

**The Burden of Mood and Anxiety Disorders during the COVID-19 Pandemic: A  
Narrative Literature Review of Risk Factors**

by

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University of Pittsburgh, 2021

## **Abstract**

Since the first case of novel coronavirus disease 2019 (COVID-19) was diagnosed in December 2019, it has rapidly spread across nations and stimulated global public health action. In order to mitigate the spread of COVID-19, policies have been implemented in order to enforce physical distancing (or social distancing). Although clinically necessitated to prevent transmission of COVID-19, these policies have psychological secondary effects including loneliness and social isolation. The aim of this narrative literature review is to understand the prevalence of mood and anxiety disorders during the COVID-19 pandemic as well as associated risk factors. A literature search was conducted on studies published between March 1, 2020 and March 15, 2021. A total of 20 articles were selected for inclusion. All studies included in this review found an increase in mood and anxiety disorder prevalence in communities across the world, particularly impacting those who are Hispanic, women, young, low-income, as well as those who exhibit low distress tolerance and low resilience. This increased prevalence of mental health conditions during the COVID-19 pandemic may have public health repercussions in subsequent years, including increased morbidity and mortality. A shift from individual-

level to population health approaches for mental health treatment is critical in the context of the COVID-19 pandemic.

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## **Preface**

I would like to thank Dr. Todd Bear for his continued support of my public health interests and guidance during my educational and professional pursuits, and I thank Dr. John Musser for his highly-valued writing expertise and insight.

## **Introduction**

Since the first case of novel coronavirus disease 2019 (COVID-19) was diagnosed in December 2019, it has rapidly spread across nations and stimulated global public health action. Due to the nature of transmission of COVID-19, public health policies have been implemented in countries all over the world encouraging or mandating citizens to practice physical distancing (or social distancing). These social distancing practices have resulted in changes to human behavioral patterns and severe disruptions of typical daily activities, including social activities (Galea, Merchant, & Lurie, 2020).

The majority of the extant literature on the mental health repercussions of epidemics relates more to the effects of the disease itself, rather than policies put into place to help mitigate the epidemic. However, prior research on large-scale disasters, including traumatic events such as the 9/11 attacks, natural disasters such as tornadoes, and environmental disasters such as oil spills, has shown that such disasters are nearly always associated with increases in depression, domestic violence, child abuse, posttraumatic stress disorder (PTSD) and substance abuse, as well as many other behavioral disorders in the affected communities. Following Hurricane Ike in 2008, 5% of the affected population met diagnostic criteria for major depressive disorder one month after the event. In addition, 10% of adults in New York City displayed symptoms of depression over the month following the events of 9/11, while nearly 25% reported increased alcohol use. Similarly, individuals affected by the Deepwater Horizon oil spill showed clinically significant symptoms of depression and anxiety. These mental health consequences may occur immediately following the event, but often persist for a long period of time (Galea et al., 2020).

Several studies have shown evidence for the impact of disease outbreaks and epidemics on mental health, including severe acute respiratory syndrome (SARS) in 2003 and novel influenza A (H1N1) epidemic in 2009. These public health crises have been shown to result in psychological problems such as PTSD, psychological distress, depression, and anxiety within the affected communities, as well as within the healthcare provider community (Liang et al., 2020).

The emergence of COVID-19 in Wuhan, China, and its rapid global spread has resulted in substantial fear across populations. In order to mitigate the spread of COVID-19 in the absence of a cure or vaccine, governments across the world instituted public health policies such as shutting down “non-essential” services and businesses, restricting travel, and adopting social distancing practices, self-isolation, and quarantine measures. Such social distancing measures have included limiting the number of individuals permitted to gather within a specific location, self-quarantining for two weeks after traveling, as well as self-quarantining after potential exposure to another individual with symptoms of COVID-19. Such measures, despite their significant clinical necessity, have greatly disrupted the typical patterns of socialization and economic activities of nations across the world (Nwachukwu et al., 2020).

These abrupt policy changes may have resulted in negative health impacts for a significant number of individuals. As of June 30, 2020, an estimated 41% of U.S. adults had delayed or avoided medical care due to COVID-19 (Czeisler et al., 2020). Although this statistic may reflect positive adherence to community mitigation efforts, sustained routine care avoidance could lead to poor management of chronic health conditions, missed vaccinations, as well as early detection of new health conditions. These impacts are not limited to physical health conditions. Potential unintended negative effects of these aforementioned social distancing policies include greater prevalence of anxiety, depression, and PTSD. As many individuals have delayed health care as a

result of the pandemic, detection and treatment of these emerging mental health conditions may have been negatively impacted as well (Nwachukwu et al., 2020).

In addition to that of the general public, the mental well-being of healthcare workers has been particularly impacted by the pandemic. These individuals have had to manage both clinical and nonclinical stressors, such as shortages of personal protective equipment, morbidity and mortality of COVID-19, as well as fear of exposure to COVID-19 and/or fear of transmitting the virus to family members. Research conducted during previous outbreaks suggests that such events have substantial effects on the mental well-being of healthcare workers, both in the short- and long-term. For example, a study of 652 frontline healthcare workers in three Hong Kong hospitals during the 2003 SARS outbreak found that 56.7% exhibited significant psychological distress. The effects of the SARS outbreak on mental health persisted long after the outbreak had ended; in 2006, a survey of 549 healthcare workers in Beijing found that 10% had exhibited symptoms of PTSD since the outbreak (Hall, 2020).

In the context of the COVID-19 pandemic, it appears likely that there will be substantial increases in mood and anxiety disorders, particularly depression. We must conduct a thorough review of the current literature on the association between pandemics and mood and anxiety disorders, with a focus on depression, to understand how COVID-19 and its associated social isolation measures have impacted the mental well-being of populations across the world. Such research can help us understand the magnitude of this issue and can help to inform prevention and treatment options to benefit both individual- and population-level mental health.

## **Background**

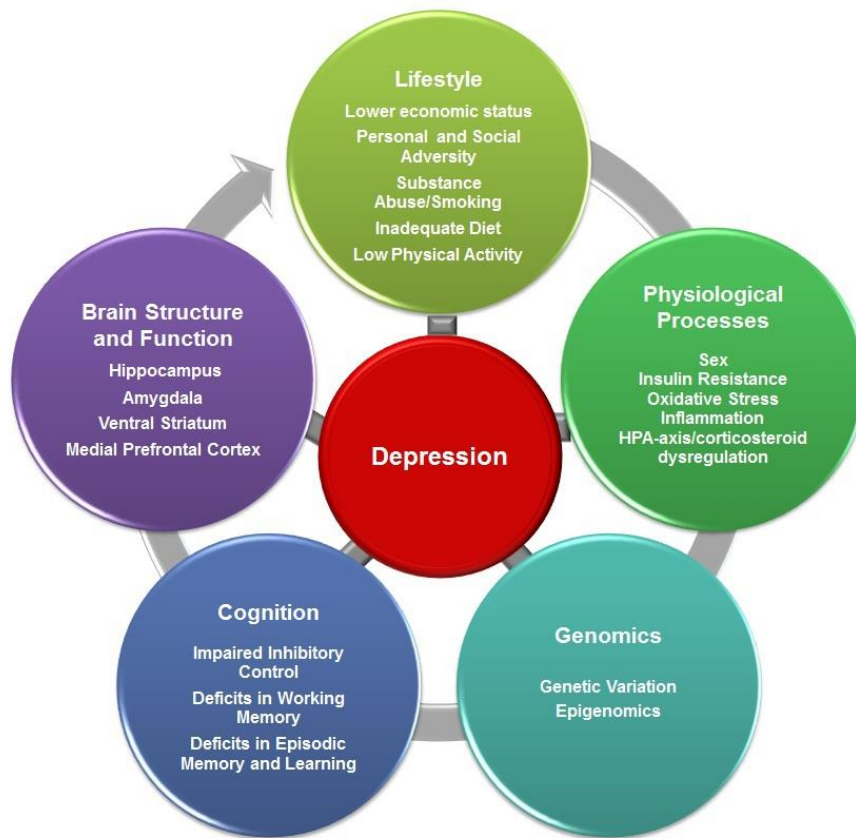
### **What is Depression?**

A mood disorder is a mental health problem that impacts an individual's emotional state, including prolonged periods of sadness or happiness. Examples of mood disorders include major depressive disorder (or depression), seasonal affective disorder, bipolar disorder, as well as dysthymia. Mood disorders frequently occur in conjunction with anxiety disorders, in which excessive worries or fear impacts an individual's ability to function in their daily lives. Anxiety disorders include generalized anxiety disorder, posttraumatic stress disorder, panic disorder, and social phobia (National Institute of Mental Health, 2018)

Depression is a common but serious mood disorder that negatively impacts the way that one feels, thinks, and/or acts, resulting in feelings of sadness or loss of interest in normal activities for the affected individual. Common symptoms of depression include feelings of sadness, loss of interest in activities, changes in appetite, disrupted sleep patterns, loss of energy, difficulty concentrating, and thoughts of suicide. A diagnosis of depression results from an individual experiencing several of the aforementioned symptoms for at least 2 weeks or more, and this must represent a change in the individual's baseline level of functioning (American Psychiatric Association, 2020).

Depression results from a complex interaction of biological, genetic, environmental, and psychological factors, as seen in Figure 1. Genetic factors have been shown to play a major role in the development of major depressive disorder, as evidenced by family, twin, and adoption studies. In addition to genetic factors, environmental factors, such as natural disasters, physical or

emotional trauma, poverty, discrimination, unemployment, and other stressors may play a role in the development of depression. Finally, those with certain inherent personality traits, such as those who are prone to catastrophizing, self-criticism, and negativity are more likely to develop depression. These factors are not necessarily independent of one another. For example, the diathesis-stress model proposes that depression results when a diathesis, or preexisting vulnerability, is activated by stressful life events. In this model, the diathesis could be genetic, suggesting an interaction between nature (genetic predisposition) and nurture (stressful life events or trauma) (Lohoff, 2010).



**Figure 1 Risk Factors for Depression (PALS Network)**

There are evidence-based, effective treatment options for depression, making it one of the most treatable mental disorders. Between 80% and 90% of patients with depression respond well to treatment, while nearly all patients experience at least partial relief of their depression symptoms (American Psychiatric Association, 2020). One of these current treatment options is pharmacotherapy. As brain chemistry may play a role in the manifestation of depression, antidepressants such as selective serotonin reuptake inhibitors (SSRIs), serotonin and norepinephrine reuptake inhibitors (SNRIs), as well as several other drug classes, may be used. These antidepressants work by targeting chemical imbalances in the brain. For example, SSRIs work by blocking reuptake of the neurotransmitter serotonin, allowing for increased levels of serotonin in the brain (National Institute of Mental Health, 2016).

In addition to pharmacotherapy, psychotherapy, or talk therapy, has been shown to be very effective either alone or in conjunction with pharmacotherapy. One of the most widely used forms of psychotherapy is cognitive behavioral therapy (CBT), in which mental health professionals teach their clients to target negative, self-defeating thinking patterns by developing more healthy, productive ways of thinking and behaving in response to life's many challenges. Multiple studies have shown that CBT may be just as effective as pharmacotherapy approaches in treating moderate to severe depression (American Psychological Association, 2017).

Finally, lifestyle and behavioral modifications, such as increased physical activity and practicing sleep hygiene can help treat depression. According to a review of three meta-analyses on the effects of exercise interventions on depression, the results reflected an increase in success rate due to treatment (i.e., exercise) of 67%, 71%, and 74%, and such results suggest there is strong evidence to incorporate the use of exercise as a powerful adjunct to existing treatments (Craft & Perna, 2004).

## **Burden of Mood and Anxiety Disorders on Public Health**

Depression is very common, with more than 264 million individuals affected across the world. It is a leading cause of disability worldwide and a major contributor to the overall global burden of disease. In any given year, depression affects an estimated one in 15 adults (6.7%), and one in six people (16.6%) will experience depression at some point in their life ((World Health Organization, 2020a)

Depression is associated with significant impairment. While all individuals likely experience mood fluctuations and emotional challenges throughout their lifetime, prolonged, untreated episodes of clinical depression can result in serious morbidity and mortality. For example, depression can impact an individual's ability to perform effectively at school, work, and can greatly impact interpersonal relationships. In addition, depression may lead to suicide. Approximately 800,000 people commit suicide every year (World Health Organization, 2020a).

According to national data, nearly all depressed individuals experience some level of functional impairment as a result of depression, and nearly two-thirds experience severe impairment. Among individuals who report even mild impairment, they utilize health services more frequently, are more likely to be hospitalized, and are twice as likely to be unemployed compared to individuals who do not experience depression (McLaughlin, 2011).

In addition to increased impairment experienced by individuals with depression, morbidity and mortality is impacted within this population. Evidence has shown that depression may predict subsequent myocardial infarction, can exacerbate existing cardiovascular disease, and drastically increases mortality following myocardial infarction and unstable angina. In addition, depression is associated with a greater risk for stroke and hypertension. Alarmingly, depressed individuals are eleven times more likely to attempt suicide than those without depression, and over one in ten



individuals with depression will attempt suicide at some point during their life (McLaughlin, 2011).

Given the context of the COVID-19 pandemic, it is important to note that social and economic conditions greatly contribute to an individual's mental well-being. In general, poor socioeconomic conditions, such as unemployment, poverty, housing instability, and lack of education, are associated with a greater burden of mental illness. All of these factors may be compounded in the context of a global pandemic and economic recession (Ettman et al., 2020).

### **What is COVID-19?**

In December 2019, reports emerged of patients diagnosed with a form of viral pneumonia due to an unknown pathogen in Wuhan, China. Subsequently, a new coronavirus was identified as the pathogen and this pathogen was named the 2019 new coronavirus (COVID-19). On January 30, 2020, the World Health Organization (WHO) confirmed that the arrival of COVID-19 was considered a public health emergency of international concern (PHEIC). By February 18, 2020, 57,905 individuals were confirmed to be infected with COVID-19 across 31 provinces in China, and 2,004 COVID-19 related deaths were confirmed. The COVID-19 outbreak in China resulted in mass panic and stress among populations across the world, as an exponentially increasing number of cases in China were diagnosed and potential cases were confirmed in other countries (Liang et al., 2020).

Coronaviruses are a family of viruses that can cause illnesses as mild as the common cold to more severe illnesses, including Severe Acute Respiratory syndrome (SARS) and Middle East Respiratory Syndrome (MERS). Coronaviruses are large, single-stranded RNA viruses that can be

found in humans and other mammals, such as dogs, cats, pigs, and birds. They are known to cause respiratory, gastrointestinal, as well as neurological disease (Wiersinga, Rhodes, Cheng, Peacock, & Prescott, 2020).

COVID-19 is predominantly transmitted through respiratory droplets expelled during close, face-to-face contact with others while talking, coughing, or sneezing. It can be spread by asymptomatic, presymptomatic, and symptomatic carriers. The mean time from COVID-19 exposure to symptom onset is 5 days, and 97.5% of individuals who are symptomatic will develop these symptoms within 11-12 days. COVID-19 infection may be asymptomatic, or it may cause a wide range of symptoms, including mild-to-moderate symptoms of upper respiratory tract infection. The most common symptoms of COVID-19 include cough, fever, headache, new loss of taste or sense of smell, chills, sore throat, shortness of breath, and muscle pain. In some individuals, COVID-19 infection results in life-threatening, severe illnesses, such as acute respiratory failure or sepsis (Wiersinga et al., 2020).

### **Burden of COVID-19 on Global Health, Food Security, and Jobs**

COVID-19 emerged in December 2019 and has rapidly spread across the world. As of February 27, 2021, there have been 113,076,707 confirmed cases of COVID-19, and 2,512,272 COVID-19 related deaths. The Americas have been greatly burdened by the virus, with 50,246,580 confirmed COVID-19 cases. Specifically, within the Americas, the United States has been most greatly impacted by the virus, with 28,102,166 confirmed cumulative cases and 504,654 deaths since the beginning of the COVID-19 pandemic. Other countries which have been most impacted include India (11,079,979 cases, 156,938 deaths) Brazil (10,390,461 cases, 251,498 deaths), the

Russian Federation (4,234,720 cases, 85,743 deaths), and the United Kingdom (4,163,089, 122,415 deaths). Although the distribution of vaccines is anticipated to slow transmission, projections regarding the spread of COVID-19 estimate that there will be 3,917,881 COVID-19-related deaths globally by July 1, 2021, with 596,201 deaths occurring in the United States alone (World Health Organization, 2021).

The COVID-19 pandemic has resulted in significant morbidity and mortality across the globe and has presented unparalleled challenges to public health, food systems and employment. The economic and social disruption caused by the pandemic is overwhelming, with millions of individuals at risk of extreme poverty, and the number of undernourished people, estimated at 690 million as of October 2020, expected to increase dramatically. The pandemic has impacted the entire global food system, as border closures, trade restrictions and quarantine measures have impacted both domestic and international food supply chains (World Health Organization, 2020b).

The pandemic has decimated jobs and put millions at risk of unemployment (World Health Organization, 2020b). In the second quarter of 2020, the U.S. economy contracted at a record 31.4%, amid coronavirus lockdowns and frozen activity. In addition, the unemployment rate spiked to 14.7% in April 2020, its highest point since the Great Depression (Winck & Kaplan, 2020).

### **Potential Interaction between COVID-19, Pandemic Life, & Global Mental Health**

By April 13, 2020, 42 U.S. states were under stay-at-home orders, which affected at least 316 million people in the U.S., or approximately 96% of the population. At this time,

unemployment rates were skyrocketing, with over 20 million individuals filing for unemployment between the beginning of the COVID-19 pandemic and mid-April 2020 (Ettman et al., 2020).

The majority of the extant literature surrounding the public health impacts of the COVID-19 pandemic has focused on the physical impacts and medical complications associated with COVID-19, with much less focus on the mental health consequences. The COVID-19 pandemic has impacted the entire world, forcing individuals to drastically change their lives overnight and adhere to new regulations designed to enforce social distancing precautions. While these public health measures may potentially prevent many illnesses, hospitalizations, and deaths from COVID-19, we must consider the potential mental health impacts of these social distancing measures. Given the previously mentioned strain that the pandemic has placed on global resources, health care systems, and given the pandemic's abrupt interruption of the daily lives of populations across the world, one can only assume that the mental well-being of these populations would be drastically impacted.

Given the policies and measures in place to enforce social distancing, feelings of isolation and loneliness may be particularly prevalent. Much of the current literature on mood and anxiety disorders suggests that loneliness is a key risk factor for both depression and anxiety. In addition, the literature shows that social networks, social supports, and participation in social activities are associated with better mental health. If widespread social isolation and loneliness exists as a result of the pandemic and its associated social distancing policies, this may result in dramatic increases in the prevalence of mood and anxiety disorders (Smith et al., 2020).

Mental health is sensitive to traumatic events and their corresponding economic and social consequences. Prior research on life-altering disasters, pandemics, and civil unrest has suggested that there is an association between experiencing large-scale traumatic events and subsequent

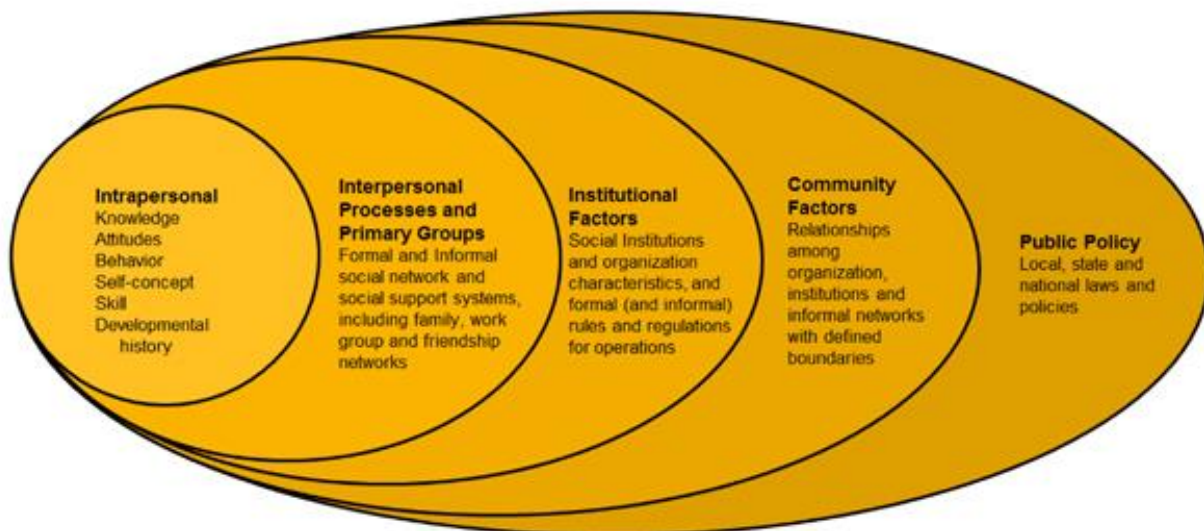
mental illness for affected populations. For example, following the events of September 11, 2001, 9.6% of Manhattan residents reported symptoms consistent with depression, while 7.5% reported symptoms of posttraumatic stress disorder. Increased prevalence of mental illness has been reported following natural disasters, such as hurricanes, as well as past epidemics, including the SARS and Ebola outbreaks. In addition, past studies have shown increases in mental illness following social disruptions in day-to-day life as a result of civil unrest, such as the increases in depression, anxiety, and psychological distress reported by Hong Kong residents following the 2019 Hong Kong civil protests (Ettman et al., 2020).

It is important to note that the mental health consequences of traumatic events are not distributed equally across populations. As mentioned previously, an individual's well-being is greatly impacted by the social and economic conditions in which one lives. Poor socioeconomic conditions are associated with a greater burden of mental illness. In addition, racial, ethnic, gender, and sexual minorities often experience poor mental health outcomes as a result of systemic, historical inequities which limit access to care and contribute to health disparities. Increased prevalence of mental illness has been well documented during previous traumatic events and economic recessions, most frequently experienced by those who are unemployed and face other social and economic adversity (Ettman et al., 2020).

In general, the COVID-19 pandemic has affected people of color disproportionately. COVID-19 infection case rates, hospitalizations, and deaths among Black, Latinx, and Native American individuals in the United States are 2 to 5 times higher than among white populations. While these physical health disparities have been well documented, limited data exists regarding racial mental health disparities during the COVID-19 pandemic (Ibrahimi et al., 2020).

In consideration of the extant literature regarding the impacts of traumatic events on mental well-being, the aim of this narrative literature review is to understand how the prevalence of mood and anxiety disorders has been impacted by the COVID-19 pandemic, as well as to understand the risk factors associated with developing these disorders in the context of this global health crisis.

### **Guiding Framework: The Social Ecological Model**



**Figure 2 The Social Ecological Model (American College Health Association, 2020)**

In order to understand the multiple levels at which the COVID-19 pandemic may have impacted the mental health of affected individuals across the world, the social ecological model was used as a guiding framework to help evaluate the extant literature and understand how these factors interact at multiple levels of influence. Historically, health was determined to be most greatly impacted by individual-level determinants and interventions. However, significant and dynamic interrelationships exist among different levels of health determinants, and the most

effective health interventions target multiple levels of the social ecological model. In the social ecological model, health status and behavior is determined to be impacted by the following determinants (Golden & Earp, 2012):

- Intrapersonal: This includes individual-level characteristics, including knowledge, beliefs, attitudes, gender, sexual orientation, race/ethnicity, age, genetics, religious identity, and socioeconomic status.
- Interpersonal: This includes social supports and social networks, including family, friends, and work groups.
- Institutional: This includes formal and informal rules, regulations, policies, and initiatives associated with institutions, such as schools or workplaces.
- Community: This refers to community-level factors and the collection of organizations within a community, such as geographic location, the built environment, community walkability, neighborhood associations, community leadership, businesses, transportation, and parks.
- Policy: This includes local, state, national, or global policies or laws that impact health.

This guiding social ecological model is important for considering how the mental health of populations may have been impacted by the COVID-19 pandemic. For example, intrapersonal factors that may determine the impact of the pandemic on depression include one's genetics (or familial predisposition to mood or anxiety disorders), financial security, or age. A potentially relevant factor at the interpersonal level includes the presence of close family or friends. Institutional factors include the requirement for essential workers to report for onsite work, increasing the risk of potential exposure to the virus and the resulting anxiety surrounding repeated

exposure. Potential community-level factors include access to mental health resources, and policy-level factors include social distancing policies implemented at the local, state, and national levels (Golden & Earp, 2012).



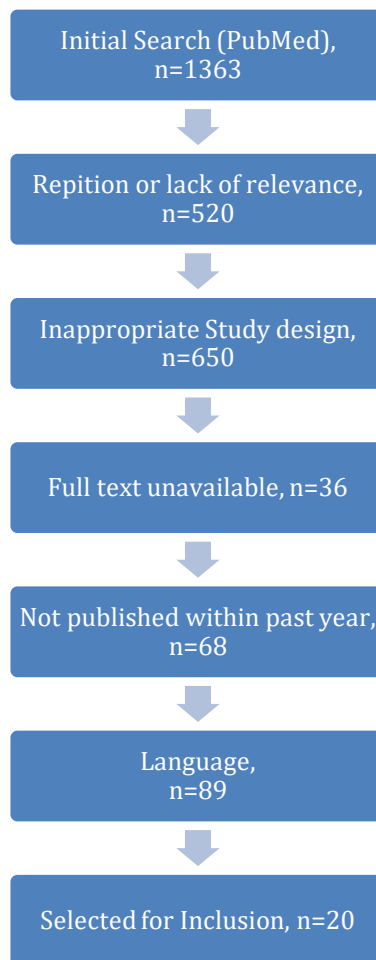
## Methods

To evaluate the potential impact of COVID-19 on the mental health of the population at hand, I conducted a thorough online literature search of research published between March 1, 2020 and March 15, 2021 using PubMed. By using search terms such as “COVID-19,” “coronavirus,” “mental health,” “mental illness,” and “depression,” I was able to generate an extensive list of relevant, credible, full-text, peer-reviewed scientific articles. Journals that were included within this search included the Journal of the American Medical Association (JAMA), Primary Care Companion to the American Journal of Psychiatry, Brain, Behavior, and Immunity, PLOS One, Psychiatry Research, Journal of Affective Disorders, as well as many others.

Cross-sectional studies, systematic reviews, and meta-analyses evaluating prevalence of mood and anxiety disorders both before and during COVID-19 were selected for inclusion into this narrative literature review. Articles describing case studies and case reports were excluded, as it would be difficult to generalize results from these studies to the overall population. As the COVID-19 pandemic has impacted individuals globally, no exclusions regarding study location were created. However, articles were excluded if they were not published in the English language. Additionally, articles were excluded if the full article was not available. The resulting list of articles included in this narrative literature review were organized using EndNote X 9.0 software. This software was also used to ensure that no duplicate articles were included.

## Results

A total of 1327 articles were initially identified in PubMed using the aforementioned search terms. After removing articles due to predefined exclusion criteria including study design, full text unavailability, publication language, inappropriate study design, or lack of relevance, 20 articles describing meta-analyses, systematic reviews, and cross-sectional studies of mental health impacts of the COVID-19 pandemic were selected for inclusion into this narrative literature review.



**Figure 3 Summary of Study Selection**

## **Overall Prevalence**

A study by Ettman et al. (2020) evaluated the impact of COVID-19 on depression in the U.S. population using two surveys of adults aged 18 or older. In order to understand the prevalence of depression in the U.S. during the COVID-19 pandemic, a primary sample of 1,441 participants were surveyed about COVID-19 exposure, stressors, and mental health using the COVID-19 and Life Stressors Impact on Mental Health and Well-being (CLIMB) study questionnaire. In order to compare the resulting CLIMB survey data to pre-COVID-19 depression in the U.S., this study used data from the National Health and Nutrition Examination Survey (NHANES). This study was conducted between 2017 and 2018, and the resulting data from 5,065 participants was used as a comparison group for pre-COVID-19 depression (Ettman et al., 2020).

In order to evaluate depression, both the CLIMB study and the NHANES study utilized the Patient Health Questionnaire-9 (PHQ-9; Figure 3), a clinically validated depression assessment tool. COVID-19 stressors were evaluated in the primary sample based on prior research on stressors resulting from traumatic events. Such COVID-19-related stressors included losing one's job, losing a loved one as a result of COVID-19, as well as financial difficulties. Demographic data, including sex, age, race/ethnicity, household income, and education were also collected (Ettman et al., 2020).

<b>PATIENT HEALTH QUESTIONNAIRE -9</b>				
<b>Over the last 2 weeks, how often have you been bothered by any of the following problems?</b>	<b>Not at all</b>	<b>Several days</b>	<b>More than half the days</b>	<b>Nearly every day</b>
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself — or that you are a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed? Or the opposite — being so fidgety or restless that you have been moving around a lot more than usual	0	1	2	3
9. Thoughts that you would be better off dead or of hurting yourself in some way	0	1	2	3
<p><i>FOR OFFICE CODING</i></p> <p>0 + _____ + _____ + _____</p> <p>=Total Score: _____</p>				
<p><b>If you checked off <u>any</u> problems, how <u>difficult</u> have these problems made it for you to do your work, take care of things at home, or get along with other people?</b></p> <p style="text-align: center;"> <b>Not difficult at all</b>                      <b>Somewhat difficult</b>                      <b>Very difficult</b>                      <b>Extremely difficult</b>  <input type="checkbox"/>    <input type="checkbox"/>    <input type="checkbox"/>    <input type="checkbox"/> </p>				

**Figure 4 Patient Health Questionnaire-9**

Prior to the COVID-19 pandemic, 458 participants (8.5%) in the NHANES comparison sample reported moderate-to-severe depression symptoms (PHQ-9  $\geq$  10), while 382 participants (27.8%) in the CLIMB primary sample endorsed moderate-to-severe depression symptoms during the COVID-19 pandemic as seen in Table 1 (Ettman et al., 2020).

**Table 1 Prevalence of Depression Before and During COVID-19 (Ettman et al., 2020)**

Depression symptoms <sup>a</sup>	% (95% CI) <sup>b</sup>		Difference	
	Before COVID-19 <sup>c</sup>	During COVID-19 <sup>d</sup>	Absolute, %	Relative
None	75.3 (73.3-77.1)	47.5 (44.2-50.9)	-27.7	0.6
Mild	16.2 (15.1-17.4)	24.6 (21.8-27.7)	8.4	1.5
Moderate	5.7 (4.8-6.9)	14.8 (12.6-17.4)	9.1	2.6
Moderately severe	2.1 (1.6-2.8)	7.9 (6.3-9.8)	5.7	3.7
Severe	0.7 (0.5-0.9)	5.1 (3.8-6.9)	4.4	7.5

Abbreviation: COVID-19, coronavirus disease 2019.

<sup>a</sup>Depression symptoms assessed using the Patient Health Questionnaire-9 and categorized as none (score, 0-4), mild (score, 5-9), moderate (score, 10-14), moderately severe (score, 15-19), and severe (score,  $\geq 20$ ).

<sup>b</sup>Percentages weighted to the noninstitutionalized US adult population.

<sup>c</sup>Before COVID-19 estimates from the National Health and Nutrition Examination Survey from 2017 to 2018.

<sup>d</sup>During COVID-19 estimates from the COVID-19 and Life Stressors Impact on Mental Health and Well-being study collected from March 31, 2020, to April 13, 2020.

Depression symptoms were found to be higher during COVID-19 compared to before across all demographic groups, as seen in Table 2. In general, the prevalence of depression symptoms was found to be approximately three times higher during the COVID-19 pandemic. A higher exposure to COVID-19-related stressors, such as unemployment or losing a loved one due to COVID-19, was associated with increased depression symptoms. For example, 42.9% of those who endorsed a “high” level of exposure to COVID-19-related stressors reported symptoms of depression, compared to only 15.5% of those with a “low” level of exposure to COVID-19 stressors (Ettman et al., 2020).

Several studies included in this literature review have found slightly differing prevalence statistics. For example, a systematic review and meta-analysis of 68 mental health-related COVID-19 studies by Wang, Kala, and Jafar (2020) estimated the prevalence of depression among the general public to be 30% (26%-36%) (Wang, Kala, & Jafar, 2021). On the other hand, Nwachukwu et al. (2020) found that studies were consistently reporting a prevalence of moderate-to-severe

depression (defined as a PHQ-9 score  $\geq 10$ ) in an estimated 20% or more of the general population (Nwachukwu et al., 2020). The disparities by demographic variables noted by Nwachukwu et al. (2020), Ettman et al. (2020), and others will be further explored in later sections. Regardless of the specific statistic, all of the studies reviewed have found a significant increase in depression prevalence during the COVID-19 pandemic.

**Table 2 Prevalence of Depression in US Adults Before and During COVID-19 by Demographics (Ettman et al., 2020)**

Characteristic	Before COVID-19 <sup>a</sup>			During COVID-19 <sup>b</sup>		
	No. (%) <sup>c</sup>		P value <sup>e</sup>	No. (%) <sup>c</sup>		P value <sup>e</sup>
	Total (n = 5065)	Depression symptoms (n = 458) <sup>d</sup>		Total (n = 1441)	Depression symptoms (n = 382) <sup>d</sup>	
<b>Sex</b>						
Men	2477 (48.6)	181 (6.9)	.02	723 (48.1)	149 (21.9)	<.001
Women	2588 (51.4)	277 (10.1)		718 (51.9)	233 (33.3)	
<b>Age, y</b>						
18-39	1704 (37.8)	149 (9.0)	.62	619 (38.0)	219 (38.8)	<.001
40-59	1542 (34.2)	144 (8.5)		462 (32.4)	113 (26.8)	
≥60	1819 (28.0)	165 (7.9)		360 (29.7)	50 (14.9)	
<b>Race/ethnicity</b>						
Non-Hispanic White	1790 (62.9)	186 (8.4)	.01	933 (62.9)	225 (26.5)	.32
Non-Hispanic Black	1176 (11.1)	97 (8.4)		143 (11.9)	36 (24.2)	
Hispanic	1155 (15.8)	109 (8.4)		255 (16.6)	84 (34.0)	
Non-Hispanic Asian	674 (5.3)	26 (4.4)		36 (3.1)	8 (23.1)	
Other or multiple	270 (4.8)	40 (16.0)		74 (5.6)	29 (34.4)	
<b>Education</b>						
<High school	958 (11.0)	117 (13.3)	.004	65 (9.8)	22 (29.2)	<.001
High school or GED	1292 (28.4)	129 (9.3)		274 (27.9)	85 (35.0)	
Some college	1636 (30.5)	158 (9.8)		637 (27.8)	186 (32.0)	
≥College	1173 (30.1)	52 (4.7)		465 (34.5)	89 (18.3)	
<b>Marital status</b>						
Married	2404 (53.4)	146 (5.5)	<.001	712 (47.8)	124 (18.3)	<.001
Widowed, divorced, or separated	1093 (18.5)	156 (13.9)		247 (18.4)	75 (31.5)	
Never married	870 (18.7)	91 (10.5)		344 (24.2)	130 (39.8)	
Living with partner	450 (9.4)	42 (10.7)		138 (9.7)	53 (37.7)	
<b>Household income, \$</b>						
≤19 999	868 (12.9)	130 (16.8)	<.001	246 (19.8)	116 (46.9)	<.001
20 000-44 999	1319 (24.0)	133 (10.1)		357 (25.8)	109 (31.1)	
45 000-74 999	887 (19.8)	61 (8.3)		357 (25.1)	83 (23.3)	
≥75 000	1354 (43.4)	68 (4.8)		447 (29.3)	67 (16.9)	
<b>Household savings, \$</b>						
≤4999	NA	NA	NA	577 (43.2)	227 (40.4)	<.001
≥5000	NA	NA		819 (56.8)	146 (19.3)	
<b>COVID-19 stressor score<sup>f</sup></b>						
Low	NA	NA	NA	450 (30.7)	64 (15.5)	<.001
Medium	NA	NA		545 (37.5)	132 (25.1)	
High	NA	NA		443 (31.9)	185 (42.9)	
Household size, mean (SD)	3.1 (0.6)	NA	NA	3.2 (0.6)	NA	NA

Abbreviations: COVID-19, coronavirus disease 2019; GED, general education diploma; NA, not available.

<sup>a</sup>Before COVID-19 estimates derived from the National Health and Nutrition Examination Survey (NHANES) from 2017 to 2018. Missing data in the NHANES sample included 637 participants with missing household income, 248 participants with missing marital status, and 6 participants with missing education level.

<sup>b</sup>During COVID-19 estimates derived from the COVID-19 and Life Stressors Impact on Mental Health and Well-being (CLIMB) study collected from March 31 to April 13, 2020. Missing data in the CLIMB study sample included 34 participants with missing household income, 45 participants with missing household savings, and 3 participants with missing COVID-19 stressor score.

<sup>c</sup>Frequencies are unweighted. Percentages are weighted. Categories may not add up to total number owing to missing data. Percentages may not add up to 100 owing to rounding.

<sup>d</sup>Defined as Patient Health Questionnaire-9 score of 10 or greater.

<sup>e</sup>Two-tailed  $\chi^2$  analysis conducted for significance testing.

<sup>f</sup>Calculated from stressor summation (range, 0-13); stratified as low (score, 0-2), medium (score, 3-4), and high (score, 5-13).

## **Financial Security and Employment**

The research by Ettman et al. (2020) found that having more resources was associated with a lower incidence of depression symptoms, both before and during COVID-19. For example, 46.9% of individuals in the lowest income category reported symptoms of depression, compared to 16.9% of those in the highest income category. In addition, 40.4% of Individuals with household savings of \$5,000 or less reported symptoms of depression, compared to 19.3% of those with household savings of \$5,000 or more (Ettman et al., 2020). In another systematic review and meta-analysis by Y. Wang et al. (2021), lower socioeconomic status was associated with higher odds of psychological distress, while current employment was associated with lower odds of psychological distress (Wang et al., 2021).

## **Age**

Of the studies that have been conducted on the mental health impacts associated with the COVID-19 pandemic, many have reported a possible negative relationship between depression, anxiety, PTSD, and age (Nwachukwu et al., 2020). The meta-analysis by Wang, Kala, and Jafar (2020) found that younger age (majority <35 years) versus older age ( $\geq 35$  years) was associated with higher odds of primary outcomes of psychological distress (Wang et al., 2021). Huang and Zhao (2020) found the same result, as the prevalence of generalized anxiety disorder and depressive symptoms was found to be significantly higher in participants younger than 35 years than in participants aged 35 years or older (Huang & Zhao, 2020) Similarly, Solomou and Constantinidou (2020) found that the youngest study cohort reported the highest anxiety and



depression scores (Solomou & Constantinidou, 2020). In addition, Nwachukwu et al. (2020) found that the mean scores for the GAD-7, a clinically validated questionnaire measuring anxiety severity, as well as the PHQ-9 declined significantly with a shift from the younger age cohort to the older age cohort, which indicates that older participants had less stress, anxiety, and depression in comparison to younger participants (Nwachukwu et al., 2020).

## **Gender**

According to Wang et al. (2021), a total of 50 studies with 82 data points reported the association between women and higher odds of psychological distress (Wang et al., 2021). X. Wang et al. (2020) also found that gender had significant effects on depression and anxiety severity (X. Wang et al., 2020). Solomou and Constantinidou (2020) found that depression severity (PHQ-9 score) was higher for women (Median = 6.00) compared to men (Median = 4.00) (Solomou & Constantinidou, 2020). In the study by Smith et al. (2020), which used a sample of 932 U.K. adults, it was found that correlates of poor mental health included gender (women), age (younger), annual income (lower), smoking status (active current smoker), and having a physical comorbidity. (Smith et al., 2020).

## **Media Exposure**

Multiple COVID-19-related studies have noted the association between increased media exposure and adverse mental health outcomes. In the study by Y. Wang et al., (2021), it was found in ten studies and 20 data points that longer media exposure was associated with higher odds of anxiety, depression, insomnia, and PTSD/PTSS (Wang et al., 2021). Ni et al. (2020) found that spending over 2 hours per day on COVID-related news via social media was associated with anxiety and depression among community-based adults (Ni et al., 2020). In addition, Gao et al. found that frequent social media exposure was associated with increased prevalence of both depression and anxiety symptoms during the COVID-19 outbreak in China (Gao et al., 2020).

## **Psychological Factors: Distress Tolerance, Resilience, Loneliness, Social Support**

The CARES 2020 project (COVID-19 Adult Resilience Experiences Study), was a cross-sectional, online study by Liu et al. (2020) that evaluated the factors contributing to mental health outcomes among 898 young adults (18-30 years of age) during the COVID-19 pandemic. This study evaluated depression, anxiety, and PTSD symptoms, as well as psychological experiences including distress tolerance, individual resilience, loneliness, and social support. Individual resilience, which refers to one's ability to cope with stress, and distress tolerance, which describes one's ability to manage and tolerate emotional distress, may be characteristics that protect against the mental health symptoms that follow major stressors. In previous research, individual resilience and distress tolerance have been shown to be significant protective factors for depression, PTSD,

and general health after natural disasters, but this has not been extensively studied in the context of a global pandemic (S. Liu et al., 2020).

In the CARES 2020 project, psychological resilience was measured using the 10-item Connor-Davidson Resilience Scale (CD-RISC-10), which measures one's ability to cope with adverse experiences, while distress tolerance was measured using the 15-item Distress Tolerance Scale, which measures one's ability to withstand emotional distress. Perceived social support was measured using the Multidimensional Scale of Perceived Social Support (MSPSS), while loneliness was measured using the UCLA Loneliness Scale short form. Depression was measured using the 8-item Patient Health Questionnaire (PHQ-8), while anxiety and PTSD were measured using the Generalized Anxiety Disorder Scale (GAD-7) and The PTSD Checklist—Civilian Version (PCL-C), respectively. In addition to these psychological measures, the severity of individual COVID-19-related worries was assessed using a newly developed measure consisting of 6 pandemic-related items, such as fear of contracting the virus, keeping in touch with loved ones given social distancing protocols, as well as having enough groceries (S. Liu et al., 2020).

Overall, participants scored as having high loneliness (61.5%), low resilience (72.0%), and low distress tolerance (74.1%). Across all study participants, 43.3% reported high levels of depression (PHQ-8 scores  $\geq 10$ ), 45.4% reported high levels anxiety (GAD-7 scores  $\geq 10$ ) and 31.8% reported high levels of PTSD symptoms (PCL-C scores  $\geq 45$ ). Predictors that were significantly associated with depression, anxiety, and PTSD included loneliness (OR range = 1.98 – 2.72), COVID-19-specific worry (OR range = 2.87 – 5.05), and distress tolerance (OR range = 0.22 – 0.42). Participants who endorsed high levels of loneliness and worries about COVID-19 and low levels of distress tolerance were more likely to report high levels of depression, anxiety, and PTSD. Participants who endorsed high levels of resilience were less likely to report high levels

of depression and anxiety. Those with high levels of family support were less likely to report high levels of depression and PTSD (OR = 0.46 and 0.44, respectively) (S. Liu et al., 2020). In addition, Y. Wang et al. (2021) found that social/family support and physical activity were inversely associated with higher odds of anxiety and depression (Wang et al., 2021).

## **Location**

In multiple studies, the location or place of living during the COVID-19 pandemic was associated with mood and anxiety disorders. For example, Özdin et al. (2020) found that participants who lived in urban areas were more likely to report symptoms of depression during the pandemic (Özdin & Bayrak Özdin, 2020).

Interestingly, in China the prevalence of mood and anxiety disorders has generally been higher in rural populations compared to their urban counterparts. However, a cross-sectional study by L. Liu et al. (2020) surveyed 2068 outpatients in West China Hospital at Sichuan University in 2020, including 1,928 urban individuals and 1,140 rural individuals. Among the recruited participants, 1,110 (36.2%) endorsed mental health problems related to the COVID-19 outbreak. There was a significantly higher prevalence of mood and anxiety disorders (anxiety, depression, and insomnia) in urban individuals compared to their rural counterparts, controlling for age, sex, marital status, and medical comorbidities (L. Liu et al., 2020)

## Race and Ethnicity

In a study by McKnight-Eily et al. (2021), Internet-based surveys of U.S. adults were conducted in April and May 2020 to assess the prevalence of depression, suicidal thoughts, or substance use to manage stress, psychosocial stressors, and social determinants of health during the COVID-19 pandemic (McKnight-Eily et al., 2021).

**Table 3 Weighted prevalence estimates of current depression, suicidal thoughts/ideation, and substance use increase or initiation among adults aged  $\geq 18$  years, by race/ethnicity (McKnight-Eily et al., 2021).**

Race/Ethnicity	Unweighted no. of persons	Weighted % (95% CI)		
		Current depression	Suicidal thoughts/Ideation	Substance use increase or initiation
Total	1,004	28.6 (25.6–31.5)	8.4 (6.6–10.2)	18.2 (15.7–20.7)
White, NH	657	25.3 (21.9–28.7)	5.3 (3.6–6.9)	14.3 (11.6–17.0)
Black, NH	100	27.7 (18.7–36.7)	5.2 (0.7–9.7)	15.6 (8.4–22.7)
Hispanic/Latino	118	40.3 (31.3–49.3)	22.9 (15.2–30.6)	36.9 (28.1–45.7)
Other, NH <sup>§</sup>	129	31.4 (22.8–40.0)	8.9 (3.6–14.1)	15.1 (8.4–21.7)

In this study, it was found that the overall prevalence estimates of current depression, suicidal thoughts, and substance use/initiation were 28.6%, 8.4%, and 18.2%, respectively. Breakdowns by race can be seen in Table 3. Hispanic participants reported current depression 59% more frequently than by non-Hispanic White participants. Estimates of suicidal thoughts among Hispanic persons (22.9%) were four times higher than those among non-Hispanic Black and White participants, while approximately twice those of multiracial and non-Hispanic participants of other

racess/ethnicities. Substance use increase or initiation was reported among 36.9% of Hispanic participants, compared to 14.3%–15.6% among all other participants (McKnight-Eily et al., 2021).

## **Healthcare Workers**

A study conducted by An et al. (2020) in the beginning of the COVID-19 pandemic found that frontline clinicians, especially those who have had close contact with infected patients, regularly experienced depression and anxiety symptoms, emotional disturbances, and sleep disturbances. This study included a survey of 1103 frontline emergency department (ED) nurses. It was found that the overall prevalence of depression in ED nurses was 43.61% (95% CI: 40.68–46.54%) (An et al., 2020).

Another study including 908 healthcare workers by Li et al. (2020) found that healthcare workers had higher morbidity of both depression (32.93%) and anxiety (24.34%) compared to controls. The researchers also found that individuals with a history of contact with infected patients, as well as people residing within the epidemic area, were more likely to experience depression (OR = 3.267, 95% CI: 1.082-9.597,  $p < 0.05$ ). Exposure to COVID-19 (AOR = 0.49, 95% CI: 0.36–0.66), worry about themselves (AOR = 1.71, 95% CI: 1.25–2.34), as well as worrying about family (AOR = 0.52, 95% CI: 0.06–4.52) all displayed significant associations with depression within healthcare workers. Thus, in addition to the occupational stress associated with being a frontline healthcare worker during the COVID-19 pandemic, the impact that this could place on family members added significant psychosocial burden for these individuals (Li et al., 2020).

## Discussion

**Table 4 Risk Profile Overview of Mood and Anxiety Disorders during COVID-19**

Variable	Higher Risk	Lower Risk
Age	Younger	Older
Gender	Women	Men
Race and Ethnicity	Hispanic	Non-Hispanic
Income/Socioeconomic Status (SES)	Low Income/Low SES	High Income/High SES
Occupation	Healthcare Workers	Non-Healthcare Workers
Location	Urban	Rural
Media Exposure	Frequent	Infrequent
Psychological Resilience	Low Resilience	High Resilience
Social Support	Low Social support	High Social Support

### Public Health Relevance

In the CARES 2020 project, the rates of depression, anxiety, and PTSD in the study were significantly higher compared to prior studies that have used the same cut points (PHQ-8  $\geq$  10; GAD-7  $\geq$  10; and PCL-C  $\geq$  45) (S. Liu et al., 2020). For instance, PHQ-8 data collected from a study on U.S. adults in 2006 found a prevalence of 6.2% among 18-24-year-olds and a prevalence of 13.1% among 25-34-year-olds (Kroenke et al., 2009). In all studies evaluated for this literature review, prevalence of mood and anxiety disorders had significantly increased since the beginning of the COVID-19 pandemic. It is important to note that the research incorporated for this work was not exclusively based within the United States; this literature review incorporated research on mental health impacts experienced by various nations, including China, Turkey, and Canada.

Over the course of the COVID-19 pandemic, existing social inequities have been amplified in regards to disease exposure and disease burden, health care access, and resources. The COVID-19 pandemic has resulted in disproportionate harm for historically marginalized groups. For example, rates of COVID-19 infection, hospitalization, and death have been found to be significantly higher in Black, Hispanic, and Asian people in comparison to their White counterparts (Lopez et al., 2021).

As mentioned earlier, racial and ethnic minorities frequently experience poor mental health outcomes as a result of systemic, historical inequities. These inequities prevent racial and ethnic minorities from receiving high-quality health care and contribute to the health disparities experienced by these groups. During the COVID-19 pandemic, these enduring inequities and discrimination related to race, socioeconomic status, working status, and living arrangements can further exacerbate health problems faced by these individuals, thus worsening stress and its related mental health impacts for these affected groups.

Although research on mental health racial and ethnic disparities is limited, the extant literature shows alarming disparities experienced by minority communities, particularly with Hispanic individuals, who reported current depression symptoms 59% more frequently than non-Hispanic White participants. Persistent, systemic racial and ethnic inequities may further contribute to health problems experienced by racial and ethnic minorities during COVID-19, as well as worsen stress and mental health issues experienced by these groups of individuals (McKnight-Eily et al., 2021).

Interestingly, age seems to have a significant effect on the development of mood and anxiety disorders during the pandemic, as all research has indicated that younger age was associated with a higher prevalence of depression in comparison to their older counterparts. This



is consistent with previous research on mental health of populations following epidemics, including the 2003 SARS outbreak in Taiwan (Nwachukwu et al., 2020). A significant association between gender and depression was noted, as all studies reviewed indicated that the prevalence of depression in women was markedly higher.

Financial security and access to resources is strongly associated with the development of depression during the COVID-19 pandemic. In the study by Ettman et al. (2020), 46.9% of individuals in the lowest income category reported symptoms of depression, compared to 16.9% of those in the highest income category. In addition, 40.4% of Individuals with household savings of \$5,000 or less reported symptoms of depression, compared to 19.3% of those with household savings of \$5,000 or more (Ettman et al., 2020).

It has been well documented that healthcare professionals, particularly frontline healthcare workers (such as emergency department and ICU nursing staff) have experienced mental health disturbances, including depression, anxiety, and insomnia, at an alarming rate since the beginning of the COVID-19 pandemic. This may be the result of multiple factors, including fear of personal exposure or fear of transmitting the virus to family members, fear of the unknown in regards to COVID-19 (particularly at the beginning of the pandemic when knowledge about the virus and its associated effects was limited), as well as the lack of sufficient personal protective equipment. In addition, many of these frontline healthcare workers were expected to work beyond their regular schedules to meet the increased demand for critical care, increasing the susceptibility for anxiety, depression, burnout, and insomnia (Hossain et al., 2020)

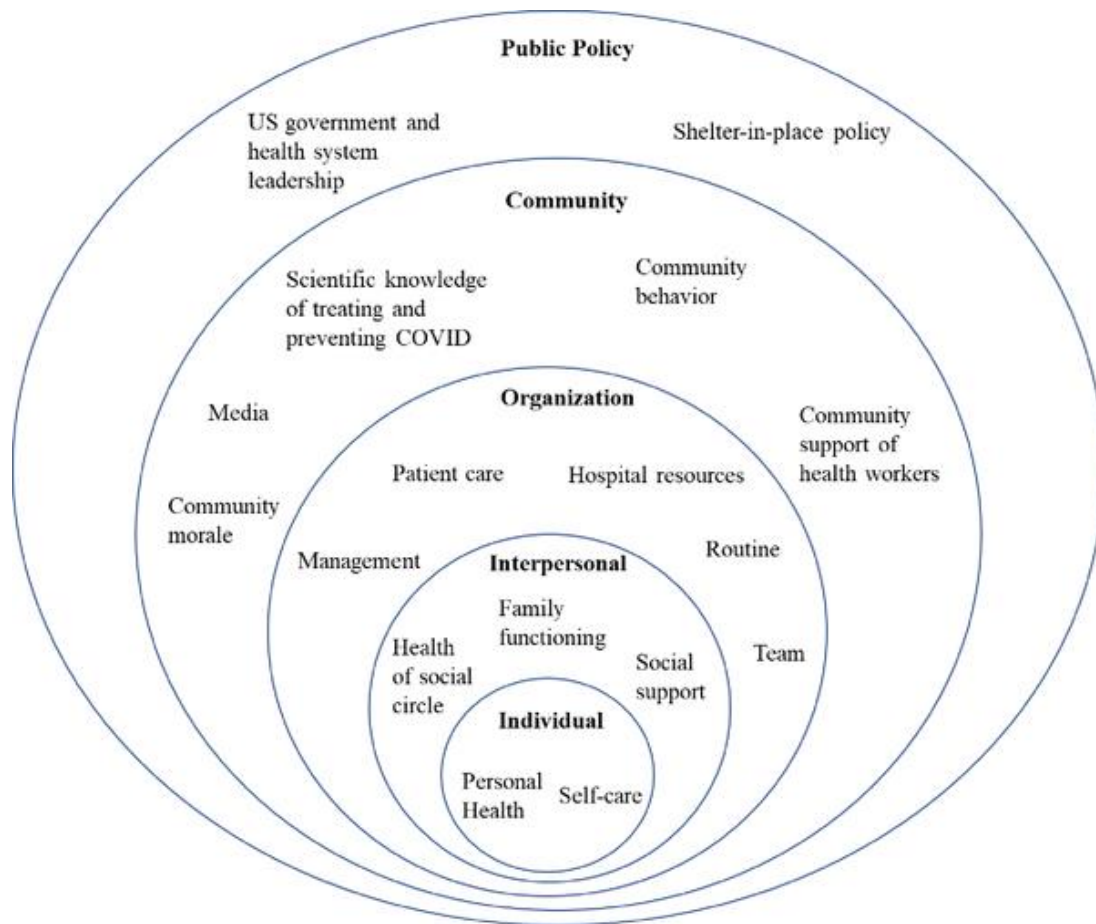
Individual-level psychological factors as well as social supports seem to be an important factor in the development of mental health issues during the COVID-19 pandemic. In the research by S. Liu et al. (2021), participants who endorsed high levels of loneliness and worries about

COVID-19 and low levels of distress tolerance were more likely to report high levels of depression, while participants who endorsed high levels of resilience were less likely to report high levels of depression. Those with high levels of family support were less likely to report high levels of depression.

Finally, media exposure seems to play an important role in the development of depression during COVID-19. This finding is consistent with previous research that has noted adverse mental health outcomes associated with increased social media use, even without the context of a global pandemic (Lin et al., 2016). Multiple COVID-19-related studies have noted the association between COVID-19-related news and social media and adverse mental health outcomes, including increased rates of depression, insomnia, and anxiety that positively correlate with increased exposure to media sources and social media.

### **Social Ecological Model**

Although there are various factors that have an association with mood and anxiety disorders during the COVID-19 pandemic, it is unlikely that any of these aforementioned factors operate independently. Using the social ecological model as a framework, it is more likely that factors at multiple levels of influence, including individual (or intrapersonal), interpersonal, organizational (or institutional), community, and public policy, all interact with one another, resulting in differing health outcomes for individuals.



**Figure 5 Social Ecological Model Applied to Healthcare Workers during COVID-19 Pandemic (Hennein & Lowe, 2020),**

For example, individual-level factors including age (younger), gender (women), financial security (low income), and psychological factors (low distress tolerance, loneliness, low resilience) have all been found to have an association with mood and anxiety disorders. In addition, interpersonal factors, such as social support and social networks, have been found to have an inverse relationship with mental health disturbances. Organizational-level factors include hospital resources for frontline workers, while community-level factors may include scientific knowledge of treating COVID-19, as it was noted in several studies that the lack of scientific knowledge contributed to COVID-19-related anxiety and depression in healthcare workers. Finally, COVID-

19-related measures, such as self-isolation and shelter-in-place mandates, are policy-level factors that may contribute to mental health outcomes.

The social ecological model helps us to understand the factors at multiple levels of influence which may have an influence on the development of certain health outcomes, including adverse mental health outcomes such as depression. By understanding these risk factors and how these may interact, we can also help to develop potential prevention or treatment interventions, as it has been well documented that the most effective public health interventions operate at multiple levels of the social ecological model.

Unfortunately, current practices in mental health treatment reflect an emphasis on individual-level interventions, focusing intervention strategies solely on individuals with a clinical mental health diagnosis. This individual-level approach greatly limits the number of individuals who can benefit from such interventions, either due to lack of access or not meeting appropriate diagnostic criteria to warrant an intervention. As a result, this type of approach results in poor psychological outcomes for individuals who do are not able to receive appropriate care. In the context of the COVID-19 pandemic and the associated rise in mental health morbidity, relying on such individual-level approaches to treat mental health issues is insufficient. A transition to population-level interventions for mental health that address upstream social determinants of health, including poverty, unemployment, and access issues is warranted in this new global context.

## **Intervention Opportunities**

The COVID-19 pandemic has emphasized the need for a shift away from individual-level approaches to improve the health of the general population. Adoption of population health approaches in lieu of these individual-level approaches is critical in order to effectively identify and implement strategies across systems to improve public health. According to the Centers for Disease Control and Prevention (2020), population health “brings significant health concerns into focus and addresses ways that resources can be allocated to overcome the problems that drive poor health conditions in the population.” This population health approach makes use of non-traditional collaborations among different parts of the community, including public health, private industry, educational systems, health care systems, and local government offices to achieve positive health outcomes for populations (Centers for Disease Control and Prevention, 2020).

Although a population health approach has been gaining traction in the realm of physical health, this approach has not been utilized extensively within mental health. A population health approach to mental health has a goal of optimizing mental well-being across the spectrum of need. This population mental health approach operates at multiple levels of the social ecological model, while emphasizing the need to focus on upstream social determinants of health (such as poverty, unemployment, housing, and lack of insurance) and promoting intervention before individuals need clinical treatment. In addition, this approach shifts the goal of mental health treatment to behavioral wellness, and not simply the absence of mental illness. Finally, promoting population mental health has the potential to improve resiliency and reduce the burden of mental health issues, including depression, and these improvements in mental health may also result in improved outcomes in overall physical health (Evans & Bufka, 2020).

To propose how we must address the emerging mental health issues associated with the COVID-19 pandemic, the American Psychological Association has developed their own population health framework. The three levels of the population in this framework include:

1. Individuals with mental health conditions that warrant clinical treatment
2. Individuals who are experiencing subclinical levels of psychological distress
3. Individuals who do not report psychological distress

This framework includes 3 broad levels of the population to help guide the development of mental health intervention strategies. In this framework, indicated approaches, such as pharmacotherapy or psychotherapy, are most effective for the first group of individuals. On the other hand, selective approaches help to reduce risk or reduce the impact of risk factors that lead to psychological distress, such as interventions implemented to help individuals adapt and cope. Finally, universal approaches work by promoting general behavioral wellness. These universal approaches focus on public-facing messages to destigmatize mental health issues, emphasize education on mental health, and focus on the foundation needed to support general mental well-being (Evans & Bufka, 2020).

This shift in promotion of individual-level mental health interventions to population mental health interventions will require significant changes at national, state, and local levels. For example, national leadership should call attention to mental health issues, advocate for additional mental health resources and funding, and propose solutions. However, to meet community needs, implementation of population mental health strategies must be performed at the local level. Unfortunately, many local health governments are not actively involved in systemic initiatives to promote and improve mental health due to lack of resources, knowledge, data, and limited collaborations with local mental health agencies. Fostering these collaborations and partnerships

between local governments and mental health agencies will be critical for success (Evans & Bufka, 2020).

In addition to paradigmatic shifts in terms of how we approach mental health interventions from a population health perspective, we must also consider how these extant individual-level interventions are being implemented given the current global context. For example, the expansion of Internet access and availability has enabled health professionals to provide online mental health services to a wide range of populations (S. Liu et al., 2020). In an increasingly remote world, we must consider intervention options that do not require face-to-face contact, such as mental health services provided through telemedicine, as well as Internet-based cognitive behavioral therapy. In a previous meta-analysis, it was shown that internet-based cognitive behavioral therapy (ICBT) was just as effective as face-to-face therapy for depression and anxiety (Andersson, Cuijpers, Carlbring, Riper, & Hedman, 2014). Web-based interventions have already been established in many settings as an alternative to face-to-face therapeutic interventions. Also, web-based interventions have shown some advantages compared to face-to-face therapy. Such advantages include increased accessibility, flexibility of time and place, a high level of privacy, and lower financial burden (Schröder, Berger, Westermann, Klein, & Moritz, 2016).

These advantages may be especially relevant in the context of the COVID-19 pandemic, as a web-based ICBT intervention could also lower the risk of infection in mental healthcare providers and patients. In addition, this intervention may be effective by operating at multiple levels of the social ecological model, as was previously discussed. For example, this ICBT intervention may help reduce psychological distress and loneliness while reducing costs for the individual (individual-level), increase one's level of social support, and altering organizational

structure of health care systems to provide ICBT interventions as an alternative to face-to-face cognitive behavioral therapy.

## **Limitations**

The limitations of the research used as the foundation for this narrative literature review is that virtually all of these studies employed a cross-sectional design. Given this type of observational design, we cannot ascertain causality between variables. Although we are able to note positive or negative correlations between particular factors over a period of time, an observational design does not allow us to confirm that the COVID-19 pandemic and its associated disruptions in typical daily life are the cause of this increased prevalence of depression and other mental health issues.

Given the social distancing guidelines and policies, much of this research was performed via web-based or mail-in surveys. Although this was the most practical method to employ in the midst of a global pandemic, the reliance of self-reported measures has limitations and may be prone to misinterpretation, potentially resulting in skewed statistics. On a similar note, many of these studies employed a convenience sample to select participants for their research. A convenience sample is a form of non-probability sampling in which participants are selected based on ease of contact or access. Although the use of convenience samples was the most efficient and feasible method to enroll participants in these studies given the contextual circumstances, this practice leads to uneven sampling of subgroups within the population at hand and may result in questionable generalizability of the research findings to the broader population.



In addition to the questionable generalizability due to study design and sampling methods, survey methods may have also impacted these findings. In multiple studies, pre-COVID-19 mental health statistics were based on surveys conducted in person or over the telephone, while most of the research performed during the COVID-19 pandemic was conducted via Internet-based surveys. As a stigma persists in many cultures surrounding discussion of mental health issues, social desirability bias may have impacted interviews that were conducted in person. In general, as the survey methods often differed between these two timepoints (pre-COVID-19 and during COVID-19) across multiple studies consulted for this narrative literature review, this discrepancy in survey methods may have led to unreliable results.

Finally, it is important to note that while in some ways, it is a strength that studies emerging from countries from around the world were consulted for this narrative literature review, mental health is handled very differently across cultures. Different cultures have varying ways of describing, diagnosing, and treating mental health conditions. As a result, prevalence statistics and intervention opportunities to treat mental health conditions may differ as a result of cultural norms, beliefs, and policies. In addition, policies intended to slow transmission of COVID-19 have differing restrictions by nation (and even on a state or local basis), so certain populations may have been more greatly impacted by the COVID-19 pandemic and its associated policies than others.

## Conclusion

The emergence of COVID-19 and its rapid spread has resulted in substantial changes to the daily lives of individuals globally. To mitigate the spread of COVID-19, governments from across the world have instituted public health policies such as shutting down non-essential services and businesses, restricting travel, and adopting social distancing practices, self-isolation, and quarantine measures. Such measures, despite the significant necessity to reduce the overall burden of COVID-19 within our communities, has greatly disrupted the typical patterns of socialization and economic activities of nations across the world.

Through a review of the extant literature of mental health effects of COVID-19, a significant increase in mood and anxiety disorders since the beginning of the COVID-19 pandemic was noted across all studies.. Using the social ecological model as a guiding framework to understand the various risk factors associated depression, it was noted that individual-level factors such as age (younger), gender (women), financial security (low income), race/ethnicity (Hispanic) all have a significant association with depression, in addition to interpersonal factors such as social support. These individual-level factors interact with policy-level factors (including stay-at-home mandates), as well as community-level factors (such as scientific knowledge of COVID-19 effects). These interactions across multiple levels of the social ecological model ultimately result in adverse mental health outcomes, such as increased rates of depression, within populations across the world.

The social ecological model can be an extremely valuable tool for understanding and promoting health issues related to global health issues and pandemics. By understanding the multiple levels of influence that may impact a particular health issue (such as depression), we can

better understand particular groups which may be particularly affected by the pandemic, such as historically marginalized communities. In addition to this, the social ecological model can help us to pinpoint and develop prevention and treatment interventions which operate at multiple levels.

The research evaluated in this literature review, in consideration of the social ecological model, suggests that individual-level approaches to mental health are insufficient in the context of this global pandemic. Population mental health approaches have the potential to reach more affected individuals and more effectively serve our communities. In the United States, there have been effective public health campaigns to encourage handwashing, social distancing, and mask wearing to reduce transmission of COVID-19. Similar messages can be developed and used to increase the public's capacity to handle stress, cope with the current uncertainty, and manage distress to slow the development of mental health problems. This population mental health approach will allow us to address many persistent issues that plague our existing mental health system by placing a greater focus on prevention and early intervention and by reaching underserved groups.

While the overall impacts of the COVID-19 pandemic may not be known, we can be certain that the mental health of individuals across the world has been negatively impacted, as individuals are experiencing mood and anxiety disorders at an alarming rate. This high burden of mental health problems may result in increased morbidity and mortality in subsequent years, so it is important that action is taken now to help treat these disorders within our affected communities.

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