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Review Article

Impact of the COVID-19 Pandemic on Pediatric Anxiety and Depression: Prevalence Data, Theoretical Synthesis, and Clinical Implications

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Abstract

Over the course of the COVID-19 pandemic and its aftermath, growing concerns have emerged about the mental health of children and youth. Disease, loss, and lockdowns presented young people with enormous stressors, and much research suggests elevated levels of pediatric depression, anxiety, suicidality, and obsessive-compulsive behavior. However, considerable debate remains about the nature and persistence of these symptoms. This narrative review, conducted approximately four years after the onset of the pandemic, summarizes the major findings from four years of research, including empirical studies, meta-analyses, and systematic reviews. Studies were sourced from scholarly databases using the keywords "COVID-19", "children", "adolescents", and "mental health". The existing literature on the prevalence of depression in youth indicated that worldwide rates varied from 2.2% to 11.8% of the population, with one study revealing that one in four young people reported depressive symptoms. More specifically, 44% of youth in the United States demonstrated depression, while in China, the prevalence rate ranged from 11% to 44% of young people. Reviewed data showed that 20% of youth globally endorsed symptoms of anxiety or stress reactions, with countries such as Denmark (44%), Canada (45%), and the United States (32%) reporting extremely high rates. In the implications section, recommendations for screening and intervention procedures are outlined.

Introduction

Between December 2019 and March 2020, a novel coronavirus, severe acute respiratory syndrome coronavirus 2, evolved into a worldwide pandemic. COVID-19, as it is now known, along with its associated containment measures, fractured societies across the globe. Rates of disease, social distancing measures, and economic disruption destabilized many people's daily routines, particularly those of children, youth, and families. By 2021, 86 million individuals had contracted COVID-19, and in the United States,[1] nearly 140,000 youth experienced the death of a parent and/or a grandparent.[2] Children's vulnerability to infection and serious complications increased with the emergence of the Delta and other variants.[3]

Demaria *et al.*[4] asserted that "An unknown virus, the absence of treatment, and unanswered questions can stimulate automatic thoughts on contagion and disease." These thoughts often shape distressing feelings and problematic behaviors. The COVID-19 pandemic represented a "critical incident" exacerbating anxiety and depression in children and adolescents.[5] Pinciotti *et al.* characterized the viral outbreak as a "looming vulnerability,"[6] a psychological construct developed by Riskind, which refers to circumstances that elevate individuals' emotional distress as a function of rapidly increasing probability of danger.[7]

Consequently, mental health struggles increased globally during the peri-pandemic period,[8,9] with the worldwide prevalence of psychiatric disturbances proving far more elevated than expected.[10] During the pandemic, youth across the board faced significant disruption to the social and academic infrastructure of their daily lives.[11] A comprehensive systematic review encompassing 116 articles assessing over 125,000 children and adolescents across Europe, North America, Asia, Australia, and Africa documented significant behavioral health impacts on youth during the peri-pandemic period.[12] In a cross-sectional, web-based survey completed by Canadian adolescents and transitional-aged youth, 86% of respondents noted a decline in their mental health during the viral

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outbreak.[13] The last four years of research have begun to unearth several patterns in the mental health trajectories of children and youth, with a significant fraction of adolescents experiencing deterioration in their symptomatology, ranging from 30% to 70%.[14] However, there has been considerable debate regarding the extent of this impact and the populations most affected.[15]

Depression, anxiety, COVID-specific fears, and suicidal behaviors skyrocketed across the globe during the peri-pandemic period. Moreover, the emotional effects of the viral outbreak are not confined to the active phase of the pandemic.[16] Although the world is now living in a post-pandemic era, clinical sequelae persist. Therefore, understanding the impact of COVID-19 on young people's psychiatric functioning, crafting conceptual models to comprehend its influence, and developing clinical interventions for these repercussions are vitally important. This narrative review precisely focuses on summarizing data on depression, suicidal behavior, anxiety, and obsessive-compulsive disorder (OCD) in global youth. A conceptual synthesis guided by the construct of intolerance of uncertainty follows the discussion of the literature. Finally, the review examines clinical implications for assessing and treating the psychological sequelae associated with the pandemic.

Depression, suicidal behavior, anxiety, and obsessive-compulsive disorder spectrum in the peri-pandemic era

The emotional and behavioral impact of the COVID-19 pandemic on pediatric patients, both in the United States and globally, was undeniable.[17,18] Youth who tested positive for COVID-19 experienced higher probabilities of any mental health diagnosis compared to their peers who did not test positive.[19] Zhang-James *et al.*[19] reported a higher Hazard Ratio for children (6.0, 95% confidence interval (CI): 5.8–6.3) than for adolescents (4.2, 95% CI: 4.1–4.4). This section summarizes research investigating depression, suicidal behavior, anxiety, and obsessive-compulsive behavior, presenting findings from various studies along with commentary on the limitations of the research.

Depression

The majority of the evidence suggests that depression and anxiety rates among youth did indeed rise during the pandemic, with depression taking center stage.[8] One review noted that worldwide prevalence rates of depression in school-age children ranged from 2.2% to 11.78%,[20] and a widely cited article reported that 25% of global youth surveyed experienced depressive symptoms.[10] Zolopa *et al.*[21] conducted a rapid review of publications encompassing youth from North America, Europe, East Asia, Australia, and Southwest Asia, concluding that 79% of publications noted an increased prevalence of depression.

A recent qualitative investigation with 20 adolescents (ages 12–19 years) revealed that 70% of the respondents reported a loss of motivation.[22] Increased rates of internalizing disorders (e.g., anxiety, depression) were associated with higher levels of pandemic-related stressors,[23] and COVID-19-related stress predicted depression in a large sample of Canadian youth ($B = 0.33$, $t = 11.49$, $p < 0.001$).[24] Hawke *et al.*[25] stated that increased COVID-19 fears were related to elevated mood symptoms but not to levels of substance use. Psychiatric hospital admissions during the pandemic revealed higher rates and intensities of depression, suicidal behaviors, and trauma-related symptoms.[26] A systematic review claimed that between January and May 2020, the prevalence of depression in Chinese youth ranged from 11% to 45%.[12] In a cross-sectional survey study completed in April 2020, including 463 junior high school and high school students, Zhang *et al.*[27] found that 9.1% of junior high school students in China experienced moderate depressive symptoms, whereas 6.8% of their high school counterparts endorsed moderate depression. In terms of severe depression, 5.3% of the junior high school sample disclosed severe depression compared to 2.6% of the high school group.

Chadi *et al.*[28] summarized results from various longitudinal studies and concluded that within the United Kingdom, levels of depression surged in the early phases of the pandemic (March 2020) and then receded by the summer of 2020. Forty-four percent of U.S. youth reported persistent sadness and/or hopelessness during the pandemic. American adolescents reported increased weekly feelings of depression during the peri-pandemic period. Females living in the United Kingdom were at greater risk for depression than their male peers ($B = 1.64$; CI = 95%).[29–31] Thirty-three percent of Australian adolescents surveyed reported depressive symptoms during the peri-pandemic period.[32] A mixed-methods investigation examining emotional reactions to the viral outbreak among transitional-aged Australian youth (16–25 years old) showed marked increases in depression.[33] Bell *et al.*[33] found that 44% of Australian adolescents in a non-clinical population and 63% from a clinical group met the criteria for depression as measured by the PHQ-4. Qualitative data showed that major concerns centered around social isolation, declines in mental health, and unsatisfactory efforts at self-care.

In another review analyzing studies of youth from North American, European, and Asian countries, 14.4% of adolescents reported post-traumatic stress two weeks after the pandemic's onset, with those in treatment for a major depressive episode particularly likely to experience trauma symptoms.[17] Additionally, Millner *et al.*[26] found that treatment stays lasted longer in the peri-pandemic period than in preceding years. Chadi *et al.*'s 2022 meta-analysis found some recovery among depressive symptoms over the summer of 2020.[28]

Suicidal behavior

Suicide rates in pediatric patients apparently rose during the pandemic across Europe, North America, Asia, and Africa.[15,33–35] In particular, rates of suicidal behavior increased in the U.S., China, Australia, and Greece, while they decreased in Japan.[20] Suicidal ideation in adolescents and transitional-aged youth (ages 12–24 years) was assessed during the early stages of the pandemic in 2020.[35] The levels of suicidal ideation among these youth rose by 12.2% (adjusted odds ratio = 1.24, 95% CI: 1.15–1.35). Moreover, suicidal ideation was elevated more in older adolescents (>16 years, 15.3%) than in their younger cohorts (<16 years, 10.6%).

Suicidal behavior and attempts in Canadian youth increased after containment measures ended.[15] Likewise, 20% of Australian adolescents reported suicidal behaviors.[31] In Catalonia, the rates of suicidal behavior among female youth rose by 195% during the first year of the pandemic compared to the prior year.[36] The U.S. Centers for Disease Control and Prevention reported a 50.6% increase in emergency room visits for girls compared to a 3.7% rise for boys from 2019–2021.[37] Twenty percent of U.S. youth reported suicidal ideation, and 9% attempted suicide during the peri-pandemic period.[29] A very recent study showed that COVID-19 infection was linked to a two-fold increase in suicidal ideation among American children and adolescents.[19] In the United States, levels of suicidal behavior were associated with the length of school closures, with longer shutdowns correlating with greater suicidal behavior.[38] Table 1 below illustrates the salient findings.[10,12,15,19,20,27,29–33]

Table 1. The wide prevalence of depression during the COVID-19 pandemic. Each row represents prevalence data from specific regions

Clinical condition	Region	Prevalence	Reference
Depression	Worldwide	25% of youth reported depressive symptoms in a large study 2.2–11.78% of youth reported depressive symptoms	10,20
	United States	44% of youth endorsed hopelessness and sadness Increased weekly reports of depression by youth	29,30
	China	11–45% of youth reported depressive symptoms	12
		9.1 % of junior high and 6.8% of senior high students reported depressive symptoms	27
	Australia	33% of youth endorsed symptoms of depression 44% in non-clinical group and 63% in clinical group reported depressive symptoms	32,33
Suicide	Worldwide	Rise in Self-Injurious Behavior (SIB) in North America, Europe, Asia and Africa	15,31
	Australia	20% of youth experienced suicidal ideation	31
	United States	20% of youth reported suicidal Rate of suicidal ideation doubled	19,29

Anxiety

Demaria *et al.*[4] noted in their narrative review, "The impact on overthinking and on excessive worry was exceptionally strong during the first wave of the pandemic." Indeed, approximately 20% of youth worldwide reported symptoms of anxiety during the pandemic,[10] and published studies found anxiety disorders in 1.8–23.87% of the population.[19] A national survey of Generation Z teens in the U.S. indicated that 43% of these adolescents experienced increased stress during the pandemic.[39] Large increases in the rates of weekly anxiety were found in the U.S.[30] More specifically, anxiety was highly prevalent among American children and adolescents who tested positive for COVID-19.[19] Early in the pandemic (April 2020), over 1,000 Canadian youth were surveyed, and 43% of the sample reported being "very concerned" about the viral outbreak.[24] Anxiety increased by 32% in a sample of Danish youth.[40] Nonetheless, anxiety was not limited to the initial phases of the pandemic; there was a substantial increase in Canadian pediatric patients' emotional problems throughout the peri-pandemic period,[41] during which 20% of Australian adolescents likewise experienced anxiety.[32]

COVID-19 generated a psychological response that likely encompasses more than traditional symptoms of anxiety.[42] A March 2020 online assessment of over 1,000 U.S. children revealed some significant findings, namely that worries tended to center around fears of infecting others, spreading the disease, and concerns about personal health.[43] Overall, the number of anxious youth in China appeared relatively low (8%).[12] However, in one cross-sectional analysis of 463 youth, approximately 10% of the junior high cohort reported moderate or severe anxiety, while nearly 11% of their high school counterparts reported moderate anxiety, and 7.2% stated they were severely anxious.[27] Additionally, high rates of post-traumatic stress disorder and generalized anxiety disorder (GAD) were discovered among Chinese children and adolescents after the COVID-19 outbreak.[44]

Hawke *et al.*'s latent class analysis of COVID-19 worry trajectories in Canadian adolescents and transitional-aged youth identified several trends.[24] Youth reported heightened worries during the initial peak of the pandemic in Spring 2020, a decline over the summer, and then a significant increase in COVID-19 worries associated with the Fall 2020 surge. About 35% of a 600-person sample fell into the lowest-worry category, which tended to include more boys and adolescents from small cities or rural areas. Nearly 13% fell into the highest-worry category and also experienced the sharpest increase in worries in October. This group tended to include girls, gender-diverse individuals, those living in suburbs or big cities, or those with baseline internalizing or externalizing disorders. No differences in COVID-19 worries were found based on age, ethnicity, language, employment, living situation, physical health, or substance use.

Symptoms of OCD also worsened during the pandemic.[4,45–49] During such times, individuals naturally worry about contamination, viral spread, and inadequate viral mitigation efforts.[46] Given that contamination obsessions and cleaning compulsions were some of the most common symptoms of OCD both before and during the pandemic, this surge in symptoms is not surprising.[14] Youth with OCD also faced a significant change in social messaging around the threat of contamination, in addition to the genuinely increased risk.

A significant portion of Canadian youth with OCD experienced symptom deterioration during the pandemic, ranging from 38% to 73%.[41,45] In a recent systematic review, most studies reported that more youth experienced worsening symptoms than improvement.[14] Several factors predicted worsening OCD symptoms, including poor insight combined with obsessions involving aggressive or sexual themes.[41] There is mixed evidence regarding the effect of gender on OCD deterioration, with some studies finding more prevalent obsessive-compulsive symptoms in girls and women, while others found more frequent new diagnoses of OCD in boys and men.[44,45] One study suggested that youth whose symptoms worsened tended to have family histories of ADHD and be younger.[40] Tomczak *et al.*[49] examined parents' and children's (ages 6–18 years) reactions to the COVID-19 pandemic using data from the Boston Children's Hospital Department of Neurology and the Pediatric OCD clinic at Massachusetts General. They concluded that children with a singular diagnosis of OCD reported higher levels of anxiety and depression during the viral outbreak than did children with both OCD and a tic disorder. However, both groups experienced significant emotional impact due to the pandemic.

A recent single-center retrospective study conducted in Turkey found increasing rates of OCD and somatic disorders ($p < 0.001$).[11] Additionally, obsessions, fear of the virus, sleep problems, and somatic complaints intensified among Turkish youth.[50] Finally, a third study conducted with nearly 600 Turkish adolescents examined the effect of COVID-19 on OCD.[51] The results revealed

Table 2. Snapshot of the prevalence of anxiety and Obsessive-compulsive disorder (OCD) during the COVID-19 pandemic. Each row represents prevalence data in specific regions

Clinical condition	Region	Prevalence	Reference
Anxiety	Worldwide	20% of youth noted symptoms of anxiety 1.8–23.9% of youth experienced anxious symptoms	10,19
	United States	43% of teens report stress	39
	Denmark	Increase of 32% in anxious youth	40
	China	Low rate (8%) in one study 10% of junior high school students reported moderate to severe anxiety 7.2 of high school students reported moderate/severe anxiety	12,27
Obsessive-Compulsive Disorder	Denmark	44.6% of adolescents with OCD experienced symptom exacerbation	40
	Canada	38–73% of adolescents with OCD reported symptom exacerbation	41

several compelling findings. First, incidences of OCD increased during the pandemic. However, more nuanced and complex outcomes were discovered. Through a mediation analysis, COVID-19 stress predicted emotional reactivity (B = 0.50, $p < 0.01$), which in turn was linked to experiential avoidance (B = 0.59, $p < 0.01$) as well as depression/anxiety (B = 0.81, $p < 0.01$).

Research in Denmark involving a sample of youth from a specialized clinic and a group surveyed from the general population found that 44.6% of the clinic group reported worsening OCD symptoms, 32.3% reported increased anxiety, 33.8% indicated exacerbated depression, and 18.5% noted increased avoidance.[40] Additionally, these investigators found that 15.4% of newly diagnosed children and adolescents with OCD reported that thoughts about COVID-19 played a central role in their condition. This phenomenon, along with deepening anxiety and depression, predicted the aggravation of OCD. Table 2 summarizes the relevant findings.[10,12,19,27,39-41]

Typical long-term outcomes of depression and anxiety in youth

Examining the characteristic trajectories of depression and anxiety in pediatric populations provides valuable context. In their review, Walter *et al.*[52] reported that untreated anxiety in youth leads to impaired social functioning, educational achievement, physical health, and mental health. More specifically, they noted that 9% of adolescents experience suicidal ideation and 6% attempt suicide.

Typically, anxiety disorders such as GAD, social anxiety, and separation anxiety decrease during adolescence, whereas depression tends to increase during this period.[53] In the U.S., adolescent depression is associated with multiple clinical sequelae, including eating disorders, substance use (e.g., nicotine, alcohol, street drugs, prescription medications), physical health conditions (e.g., cardiovascular issues, obesity), lowered academic achievement, and recurrent depressive episodes in adulthood.[54] The presence of depression may exacerbate anxiety disorders.[53] Clearly, the most serious consequence of persistent depression and anxiety is suicidal behavior.[55]

Limitations of the reviewed research

The research literature covering the impact of the COVID-19 pandemic on pediatric anxiety and depression is not without limitations. A common concern in many of the studies involves the representativeness of the sample. Studies with smaller sample sizes suffer from inadequate power, and many larger-scale investigations are compromised by a lack of racially and ethnically diverse participants. This is particularly unfortunate given that the pandemic disproportionately affected marginalized populations.[2,56] These individuals and families experienced greater exposure to infection due to their front-line worker status, as well as food insecurity, mandated work furloughs, lack of healthcare coverage, hate crimes, and various forms of oppression.[57,58] Therefore, selection bias may be a factor. Although recruitment for research during the pandemic was understandably challenging, future research should strive for larger and more representative samples to enhance ecological validity and generalizability.

The frequent use of cross-sectional designs represents another significant limitation of the literature. Similar to the challenges in recruiting, the pandemic made randomized and complex methodologies difficult to implement. However, all cross-sectional and quasi-experimental designs suffer from typical threats to internal and external validity, such as differential history and maturation. Moreover, reliable cause-and-effect relationships cannot be established. In particular, differential maturation jeopardizes sound conclusions in studies without follow-up components.[59] Therefore, follow-up and longitudinal evaluations are crucial in the post-pandemic period.

Additional limitations pertain to measurement issues and the timing of assessment. First, there appears to be an over-reliance on questionnaire data rather than observational or behavioral measures. Second, most studies depend on parental or youth self-report data, which introduces the potential for response bias. Finally, considerable variability in the timing of data points between studies makes cross-comparisons challenging.

Theoretical synthesis: Making sense of the literature

From infancy, humans learn to perceive uncertain situations as dangerous.[60] Indeed, individuals may be hard-wired to be wary of uncertainty, which could represent an evolutionary adaptation.[60–62] Unknown circumstances often trigger fear, and doubt becomes highly distressing.[63–66] Given the various ways pandemics create uncertainty and Korte *et al.*'s observation that "Uncertainty and health-related anxieties grow organically in the peri- and post-pandemic periods",[9,65] the construct of intolerance of uncertainty (IU) may offer a unique insight into the psychological consequences of pandemics. IU refers to the fear of unknown, unpredictable, or

ambiguous situations.[60,62] Heightened IU can lead to skewed attention and biased recall.[62] Scholars conceptualize IU as a dispositional or temperamental trait,[67,68] representing a diathesis for various psychopathological conditions and a potential transdiagnostic pathway.[62,65,66,69]

IU is associated with multiple psychiatric diagnoses in youth, moderating the relationship between stressful events and anxiety.[68,70,71] For example, GAD is related to elevated levels of IU (r = 0.66) in 7- to 17-year-olds.[71] Additionally, IU predicted the emergence of GAD (B = 0.03, SE = 0.01, OR = 1.03) and was highly correlated with social anxiety.[70,71] Health anxiety also showed a significant correlation with IU (r = 0.80), which was associated with obsessive-compulsive symptoms (r = 0.63–0.69) in children and adolescents.[70,72] In particular, ordering, symmetry, washing, checking, and perfectionism were related to IU.[73,74] Moreover, eating disorders were found to be concomitant with IU, with coefficients ranging from 0.42 to 0.45.[75,76] Courtney *et al.*[77] asserted that anxiety and depression in youth increase during times of uncertainty. IU and symptoms of depression were similarly correlated, with coefficients ranging from 0.43 to 0.55.[75] Therefore, IU is clearly linked to multiple forms of distress. Pandemics are well known for generating various kinds of uncertainty at all levels of society.[9] Friedberg *et al.*[78] noted that "the COVID-19 virus is a tricky bug, and its frequent morphing into multiple variants that evade immunity breeds heightened levels of uncertainty." Li *et al.*[79] conceptualized COVID-19-specific IU as a tendency to overestimate the threat of uncertainty in COVID-related experiences. A recent study concluded that during the pandemic, elevated IU was significantly associated with higher levels of anxiety in youth.[80] Paluszek *et al.*[81] proposed a COVID-stress syndrome characterized by emotional (e.g., fear of the virus, fear of foreigners who may transmit the virus) and behavioral (e.g., reassurance-seeking, checking COVID-19-related information) manifestations. Individuals with greater anxiety sensitivity and a diagnosis of an anxiety disorder reported more COVID-19-related stress—a relationship that high IU may amplify.[81,82] A recent project involving 234 5th- to 8th-grade Croatian youth uncovered a clear relationship between IU, anxiety, and COVID-related distress.[83] Additionally, a study of U.S. children found a very strong correlation between IU and thoughts/behaviors associated with COVID (r = 0.60, $p < 0.001$).[78]

Uncertainty often accompanies illness. "This may be due to the unpredictability of the symptoms/course of illness or a lack of clarity about, for example, diagnosis, prognosis, treatment options, likely efficacy of treatment, roles within the care team, services available, responsibilities of patients and caregivers, their ability to engage in treatment, etc."[60] This explanation aligns well with the early waves of the COVID-19 pandemic, which were characterized by high levels of unpredictability and ambiguity regarding diagnosis, prognosis, availability of services, and treatment efficacy.

Our theoretical synthesis is fundamentally informed by the work of Korte *et al.*[65] Simply put, their model proposes that the pandemic served as a critical incident, and IU represented an individual diathesis (e.g., vulnerability factor) that catalyzed a variety of psychiatric symptoms, including anxiety, depression, contamination worries, hypervigilance, catastrophic predictions, somatic reactions, fears of losing control, helplessness, rumination, checking behaviors, and avoidance behaviors. Korte *et al.*[65] explained that IU could be a determinative or contributing factor to a host of conditions. Despite the ambiguity surrounding its mechanism of action, IU presents a compelling transdiagnostic treatment target.[84,85]

Implications

The existing literature unequivocally documents rising concerns about pediatric behavioral health. Pediatric medical clinics are often the first point of contact for treating these conditions,[20] and routine screening for emotional and behavioral disorders is therefore imperative.[86–88] Regular surveillance of symptoms offers numerous benefits, including early identification, improved accessibility, and more accountable treatment.[89] Self-report screeners provide both efficiency and solid psychometrics.[90] Preventive screening facilitates effective clinical decision-making and quality assurance.[88] Additionally, both caregivers and young patients generally favor screening efforts.[90]

Given the surge in anxiety and depression rates due to COVID-19, several disorder-specific screening measures are recommended. The screen for child anxiety-related emotional disorders (SCARED) and the social phobia and anxiety inventory for children (SPAI-C) are suggested for anxiety spectrum disorders.[86–88,91,92] The SCARED is a 41-item broad-scale tool with robust psychometric properties and aligns well with Diagnostic Statistical Manual-5 criteria.[93] A brief 5-item version is particularly useful in integrated pediatric settings.[94,95] The SPAI-C, a well-regarded 26-item measure, assesses distress in social situations.[96] More specifically, the SPAI-C covers three factors: assertiveness/general conversation, traditional social encounters, and public performance. For depression screening, the Patient Health Questionnaire-9 (PHQ-9) and its adolescent version (PHQ-9A) are recommended.[87,88,97,98] Like the SCARED and SPAI-C, the PHQ-9 has strong psychometric foundations.[97,98] These instruments provide baseline metrics for targeted treatment planning and methods for tracking treatment progress, which is crucial in the post-pandemic period. Based on these measures' psychometric properties, sensitivity to symptom presentation, accessibility, brevity, and recommendations from clinicians,[52,87,88] we advise practitioners to consider their use in the post-pandemic period.

Despite the clear advantages of screening initiatives, there are reasons to be cautious about overzealous implementation. Clinics planning to assess pediatric patients for anxiety or depression need appropriate infrastructure to support these efforts.[88] For instance, these offices should be staffed with clinicians who can provide warm handoffs for further evaluation and/or intervention.[99] These providers should also be competent in cognitive behavioral therapy (CBT), which has long been considered the gold standard for treating psychiatric problems in pediatric patients.[100]

In 2009, March predicted that "psychiatry will move to a unified cognitive-behavioral intervention model that is housed within neurosciences medicine".[100] Pediatric depression is effectively treated by the CBT approach, which yields large effect sizes (g = 1.28–2.54).[101–104] Furthermore, CBT effectively mitigates anxiety and obsessive-compulsive disorder, also achieving large effect sizes.[64,103–106] "The CBT reservoir holds an array of brief, portable, effective, and engaging interventions for treating common childhood problems."[100] Contemporary CBT includes a variety of modules,[65,84,107] offering a large supply of evidence-based interventions commonly grouped into psychoeducational, basic behavioral, cognitive restructuring, and exposure techniques. Psychoeducation informs pediatric patients about their condition and treatment options. Basic behavioral tasks are often the first methods used and target issues such as somatic tension, withdrawal, avoidance, impaired social functioning, and intolerance of distress. Cognitive restructuring aims to re-engineer thought content and logical reasoning processes. Exposure-based practices are powerful tools for mitigating inaccurate perceptions of threats, intoler-

ance of uncertainty, difficulty managing distress, and maladaptive patterns of avoidance.

Recent research has evaluated CBT interventions for children and adolescents experiencing psychological distress related to the COVID-19 pandemic.[65,84,85,108,109] Outcomes from a small but significant single-group pre-post design with 13- to 18-year-olds receiving a six-session CBT protocol are very encouraging, showing an 18-point decrease in anxiety and depression scores at post-test (95% CT; 6.17–30.10, t = 3.25, $p < 0.006$).[85] This data yielded a large effect size (g = 0.82), with 60% of participants showing improvement. Additionally, the approach reduced COVID-19-related fears ($Y_t = 4.45$, $p < 0.04$, r = 0.046).

A coping skills protocol for managing emotional distress (CC-19) was introduced early in the pandemic.[108] This intervention package included relaxation, psychoeducation, mindfulness, behavioral activation, and cognitive restructuring, with a particular focus on IU. Youth in the program learned to identify controllable circumstances, recognize and accept feelings and thoughts about events beyond their control, and develop productive problem-solving strategies for situations within their control. Preliminary results demonstrated the feasibility and acceptability of the approach.

Wahlund *et al.*[109] piloted a brief CBT intervention for IU with twelve adolescents. Their protocol included worry awareness, education about the connection between IU and worry, and exposure to uncertainty. They found that the majority of their sample experienced reductions in IU, worry, and avoidance. Wahlund *et al.*[109] concluded that their program was feasible, acceptable, and effective. They noted that "relatively prompt exposure to situations involving uncertainty reduced worry and helped adolescents identify how they could increase their tolerance through behavioral change."

A series of clinical articles propose several innovative CBT procedures for alleviating emotional distress in the post-pandemic period.[65,84] These include novel cognitive restructuring interventions such as *Mighty Predictions*, *Changing the Sign*, *Who's Got the Germ*, and *Psychological Immunity Boosters*, as well as creative exposure-based tasks such as *Karaoke Worries, Musical Contaminants,* and *Germ Scavenger Hunt.* While these strategies are promising and intriguing, they require further empirical testing and data-based support.

Future Directions

Ludlow *et al.*[85] explained in their 2023 paper, "The COVID-19 pandemic has shown that infectious disease outbreaks have broader implications than just physical health, with far-reaching psychosocial consequences that detrimentally impact the mental health of affected communities." This assertion has proven particularly accurate concerning children and youth. Over the last three years, providers and patients worldwide have reported increasing rates of depression and anxiety, as well as their symptoms in non-clinical populations.[8,20–22,43,44] Likewise, obsessive-compulsive disorder has risen in prevalence, with previously existing patients deteriorating and COVID-19-related obsessions featuring prominently.[45,46] These trends, combined with a concurrent rise in suicidal behavior,[15,34] constitute an urgent imperative to find effective, scalable ways to intervene with at-risk youth.

Future research must strengthen the predominantly cross-sectional literature base with further longitudinal and follow-up studies. Moreover, researchers should make explicit efforts to recruit youth who are underrepresented in existing data, which is mostly derived from online questionnaires. Youth who are undocumented, living in under-resourced households, or immigrants learning the language of their new homes may be unable to respond to online recruitment, and may simultaneously be at high risk for mental health deterioration due to the pandemic. The field cannot afford to leave them out of the recruitment pool moving forward. Similarly, researchers should investigate factors that may render certain groups especially vulnerable, such as those who are female or gender diverse.

In addition to expanding research into the prevalence of pediatric depression, anxiety, suicidality, and obsessive-compulsive disorders, the future offers opportunities to explore promising interventions and settings. Studies should evaluate cutting-edge cognitive behavioral tools in a data-driven environment and continue investigating ways to improve intolerance of uncertainty, a formidable risk factor. Accordingly, researchers should establish best practices for successfully implementing effective CBT interventions in primary care settings. By leveraging the first lines of pediatric care, experts can more quickly identify children and adolescents in need of support. Existing data strongly suggests that when it comes to depression, anxiety, obsessive-compulsive disorder, and suicidality, there is no shortage of young people in need.

Conclusions

The COVID-19 pandemic caught the world unaware and subsequently unprepared. This once-in-a-century public health crisis produced exceedingly high morbidity and mortality rates. Moreover, as the preceding review documented, the viral outbreak's clinical sequelae contributed to an increased prevalence of anxiety and depressive disorders in children and adolescents. Similar to past pandemics in human history, COVID-19 created significant uncertainty regarding diagnosis, contagion, prognosis, and treatment efficacy. Intolerance of uncertainty likely represented a diathesis or vulnerability factor that fueled anxiety and depression in pediatric patients. Fortunately, cognitive behavioral therapy offers an empirically sound psychosocial intervention to mitigate emotional distress in children and adolescents.

While the findings and conclusions of multiple studies are valuable, if the data is not translated into better clinical care, the scholarly work's impact diminishes. Consequently, the accrued knowledge lies inert. Clinical research should migrate toward state-of-the-science bedside interventions. Ideally, the material in this review will lead to improved conceptualization, assessment, and treatment for pediatric patients experiencing anxiety and depression associated with the COVID-19 pandemic.

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Author contributions

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