety

Driving anxiety, technology-related anxiety, and performance anxiety in athletes or professionals may not meet full criteria for DSM-5 disorders but still warrant clinical attention due to significant distress and impairment (Vu & Conant-Norville, 2021; Hidalgo-Muñoz et al., 2021).

Cultural and Gender Variations in Presentation

Cultural norms significantly shape the expression of anxiety, such as through somatization (e.g., chest pain or dizziness instead of verbalizing worry). Moreover, gender differences exist, with females generally reporting higher anxiety prevalence but males more often exhibiting externalized symptoms such as irritability or avoidance (Penninx et al., 2021; Bandelow et al., 2023).

Epidemiology and Global Impact of Anxiety Disorders

Anxiety disorders are the most common category of mental disorders worldwide, affecting individuals across the lifespan and geographic regions. The global burden of anxiety is not only psychological but also deeply socio-economic, educational, and physiological. This section explores prevalence data, demographic patterns, comorbidities, and the wide-reaching consequences of untreated anxiety.

Global Prevalence and Demographic Trends

According to the World Health Organization and major epidemiological studies, anxiety disorders have a lifetime prevalence of 28–34%, making them the most prevalent class of psychiatric disorders globally (Szuhany & Simon, 2022; Penninx et al., 2021). Rates vary by region and measurement tools, but common patterns include:

- Higher prevalence among females compared to males across all age groups.

- Early onset, typically beginning in childhood or adolescence.
- Peak incidence in late adolescence and early adulthood, with chronic persistence if untreated.

The Global Burden of Disease Study ranks anxiety among the top ten causes of years lived with disability in many high-income countries (Penninx et al., 2021).

Socioeconomic and Educational Impact

Untreated anxiety disorders can substantially impair social functioning, academic achievement, and workforce productivity:

- Students with anxiety disorders are more likely to drop out of school or underperform academically (Hoeflich et al., 2023).
- Adults with persistent anxiety have increased rates of absenteeism and decreased workplace engagement.
- Anxiety disorders are associated with higher health care costs, particularly due to somatic symptom presentations and emergency care use (Szuhany & Simon, 2022).

A study on college students found that treatment utilization for anxiety has increased in recent years, yet many students with symptoms remain untreated or undertreated (Hoeflich et al., 2023).

Comorbidity and Functional Impairment

Anxiety disorders frequently co-occur with other psychiatric conditions, including:

- Major depressive disorder (MDD)
- Substance use disorders
- Obsessive-compulsive disorder (OCD)
- Posttraumatic stress disorder (PTSD)

- Somatic symptom disorders

Comorbid anxiety and depression result in greater symptom severity, poorer prognosis, and increased suicide risk (Penninx et al., 2021; Lack, 2024). Many individuals with comorbid conditions experience more frequent relapses and lower treatment responsiveness, particularly if the anxiety symptoms are not adequately targeted (Kenwood et al., 2022).

Impact in Vulnerable Populations

First Responders and Trauma Survivors

Studies show elevated rates of anxiety in populations exposed to trauma and disaster. For example, following the 9/11 World Trade Center attacks, perceived social support was a protective factor that reduced the trajectory of anxiety and depressive symptoms over decades (Pijnenburg et al., 2024). Similarly, first responders after terrorist attacks in France experienced sustained anxiety rates up to 22 months later, especially when social support was limited (Girault et al., 2023).

Conflict Zones and Refugees

Populations in war-torn areas (e.g., Kilis on the Turkey–Syria border) have shown elevated rates of PTSD and anxiety, especially when compounded by grief, relocation, and lack of services (Şahpolat & Ayar, 2020).

Technological and Environmental Factors

Recent studies have linked technology-induced isolation, climate anxiety, and self-service automation to rising anxiety rates:

- Eco-anxiety and climate-related grief are particularly prevalent in adolescents and young adults, many of whom experience existential dread related to environmental collapse (Pihkala, 2020).

- A study by Kinch & Buell (2025) found that access to human contact during high-anxiety customer service experiences significantly improved satisfaction and trust—highlighting anxiety’s impact even in non-clinical domains.

COVID-19 Pandemic and Anxiety Surge

The pandemic brought a dramatic surge in anxiety globally. Factors contributing included:

- Health fears
- Economic uncertainty
- Social isolation
- Educational disruption

Studies reported a 50–100% increase in anxiety-related symptom reporting during the pandemic (Munk et al., 2020). Tinnitus patients, for instance, reported significantly worsened symptoms due to pandemic-related anxiety (Korkut & Altıntaş, 2024).

Anxiety disorders constitute a critical public health concern with multifaceted consequences. Their high prevalence, chronic nature, and profound functional impacts make them a priority for early detection, effective treatment, and public health intervention. Left unaddressed, the ripple effects of anxiety on individual potential, social stability, and economic productivity are immense.

Neurobiological and Cognitive Mechanisms of Anxiety

Understanding the biological and cognitive underpinnings of anxiety is crucial for developing effective diagnostic and therapeutic approaches. Anxiety disorders arise from complex interactions between brain circuits, neurochemicals, genetic predispositions, and learned cognitive processes. This section synthesizes current findings from neuroscience,

cognitive psychology, and neuroimaging to elucidate how anxiety is processed and maintained in the human brain.

Brain Circuits Involved in Anxiety

At the neuroanatomical level, anxiety arises from dysfunction in interconnected brain circuits that regulate fear, threat detection, and emotional regulation. The key structures involved include:

- ***Amygdala***: Responsible for detecting threat and generating fear responses. Hyperactivity in the amygdala is a hallmark of anxiety disorders (Kenwood et al., 2022).
- ***Hippocampus***: Regulates contextual memory and fear learning. Altered hippocampal–insula functional connectivity has been linked to trait anxiety and symptom severity in generalized anxiety disorder (Liu et al., 2024).
- ***Prefrontal Cortex*** (PFC): Especially the medial and orbital regions, modulates emotional responses by exerting top-down control over subcortical structures like the amygdala (Kenwood et al., 2022).
- ***Insula***: Plays a key role in interoception (awareness of internal body states) and is involved in the anxious anticipation of physical symptoms (Schiele et al., 2021).

Dysregulation in these areas contributes to symptoms such as hypervigilance, exaggerated threat appraisal, and difficulties in emotion regulation.

Neurochemical Factors

Several neurotransmitter systems are implicated in the pathophysiology of anxiety disorders:

- ***Serotonin*** (5-HT): Central to mood and anxiety regulation. Selective serotonin reuptake inhibitors (SSRIs) are often effective due to their role in enhancing serotonin availability (Bandelow et al., 2023).
- ***Gamma-Aminobutyric Acid*** (GABA): The primary inhibitory neurotransmitter. Low GABA activity correlates with heightened anxiety and is a target of benzodiazepines.
- ***Norepinephrine*** (NE): Involved in arousal and the stress response; its dysregulation is linked to panic and hyperarousal symptoms.
- ***Dopamine*** (DA): Particularly in the prefrontal cortex, may influence attention to threats and the regulation of anxiety-related behaviors (Han et al., 2025; Kenwood et al., 2022).

Recent research also implicates the opioid system, particularly the μ -opioid receptor, in regulating anxiety sensitivity and rejection sensitivity—factors relevant to panic and anxious-depressive attacks (Kaiya, 2024).

Functional Neuroimaging and Anxiety

Neuroimaging techniques such as fMRI and PET scans have helped map the functional alterations associated with anxiety:

- Increased amygdala reactivity to neutral or ambiguous stimuli.
- Reduced prefrontal activation, indicating impaired top-down regulation.
- Altered hippocampal-insula connectivity, linked to subjective symptom severity (Liu et al., 2024).

- Studies by the ENIGMA-Anxiety Working Group reveal significant structural and functional brain alterations across anxiety subtypes, highlighting the heterogeneity of the disorder (Bas-Hoogendam et al., 2022).

Cognitive Mechanisms

Cognitive theories emphasize maladaptive thought patterns and attention biases in the development and maintenance of anxiety:

- **Attentional bias toward threat:** Individuals with anxiety tend to disproportionately attend to threatening cues in the environment.
- **Intolerance of uncertainty:** A cognitive trait that predicts worry and avoidance behaviors.
- **Catastrophic misinterpretation:** Particularly in panic disorder, where benign bodily sensations are interpreted as signs of imminent danger (Oussi et al., 2023).

Cognitive-behavioral models propose that these patterns become reinforced through avoidance, safety behaviors, and emotional suppression—processes that maintain and exacerbate anxiety over time (Kenwood et al., 2022; Oussi et al., 2023).

Emotional Regulation and Trait Anxiety

Individuals with high trait anxiety exhibit deficient emotion regulation, including:

- Reduced cognitive reappraisal capacity
- Elevated use of emotional suppression
- High levels of alexithymia (difficulty identifying and expressing emotions)

These impairments have been documented across anxiety populations and are targets for therapeutic interventions (Oussi et al., 2023; Liu et al., 2024).

Neuroplasticity and Stress-Induced Changes

Chronic anxiety leads to neuroplastic changes, especially in the hippocampus and PFC, impairing memory, attention, and executive function. Structural alterations such as hippocampal atrophy and PFC thinning have been observed in severe or long-standing anxiety conditions (Kenwood et al., 2022). Neurogenesis and synaptic remodeling are potential targets for both pharmacological and psychotherapeutic interventions.

Anxiety emerges from a dynamic interplay between brain circuits, neurochemical signaling, and cognitive processes. Advances in neuroimaging and neuroscience continue to illuminate the complex etiology of anxiety disorders, offering hope for precision-based interventions tailored to specific neural and cognitive profiles. Understanding these biological underpinnings is not only crucial for clinical diagnosis and treatment, but also for preventing the chronicization of anxiety across developmental stages.

Psychological, Cultural, and Theological Perspectives on Anxiety

Anxiety is not merely a neurological or psychiatric phenomenon. Its meanings, expressions, and impacts are deeply shaped by psychological theories, cultural interpretations, and spiritual beliefs. Understanding these perspectives provides a holistic lens for interpreting human suffering and resilience, helping clinicians and scholars design more empathetic and inclusive interventions.

Psychological Models of Anxiety

Contemporary psychology has developed multiple theoretical models to explain anxiety:

- ***Cognitive Behavioral Theory*** (CBT): Anxiety arises from distorted thinking patterns, attentional biases, and avoidance behaviors. Maladaptive cognitions such as catastrophizing, all-or-nothing thinking, and hypervigilance maintain anxiety.

CBT emphasizes restructuring irrational beliefs and gradual exposure to feared stimuli (Szuhany & Simon, 2022; Oussi et al., 2023).

- ***Psychodynamic Perspective:*** Rooted in Freudian theory, this model views anxiety as a signal of intrapsychic conflict, especially unresolved fears and desires originating in early life. Defense mechanisms like repression and projection are thought to modulate anxiety.
- ***Humanistic-Existential View:*** Anxiety is a natural aspect of human existence, tied to the awareness of freedom, choice, and mortality. It becomes problematic when individuals avoid the discomfort of existential questions or lack meaning in life (Pihkala, 2020; Chung & Freh, 2022).
- ***Attachment Theory:*** Insecure early attachments may predispose individuals to anxiety by impairing emotion regulation and increasing sensitivity to interpersonal threat. Anxious attachment has been linked to heightened vigilance, rejection sensitivity, and social anxiety (Kaiya, 2024).

Cultural Dimensions of Anxiety

Culture significantly influences how anxiety is understood, expressed, and treated.

Studies show that:

- Symptom expression varies by culture. For example, somatic complaints (e.g., heart palpitations, dizziness) are more commonly reported in East Asian and Latin American populations, while cognitive symptoms are emphasized in Western settings (Korkut & Altıntaş, 2024; Brandt & Dieterich, 2020).

- Stigma and shame play a role in the underreporting of anxiety in collectivist cultures, where emotional control is emphasized and help-seeking may be seen as weakness (Khan & Nasreen, 2023).
- Ecological and political stressors, including climate anxiety, war, and terrorism, contribute to context-specific anxiety experiences. For instance, research among Israeli civilians and Pakistani youth has shown how death anxiety and trauma coalesce in regions affected by chronic conflict (Ben-David et al., 2025; Khan & Nasreen, 2023).
- Technology and global media also influence anxiety through hyperconnectivity, comparison, and exposure to global crises—amplifying eco-anxiety and existential dread among younger generations (Pihkala, 2020; Munk et al., 2020).

Theological and Spiritual Perspectives

Theology offers a lens through which anxiety can be reframed, not only as a clinical problem but as a moral, spiritual, or existential struggle.

- Christian theology often links anxiety to spiritual disconnection, lack of trust in divine providence, or unresolved guilt. Biblical texts like Philippians 4:6 (“Do not be anxious about anything...”) encourage faith-based surrender and prayer as antidotes to worry.
- Theology of suffering recognizes anxiety as part of the human condition—sometimes a path to deeper transformation. Kierkegaard described anxiety as “the dizziness of freedom,” suggesting it is a necessary part of human growth and spiritual awakening.

- Pastoral counseling and faith-integrated psychotherapy may frame anxiety in relational terms: a longing for safety, love, and transcendence. Many clients benefit from integrating mindfulness, spiritual practices, and narratives of hope into their coping repertoire (Vu & Conant-Norville, 2021).
- Islamic and Eastern traditions likewise offer contemplative and somatic tools—like prayer, breathing, and meditation—that regulate the nervous system and offer existential grounding.

Intersectional and Multidimensional Approaches

Increasingly, researchers advocate for integrative models that bridge these domains:

- Psychospiritual models explore how early trauma, neurobiology, and belief systems intertwine to shape anxiety trajectories.
- Trauma-informed care now emphasizes not only neurological safety but cultural humility and spiritual sensitivity.
- Narrative approaches invite individuals to re-author their experiences of anxiety through culturally and spiritually resonant metaphors of resilience and meaning-making.

This multidimensional lens is crucial in a globalized world where anxiety is shaped by not just brain chemistry, but by inequality, culture, and identity.

Psychological, cultural, and theological perspectives expand our understanding of anxiety beyond the clinical lens. They remind us that anxiety is not just a disorder to be treated but a story to be interpreted, a message to be heard, and a journey that may lead to healing and transformation. These insights are essential for building inclusive, compassionate, and effective frameworks of care.

Public Health, Technology, and Anxiety in Contemporary Society

Anxiety has become one of the defining mental health challenges of the 21st century, and its growing prevalence reflects broader societal trends. Increasing stressors from economic instability, digital hyperconnectivity, health crises, and global uncertainty converge with individual vulnerabilities to shape what some scholars have labeled the “anxious society” (Knowles & Olatunji, 2020; Pihkala, 2020). This section explores how systemic, technological, and sociocultural factors are accelerating anxiety at population levels and reshaping public health responses.

Anxiety as a Public Health Crisis

Anxiety disorders are the most common mental illnesses worldwide. According to Penninx et al. (2021), their lifetime prevalence in many high-income countries exceeds 25%, with increasing trends among youth and young adults. College students, in particular, have shown alarming increases in anxiety and comorbid depression, as evidenced by epidemiological data from the Healthy Minds Study (Hoeflich et al., 2023). These disorders impair productivity, academic achievement, and interpersonal relationships, and they increase the risk of suicide, substance misuse, and chronic physical illness.

The COVID-19 pandemic intensified this burden. Lockdowns, uncertainty, and health-related fears triggered widespread anxiety and panic responses, especially in vulnerable groups such as individuals with chronic illness (Korkut & Altıntaş, 2024), hereditary angioedema (Manning et al., 2023), tinnitus (Korkut & Altıntaş, 2024), and college students (Hoeflich et al., 2023). Longitudinal findings show that both the fear of infection and social isolation independently contributed to the rise in anxiety disorders (Munk et al., 2020; Eyice Karabacak et al., 2021).

Technology, Social Media, and Digital Stress

Technology is a double-edged sword. While online tools have expanded access to mental health care, such as teletherapy and digital psychoeducation (Miqdadi et al., 2024), they have also introduced new anxiogenic environments:

- Social media amplifies comparison, surveillance, and information overload. The constant availability of curated lifestyles creates unrealistic standards and contributes to anxiety, particularly among adolescents and young adults.
- Self-service technologies (SSTs), often used in healthcare and financial services, increase efficiency but can exacerbate user anxiety when human contact is absent. Kinch and Buell (2025) found that facilitating access to a human representative—even when rarely used—significantly increased customer trust and satisfaction in high-stress settings.
- Surveillance capitalism and digital privacy violations further contribute to consumer anxiety. Jones et al. (2020) showed that even minor invasions of visual or physical privacy during commercial transactions lead to reduced satisfaction via heightened anxiety.

The paradox of digital life is that while it promises convenience, it often delivers overstimulation, surveillance, and a diminished sense of autonomy—key drivers of chronic anxiety.

Inequality, Trauma, and Marginalization

Public health approaches must recognize how systemic injustice, trauma, and structural violence contribute to anxiety. Anxiety rates are significantly higher among populations exposed

to displacement (Ulke et al., 2021), terror attacks (Ben-David et al., 2025), war (Şahpolat & Ayar, 2020), and systemic discrimination.

For example:

- World Trade Center responders with strong perceived social support demonstrated lower anxiety and depression trajectories over two decades (Pijnenburg et al., 2024).
- Refugees and displaced persons report significantly higher anxiety scores, often tied to experiences of dislocation, cultural loss, and unsupportive political environments (Ulke et al., 2021).
- Marginalized youth, particularly in politically unstable regions, show heightened death anxiety, with resilience and religiosity acting as partial buffers (Khan & Nasreen, 2023).

These findings reinforce that anxiety is not only an individual condition but a social one, embedded in histories of violence, displacement, and systemic neglect.

Health Systems and Access to Care

Despite the burden, many individuals with anxiety do not receive appropriate care.

Barriers include:

- Stigma, especially in conservative or collectivist cultures.
- Economic obstacles, such as lack of insurance or high out-of-pocket costs.
- Limited provider availability, especially in rural or underserved regions.
- Mismatched treatment models, as some individuals benefit more from somatic and spiritual approaches than pharmacological or cognitive ones (Schiele et al., 2021; Bandelow et al., 2023).

Vu and Conant-Norville (2021) emphasize that understanding the unique contexts of populations—such as athletes or trauma survivors—is crucial for effective anxiety treatment. Innovations like computer-simulated exposure therapy (Freire et al., 2020), CAST for anxiety sensitivity (Schiele et al., 2021), and culturally adapted interventions show promise in tailoring care to diverse needs. However, treatment gaps persist, especially for marginalized and low-income populations.

Contemporary society, with its digital saturation, political unrest, and public health challenges, has cultivated an environment where anxiety flourishes. Effective management must move beyond symptom control to address the social, technological, and ecological roots of anxiety. This includes making treatments accessible, reducing systemic stressors, and fostering resilience through community, meaning, and supportive care environments.

Interventions and Treatment Modalities: From Pharmacotherapy to Psychoeducation

The treatment of anxiety disorders has evolved significantly over the past several decades, with a range of approaches now available that reflect the complex and multifactorial nature of these conditions. This section reviews the primary evidence-based interventions—pharmacological, psychotherapeutic, integrative, and technological—alongside emerging modalities that show promise for improving accessibility and outcomes in diverse populations.

Pharmacological Interventions

Selective serotonin reuptake inhibitors (SSRIs) and serotonin-norepinephrine reuptake inhibitors (SNRIs) are first-line pharmacotherapies for anxiety disorders, including panic disorder, generalized anxiety disorder, and social anxiety disorder (Szuhany & Simon, 2022; Bandelow et al., 2023). These medications modulate serotonergic and noradrenergic systems

implicated in anxiety regulation. Meta-analytic data reveal small-to-moderate effect sizes, with SSRIs like sertraline and fluoxetine commonly prescribed (Szuhan & Simon, 2022).

However, challenges persist:

- Delayed onset of efficacy (often 4–6 weeks).
- Side effects, including sexual dysfunction, gastrointestinal disturbances, and sleep issues.
- Adherence issues, particularly in populations skeptical of psychotropic medication or experiencing severe side effects.
- Treatment resistance, particularly in cases with comorbid depression or trauma (Kaiya, 2024).

Emerging research into neuro-modulatory compounds (e.g., psychedelics, vagus nerve stimulation) and phytomedicines is expanding the pharmacological landscape. For example, Haller et al. (2025) found that the herbal extract EP107™ significantly reduced psychic symptoms of anxiety, although its effect on somatic symptoms was minimal. This nuanced efficacy highlights the importance of matching treatment to symptom profile.

Cognitive Behavioral Therapy and Psychotherapy

Cognitive Behavioral Therapy (CBT) remains the gold standard psychotherapeutic approach for anxiety disorders (Bandelow et al., 2023). It has demonstrated efficacy across disorders and age groups, with effect sizes often surpassing pharmacotherapy in long-term maintenance.

Key features of CBT include:

- Cognitive restructuring, targeting distorted beliefs about danger and vulnerability.
- Exposure therapy, particularly effective for phobias, panic disorder, and PTSD.

- Behavioral experiments to test catastrophic predictions.
- Relaxation training and mindfulness integration to address physiological arousal.

CBT is highly adaptable and has been successfully applied in digital formats. For example, Miqdadi et al. (2024) demonstrated that an eight-session online psychoeducation program based on CBT principles significantly reduced panic symptoms and anxiety, although quality of life (QOL) outcomes were less robust. This supports the utility of scalable interventions, especially in regions with provider shortages.

Emotion Regulation and Mind-Body Approaches

Emotion dysregulation is central to many anxiety disorders. Studies by Oussi et al. (2023) and Cha et al. (2022) have identified impaired emotional intelligence, alexithymia, and maladaptive regulation strategies (e.g., suppression, rumination) as key mechanisms in the maintenance of panic and social anxiety symptoms.

Effective interventions include:

- Emotion regulation training, focusing on reappraisal, distress tolerance, and labeling.
- Mindfulness-based therapies, which reduce avoidance and enhance interoceptive awareness.
- Progressive muscle relaxation (PMR), shown to reduce anxiety in acute medical conditions (Dewi et al., 2022).

There is increasing recognition that somatic regulation is critical for managing anxiety, particularly when cognitive access is impaired. This aligns with findings from Han et al. (2025) showing that morphine withdrawal–induced anxiety in mice was mediated by autophagy in the amygdala, further highlighting the body-brain interplay.

Emerging Innovations: Neurobiology and Digital Interventions

Recent advances in neuroimaging and computational psychiatry are shedding light on anxiety's neural circuitry, with implications for precision treatment. For instance:

- Liu et al. (2024) found that hippocampal–insula functional connectivity correlates with trait anxiety in both healthy individuals and GAD patients.
- Kenwood et al. (2022) emphasized the role of prefrontal–amygdala networks in the regulation of fear responses and avoidance.

These findings suggest that future interventions may be tailored to individual neural profiles. The ENIGMA-Anxiety Working Group is currently leading global efforts to harmonize neuroimaging data across anxiety subtypes (Bas-Hoogendam et al., 2022).

In parallel, digital therapeutics—including apps for CBT, VR-based exposure therapy (Freire et al., 2020), and online psychoeducation—are expanding access. These tools are especially beneficial for populations with limited mobility, stigma concerns, or geographic barriers.

Community-Based and Preventive Approaches

Addressing anxiety at the population level requires prevention and community engagement. Prevention strategies include:

- Resilience-building, particularly in trauma-exposed communities (Kimhi et al., 2020).
- Parental psychoeducation, to reduce intergenerational transmission of anxiety sensitivity (Francis & Roemhild, 2021).
- Public mental health campaigns, to destigmatize help-seeking and normalize emotional distress.

In disaster and high-anxiety contexts, community cohesion and access to support are critical. Studies of terror-affected populations consistently show that perceived social support and self-compassion protect against long-term psychopathology (Barel et al., 2025; Pijnenburg et al., 2024).

No single intervention suits all individuals with anxiety. A pluralistic, patient-centered approach—combining evidence-based pharmacotherapy, psychotherapy, emotion regulation strategies, and emerging digital and neurobiological tools—offers the most promise. Ensuring accessibility and cultural relevance remains essential, especially as global anxiety rates rise amid complex societal challenges.

Implications, Future Directions, and Ethical Considerations

The evolving understanding of anxiety—from its neurobiological underpinnings to its cultural manifestations—demands a dynamic, integrative approach across clinical, research, educational, and policy domains. This section discusses the broader implications of current findings, anticipates emerging research frontiers, and addresses ethical concerns surrounding the treatment and study of anxiety disorders.

Clinical and Public Health Implications

Bridging the Treatment Gap

Anxiety disorders are among the most prevalent and debilitating psychiatric conditions globally, yet a significant treatment gap persists. Patel et al. (2022) noted that even individuals with severe social anxiety often delay seeking treatment, highlighting the need for proactive outreach and early intervention programs.

Technology-assisted platforms such as online CBT, mobile apps, and teletherapy may increase treatment accessibility, particularly for marginalized or rural populations (Miqdadi et al.,

2024). Integrating mental health services into primary care, as advocated by Szuhany and Simon (2022), can normalize anxiety screening and improve early detection.

Supporting Youth and College Populations

Emerging adulthood is a critical period for anxiety onset. Hoefflich et al. (2023) found escalating rates of both anxiety and service utilization among U.S. college students between 2013 and 2019. Institutions must invest in sustainable, culturally responsive mental health infrastructure—including peer support networks, de-stigmatization campaigns, and resilience-building curricula.

Research Directions: Personalized Psychiatry and Neuroscience

Precision Mental Health

Future research should move beyond symptom clusters to identify biomarkers of anxiety subtypes. For instance, Liu et al. (2024) demonstrated how hippocampal–insula connectivity patterns vary with trait anxiety, suggesting neurofunctional markers for stratifying treatment approaches.

The work of Bas-Hoogendam et al. (2022) through the ENIGMA-Anxiety Working Group is laying groundwork for large-scale, reproducible neuroimaging studies, which may guide personalized interventions and shed light on developmental trajectories of anxiety disorders.

Gene-Environment Interactions

Anxiety arises from complex interactions between genetic predisposition, early life experiences, and ongoing environmental stressors. Epigenetic research—investigating how trauma, socioeconomic adversity, or parenting styles shape gene expression—offers promising avenues for prevention and early identification.

Sociocultural and Global Considerations

Anxiety does not exist in a vacuum; it is shaped by sociopolitical context, cultural expectations, and collective narratives. For example:

- Eco-anxiety, discussed by Pihkala (2020), represents a growing phenomenon linked to climate change awareness, especially among youth.
- Terrorism-related anxiety, grief-related panic, and disaster trauma (Lee & Bottomley, 2023; Pijnenburg et al., 2024; Barel et al., 2025) require culturally grounded therapeutic responses and collective healing processes.
- Religious and spiritual coping mechanisms can offer buffering effects in some populations, as seen in studies of trauma survivors in conflict regions (Khan & Nasreen, 2023).

Global mental health frameworks must center equity, inclusion, and cultural sensitivity in designing interventions that reflect local beliefs and resources.

Ethical Issues in Anxiety Research and Treatment

Informed Consent and Stigma

Anxiety patients may exhibit heightened fear responses and decision-making challenges, which complicates informed consent processes in clinical trials. Researchers and clinicians must ensure clarity, autonomy, and psychological safety.

Moreover, social stigma surrounding anxiety disorders persists in many cultures. Ethical care must involve efforts to reduce shame and blame associated with these conditions—particularly for marginalized and neurodiverse individuals.

Technology and Privacy

While digital interventions increase accessibility, they also raise ethical concerns related to data privacy, algorithmic bias, and consent in vulnerable populations. Researchers and tech developers must adhere to stringent ethical guidelines when deploying AI and mobile-based anxiety interventions.

Use of Emerging Biological Interventions

With renewed interest in psychedelics, neuromodulation, and genetic therapies, ethical oversight is paramount. As Bandelow et al. (2023) caution, these novel interventions must be thoroughly evaluated for safety, efficacy, and accessibility before wide clinical adoption.

The Future of Anxiety Care: Integration and Innovation

The future of anxiety treatment lies in transdisciplinary collaboration. Psychiatrists, psychologists, neuroscientists, educators, public health professionals, and patient advocates must work together to build systems that recognize and respond to anxiety's multifaceted nature.

Promising developments include:

- Emotion-aware technologies, such as wearable sensors that detect autonomic signs of anxiety and prompt coping strategies.
- Trauma-informed design in schools, workplaces, and public spaces to foster emotional safety.
- Psychoeducation campaigns to equip individuals with the language and tools to identify and manage anxiety proactively.

Above all, mental health policy must prioritize prevention, reduce systemic barriers to care, and promote human dignity across the lifespan.

Understanding anxiety through an integrative, evidence-based lens reveals its complexity and pervasiveness, but also its treatability. By investing in research, expanding access, addressing stigma, and tailoring interventions, we can mitigate anxiety's impact and support individuals in leading resilient, fulfilling lives.

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