FAMILY WELL-BEING AND THE COVID-19 PANDEMIC IN THE UNITED STATES

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A dissertation submitted to Johns Hopkins University in conformity with the requirements for the degree of Doctor of Philosophy

Baltimore, Maryland
April 2021

Abstract

Background

The COVID-19 pandemic has caused widespread infection, school closures, and high rates of job loss. Much of the current research has focused on the clinical features of COVID-19 infection, but the family well-being consequences of COVID-19 are less well documented. The goal of the current study is to describe parent and child well-being during the early months of the COVID-19 pandemic in the U.S. and to identify factors that can inform intervention development.

Methods

This study uses data from the first two waves of a longitudinal online study on well-being during COVID-19. The first wave was conducted in late March 2020, a few weeks into the initial surge of COVID-19 cases in the U.S. The second wave was completed in early May 2020, when Stay at Home orders were beginning to be lifted. Using quantitative and qualitative methods, this study examines change in parent and child mental health and behavioral outcomes. Correlates of psychological and behavioral outcomes for parents and children were assessed using multivariable analysis and generalized estimating equations. Thematic analysis was used to explore how parents describe the impact of COVID-19 pandemic on their children's health.

Results

Quantitative results indicate that parents showed decreased psychological distress and no change in their alcohol use during the early months of the pandemic, but they reported a significant increase in mental health difficulties and sleep disturbances in their children compared to pre-COVID-19. Study findings also indicate that a higher proportion of older children developed mental health issues than young children (<5 years). Household

stress, income loss, and social network disruption were found to have an adverse impact on both parent and child well-being whereas social support was identified as a protective factor. Qualitative findings identified four domains that COVID-19 had positively and negatively impacted for children including: physical health, social connections, education, and mental/behavioral health.

Conclusions/Implications

Study results suggest a need for interventions that provide trusted information about COVID-19, address household discord, and strengthen family social support networks. Policies are needed to provide a financial safety net to families. To address elevated distress, comprehensive systems of care must address families' physical, psychological, and social needs.

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Acknowledgements

This dissertation, and the path to get here, has been paved by many. Their perspectives and collaboration have allowed me to gain new ways of understanding the world and finding my place in it.

This body of work owes a debt of gratitude to the research participants. I have been honored to learn about their experiences managing parenthood during the COVID-19 pandemic and my hope is that this dissertation serves to elevate their voices.

My educational training has also been guided by many mentors. This dissertation would not have been possible without my academic advisor, Carl Latkin. I am extremely thankful for his steadfast support and for the faith that he has put in me as a student and researcher. Carl has been a guiding light through the twists and turns of doctoral training and a role model for his dedication, mentorship, and creativity. Appreciation also goes to Larry Wissow, Carol Underwood, and Ron Hess who helped direct me onto the path of doctoral education in Public Health. I also want to thank Janice Bowie, with whom I have shared many adventures and much laughter as she has taught me how to live a balanced life and develop a career devoted to serving the community. A special thanks goes to my dissertation committee members -Terri Powell, George Rebok, Melissa Davey-Rothwell, and Xiangrong Kong - who have provided invaluable input and feedback on this dissertation.

I want to also acknowledge my fellow doctoral students and colleagues whose rich conversation has challenged my thinking and whose shared gripes and celebrations have made this a memorable experience. A special note of appreciation to Alyona Mazhnaya and Anushka Aqil who have been my partners in this journey. I treasure the

sunsets and sunrises we have shared – both in Baltimore and Ukraine. I am also deeply grateful for the Lighthouse family. The entire team has served as mentors, teaching me how to engage in research and practice that is driven by community need. Each team member has supported me as both a friend and a colleague and I miss our pre-COVID daily hugs.

To my family and friends, this journey would not have begun without you. I am grateful to old friends and new who have surrounded me with their constant support and encouragement. My partner, Dan, made the day-to-day possible and taught me that hard work must be accompanied with fun. He fills my days with laughter and hikes while also making sure that I have meals to eat and tech support on hand. My brother, Aaron, continues to teach me the value of family – sharing in brother-sister adventures or sending me Gatorade during spells of illness. My dad, John, taught me compassion and a deep love for nature. His memory pushes me to try to do good in the world and live my days with a spirit of humor and joy. I learned how to be an independent female in this world from my mom, Berit, who demonstrated how to live a life of curiosity and discovery, as she has lived and her parents before her. She has been a backbone, a counselor, and an unrelenting supporter as I follow in her academic footsteps.

The journey has been winding and will continue to unfold in years to come. I feel deeply grateful to be surrounded by a passionate and supportive community who serve as my inspiration. Thank you.

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List of terms and abbreviations

ACE2 – Angiotensin-Converting Enzyme 2

AUDIT-C – Alcohol Use Disorder Identification Test- Consumption

CBT – Cognitive Behavioral Therapy

CES-D-10 – ten-item Center for Epidemiological Studies Depression Inventory

COR – Conservation of Resource Theory

CoVs – Coronaviruses

COVID-19 – Coronavirus Disease 2019

CoV-Wo – SARS-CoV-2 Worry Scale

FDA – U.S Food and Drug Administration

GEE – Generalized Estimating Equations

MERS-CoV – Middle East Respiratory Syndrome Coronavirus

MIS-C – Multisystem Inflammatory Syndrome

MTurk – Amazon Mechanical Turk

NASP – National Academy of School Psychologists

NIH – National Institutes of Health

SARS-CoV – Severe Acute Respiratory Syndrome Coronavirus

SARS-CoV-2 – Severe Acute Respiratory Syndrome Coronavirus Two

SEL – Social and Emotional Learning

SD – Standard Deviation

T1 – Time 1 (March 2020)

T2 – Time 2 (May 2020)

WHO – World Health Organization

Chapter 1. Introduction

Compared to the physical effects,[1-3] the family mental and behavioral health consequences of COVID-19 have been less well documented. It is unclear how exposure to the pandemic and associated consequences have influenced mental and behavioral health outcomes for both parents and children. Understanding the impact of COVID-19 on families is imperative in order to identify intervention targets that aim to improve family well-being. In this chapter, we review the epidemiology of COVID-19, the secondary impact of COVID-19 on families, and the current literature on how family well-being has been affected by COVID-19 and other disasters. This chapter will also outline the theoretical orientation, aims, and conceptual model of this dissertation which focuses on family well-being during the COVID-19 pandemic in the United States.

1.1 Epidemiology of SARS-CoV-2 (COVID-19)

Origin of SARS-CoV-2

Coronaviruses (CoVs) are a family of RNA viruses surrounded by a protein envelope which were first characterized in the 1960s (named *corona* to signify the crown-like appearance of surface projections).[4] There are four CoVs commonly circulating among humans which cause mild symptoms: HCoV2-229E, -HKUI, -NL63, and -OC43.[5] CoVs cause upper respiratory tract infections, and it is estimated that 15% of adult common colds are produced by coronaviruses, usually in mild forms.[4] Among children, CoVs can be isolated from 4-6% of children hospitalized with acute respiratory tract infections.[5] In contrast to other respiratory tract infections, there is not a decrease in the prevalence of coronavirus infections with increasing age.[5] The recently identified SARS-CoV-2, is the seventh identified human coronavirus and is

related to severe acute respiratory syndrome coronavirus (SARS-CoV) and Middle East respiratory syndrome coronavirus (MERS-CoV) due to similar epidemiological and biological characteristics. Based on genome sequences SARS-CoV-2 shows approximately 80 percent nucleotide identity with the original SARS- CoV.[6]

All of the currently identified CoVs have a zoonotic origin. CoVs are capable of rapid mutation leading to their spread from animals to humans.[5] In the past two decades there are three examples of this spread with new coronaviruses identified. In 2002, SARS-CoV was first identified as having been transmitted from civet cats or bats to humans in China. [5] In 2012, the novel MERS-CoV was identified as having been transmitted from dromedary camels to humans in the Middle East.[5] The current pandemic of SARS-CoV-2, which was first identified in 2019, originated from a local seafood and animal market.[6]

SARS-CoV-2 transmission and mortality

Human CoVs are transmitted from person-to-person.[7] The main routes of CoV spread are respiratory droplets and contact with fomites.[7] The incubation period for SARS-CoV-2 is approximately 5-6 days which is similar to SARS-CoV and MERS-CoV.[5] SARS-CoV-2 has been found to be less pathogenic but more transmissible compared to SARS-CoV and MERS-CoV.[7] The case fatality for SARS-CoV-2 (3.5%) is lower than that of SARS-CoV (9.6%) and MERS-CoV (34.4%). [7] Transmissibility of a virus is measured by the reproductive number (R0), which indicates the average number of new infections caused by one infected person.[8] If a virus has an R0>1, the number of infected people is likely to increase and may cause epidemic spread, whereas if the R0<1, transmission is likely to peter out.[8] Reproductive numbers depend on the

stage of an outbreak as well as geographic location and engagement in prevention strategies. SARS-CoV-2 is thought to be more transmissible than other CoVs with a reproductive number of 2-3 in contrast to SARS-CoV with an R0 between 0.3-2.9 and MERS-CoV with an R0 of 0.5-3.5.[5,8] Subsequent generations of the SARS-CoV and MERS-CoV were identified with reduced spread with the R0 identified as 0.8 for SARS-CoV and 0.7 for MERS-CoV; indicating low potential for long-term sustained community transmission.[5] Since 2003, no human infections of SARS-CoV have been identified; however, this virus is still identified in bats allowing for the possibility for it to reemerge among humans. MERS-CoV continues to spread between animals and humans and is largely attributed to dromedary camels, which have close contact with humans, as the reservoir.[5] To date, SARS-COV-2 has caused over 110 million cases and 2.5 million deaths globally.[9] In contrast, 8,000 infections and 774 deaths were documented from SARS-CoV and 2,494 infections and 858 deaths from MERS-CoV.[5]

SARS-CoV-2 viral dynamics in children compared to adults

COVID-19, the disease caused by SARS-CoV-2, can range in severity of illness with 81% having mild symptoms, 14% with severe symptoms and 5% with critical symptoms.[10] Fewer cases of SARS-CoV-2 infection have been reported globally in children compared to adults; however, the true incidence is unknown due to lack of widespread testing.[11] Among children (<18 years) in China, 94% of infected children had asymptomatic, mild, or moderate disease with 5% having severe disease; and less than 1% having critical disease.[12] This low case count among children and their mostly mild symptomology is similar to the SARS-CoV and MERS-CoV epidemics.[13,14] However, a study by Bi and colleagues (2020) suggests that children are just

as likely as adults to become infected with SARS-CoV-2 but less likely to have symptoms or to develop into severe cases.[15] The role of children as viral vectors remains uncertain.[5]

The symptoms of COVID-19 are similar for children and adults; however, children infected with COVID-19 may be asymptomatic or present with milder symptoms than adults.[1] Children may experience fever, dry cough, fatigue, or upper respiratory symptoms such as nasal congestion and running nose.[1] Gastrointestinal symptoms have also been reported among children, including abdominal discomfort, nausea, vomiting, and diarrhea.[1] Few cases progress to lower respiratory tract infections, and most recover 1-2 weeks after disease onset.[1] Evidence suggests that children with certain underlying medical conditions and infants are at increased risk for severe cases of COVID-19.[11] There is limited evidence on what constitutes an underlying condition for children. The Centers for Disease Control and Prevention suggest that, similar to adults, children with obesity, diabetes, chronic lung disease, asthma, and immunosuppression may be at heightened risk of severe illness from COVID-19.[11] A potentially severe complication among children is called multisystem inflammatory syndrome (MIS-C), where different organs become inflamed and can lead to life-threatening problems with the heart and other organs.[16]

Children are generally at high risk for respiratory tract infections; therefore, the findings that children experience milder cases of COVID-19 suggest that children may have specific protective features that contribute to milder disease.[13] One hypothesis is that children experience lower susceptibility to COVID-19 due to reduced expression of the entry receptor for the virus. SARS-CoV enters the body through the angiotensin-converting enzyme 2 (ACE2). While ACE2 is expressed in all organs, it is abundantly present in the epithelia of the lungs and small

intestines, which provide a route of entry for SARS-CoV.[17] Animal studies have identified that ACE2 expression in rat lungs decreases with age.[18] Another factor that may contribute to milder cases among children is a reduction in viral load as age has been found to be associated with viral load.[19]

Treatment of COVID-19 in children and adults

Treatment of COVID-19 depends on the severity of the disease and can range from bedrest to medications that treat inflammation and oxygen therapy.[1] Treatment is largely supportive and includes prevention and management of complications.[11] At present there are no drugs approved by the U.S Food and Drug Administration (FDA) to treat children with COVID-19.[11] Remdesivir has been approved to treat COVID-19 in adult hospitalized populations and children over the age of 12 years and weighing 40kg or above.[20] It is only available through an FDA Emergency Use Authorization for hospitalized pediatric populations under the age of 12 and weighing above 3.5kg.[20] However, the safety and effectiveness of Remdesivir has not been evaluated in pediatric populations.[20] The National Institutes of Health (NIH) also suggests that dexamethasone could benefit adult as well as pediatric COVID-19 patients who are on mechanical ventilation.[11] Yet, the safety and effectiveness of dexamethasone, as well as other corticosteroids, for the treatment of COVID-19 in pediatric patients has not been sufficiently assessed.[21]

1.2 Secondary impact of COVID-19 on families

In addition to COVID-19 causing a threat to child and parent health, COVID-19 has had a secondary impact. COVID-19 has caused widespread stress and uncertainty for families as a result of Stay at Home Orders, school closures, and the associated economic fallout.

Stay at home orders

Most state and country policymakers enacted Stay at Home Orders and school closures near the beginning of the COVID-19 epidemic in the United States. On March 12, 2020 the WHO declared the COVID-19 outbreak a pandemic.[22] By late March 2020, 27 states and the District of Columbia had implemented Stay at Home Orders for all residents.[23] These orders generally mandated that people remain in their residence except to engage in essential activities such as permitted work, local shopping, and other permitted errands. While Stay at Home Orders are effective prevention measures, these policies may affect access to social supports and increase feelings of social isolation.

School closures

Additionally, by the end of March 2020, 42 States and the District of Columbia ordered schools to be closed for the academic year (affecting 38.9 million public school children); 7 states recommended closing schools (affecting 11.4 million public school children); and, in 2 states closures varied by school/district (affecting 240,545 public school children). School closures were deployed as a policy to disrupt the transmission of COVID-19 by reducing social contacts.

School closures may impact children's education and routines as well as place additional caregiving and teaching demands on parents. Many essential workers, as well as parents working from home, have had to scramble to find alternative childcare or modify their work schedules, causing stress and uncertainty. School closures have also had an impact on child educational outcomes, with one study of K-5 students finding that most US students fell behind during the

2019-2020 academic year.[24] This same study also identified a racial divide, with White students having lost one to three months of mathematics learning while students of color lost three to five months.[24] Income disparities may also impact the ability to engage with online learning as children from low-income households may not have access to computers and reliable internet.[25]

Economic fallout

The COVID-19 pandemic has also caused an economic fallout, which likely affects family well-being. Between March and April 2020, unemployment rates soared from 4.4% to 14.7%.[26] One reason for this spike in unemployment may be parental caregiving responsibilities. Working parents without childcare options may have had to quit employment or take leave due to poor parental leave policies as only 18% of United States civilian workers having access to paid family leave, and 73% having access to paid sick leave in 2019.[27,28] Economic strain as a result of COVID-19 may also not be equally distributed as minority populations have been found to be more likely to hold lower paying or less stable jobs.[29] Economic strain can affect both parents and children as COVID-19-related job loss has been found to be associated with increased child abuse and adverse mental health among adults.[30]

1.3   Family well-being in response to COVID-19 and other disasters

Parent well-being in response to COVID-19 and other disasters

It is evident that parents are experiencing new and increased stressors as a result of childcare and educational demands as well as changes in their own work schedules. A study commissioned by the American Psychological Association found that during the COVID-19 pandemic, parents in the United States experienced higher stress than adults without children, with 46% of parents reporting high stress related to COVID-19 compared to 28% of adults who did not have children under the age of 18 between April 24th and May 4th, 2020.[31] Previous research on responses to disasters has found that worry, depressive symptoms, and alcohol use are commonly experienced outcomes.[32-34] However, in the context of the COVID-19 pandemic, these outcomes are poorly understood.

Worry is a natural response to a stressful event and can result in different outcomes. Worrying can motivate proactive behaviors.[35-37] However, prolonged or heightened worry can cause negative mental health outcomes such as depression and problematic alcohol use.[35,36] Little is known about the prevalence of worries among parents in response to COVID-19. COVID-19 may ignite many worries, some which are general to all people, while others may be specific to parents. General COVID-19-related worry may include worries about infection or economic challenges. Worries specific to parents may include worries about their children's emotional health, caregiving, education, and risk of a child becoming infected.

Depressive symptoms are another common response to experiencing a disaster.[38] One study conducted in the early months of COVID-19 found high levels of depressive symptoms among

parents.[39] However, factors associated with elevated depression among parents during COVID-19 are not well characterized. A meta-analysis found that the prevalence of depression after a disaster ranged from 4.9% to 54%.[40] The variability in depression prevalence after a disaster is partially attributed to the use of different diagnostic tools, sampling frames, and study designs.[40,41] Variability is also related to differences in the characteristics of the disaster studied as well as resources such as social support.[40,41] It is important to understand the impact of COVID-19 on depression as depression is associated with diminished health status and noncompliance with medical treatment. This can be of particular concern during the COVID-19 pandemic if people do not comply with COVID-19 prevention behaviors and treatment regimens.[42,43] There is also an established relationship between parental depression and negative parenting behavior, including increased hostility and higher rates of negative interactions.[44]

Another response to experiencing a disaster is engagement in negative coping techniques. Studies have identified a link between disaster-related stress and alcohol use and abuse.[45] Stressors caused by disaster may magnify stress, and alcohol may be used to self-medicate symptoms of stress.[45] A study by Cerda, Tracy, and Galea found that exposure to more post-disaster stressors was associated with 1.23 times higher odds of binge drinking.[45] However, other studies have found mixed relationships between exposure to disasters and alcohol use. A study of SARS-CoV survivors did not identify an increase in substance use disorders following the outbreak.[46] However, a study of hospital employees found that employees exposed to the SARS-CoV outbreak were more likely to report alcohol abuse, compared to those who were not exposed.[2] One study conducted in the early months of COVID-19, found high levels of alcohol use among parents.[39] However, it is unknown what factors might heighten use during COVID-

19. An increase in problematic alcohol after a disaster is an important area of study as problematic alcohol use among parents can result in difficulty in social relationships and fulfilling obligations at work as well as heightened risk of cognitive and social-emotional difficulties among children.[47,48]

A range of factors has been found to be associated with mental health and alcohol use following previous disasters. Previous research on disasters has identified the severity of exposure as the most predictive factor of post-disaster poor mental health outcomes[47,49] and that severity of exposure is weakly associated with alcohol use.[50] Severity of exposure refers to the experience of injury or threat to life. Individual characteristics have also been found to be associated with psychological responses with higher psychological symptomology identified among people who are younger, female, have lower socioeconomic status, from a minority group member, and have a pre-disaster psychiatric history.[47,49] Heightened alcohol use post-disaster has been found to be associated with unmarried individuals, and mixed effects have been identified by age and gender.[51,52]

Family/household factors can also impact mental health outcomes in response to a disaster. Previous research suggests that household stress escalates after major disasters,[53] which can, in turn, impact mental health outcomes.[54] COVID-19 has likely increased household stress as a result of the closing of schools and daycare centers and the associated increased caregiving and educational demands placed on parents. Psychosocial resources can serve as a protective factor and promote resilience in response to a disaster; however, the loss of these resources during a disaster is a risk factor for poor mental and behavioral health outcomes.[49,52] COVID-19 has

caused a loss of material resources through high rates of unemployment and underemployment, leading to financial strain; and social resources have been negatively affected by COVID-19 Stay at Home Orders, which have limited social interactions.

Child well-being in response to COVID-19 and other disasters

The Centers for Disease Control and Prevention identify children as vulnerable to mental stress in the face of disasters as children may experience uncertainty, fear, disrupted routines, physical and social isolation, as well as high levels of parental stress.[55,56] While empirical studies on the impact of COVID-19 on children's mental health are limited, one study was conducted among primary school students in the Hubei province of China, where the pandemic originated, about a month into lockdown mandates. This study identified that 22.6% of the children in the study reported depressive symptoms and 18.9% reported symptoms of anxiety, indicating a higher prevalence of symptoms than pre-pandemic studies of school-aged children in China.[57] While the impact of COVID-19 on child well-being is not well understood, a large body of research has identified anxiety, depression, and impaired sleep as common manifestations of psychological stress in children.[40,56,58,59] Psychosomatic and mental health responses are intertwined as emotional disturbances can cause sleep disruption, and sleep disturbances have been found to predict subsequent emotional and behavioral problems in children.[60]

There are a number of factors that may be associated with child mental health and sleep during COVID-19. Studies of previous disasters have identified severity of exposure to a disaster as one of the strongest predictors of child psychopathology.[40,58,59] One online study conducted in the Shaanxi providence in February 2020 assessed severity of COVID-19 exposure and child mental

health outcomes among 320 children aged 3-18 years.[61] This study found higher rates of fear, anxiety, and other emotions in children residing in areas that had a high prevalence of COVID-19, but the level of epidemic risk was not statistically significant.[61] Research on previous disasters has also found that severity of exposure impacts sleep outcomes, indicating that children with greater exposure to disasters exhibited shorter durations of sleep compared to unexposed children.[62]

Personal characteristics of the child (e.g., gender, age, pre-existing psychopathology) have also been found to be associated with children's mental health and psychosomatic responses to a disaster.[58] Studies of age-related differences in responses to stress have resulted in mixed findings with some studies showing that older children have greater psychological responses and sleep disturbances than younger children whereas other studies have not identified an age effect.[40,58,63] While some studies have found that girls exhibit more symptoms of stress than boys, not all studies have identified this association.[58] These differing results may be attributed to the fact that gender effects are age dependent and more pronounced among older children, given that gender differences in internalizing symptoms generally emerge at puberty.[58,64] Pre-existing child psychopathology, specifically anxiety and depression, have also been found to be associated with children's psychological response to a disaster.[58,65] Lai and colleagues conducted a study on sleep outcomes after exposure to a disaster and identified that female gender, younger age, and history of sleep problems heightened the risk of a sleep disturbance.[66] A few studies have examined racial differences in children's psychological response to a disaster and have found inconsistent results.[58,67,68] These variations in findings may be attributed to differential

access to resources associated with ethnic-minority status across different regions in the United States.[58]

Parental well-being and family resources are other factors linked with child mental health and sleep. Parent mental health and substance use can influence child health through parent-child relationships.[69] A study conducted in late March 2020 suggests that other COVID-19-related factors may also influence parenting, with this study finding that more than 50% of parents reported financial concerns and social isolation as negatively influencing their parenting.[70] Major disruptive events, like COVID-19, may also heighten violence in the household and create unsafe household environments that activate child stress responses.[53] Social supports can provide a major reservoir of resources and can limit the depletion of other resources.[71] COVID-19 uniquely affects social interactions by demanding isolation and quarantine rather than the typical mobilization of social support, which involves convergence and gathering.[72] One aspect of social support that has been disrupted by COVID-19 is childcare. A PEW study conducted in late March 2020 found that 32% of adults with children 12 and younger in the household reported that it was very or somewhat difficult to handle childcare responsibilities during the coronavirus outbreak.[73] Pandemics, like COVID-19, likely reduced peer and community support, which can impact child resilience and recovery. A study of children in locales with high H1N1 prevalence found that children experiencing isolation or quarantine exhibited higher psychological distress than those who did not have these experiences.[72] However, among families that have access to support systems, these supports can help buffer children from the impact of negative events and provide a safe recovery environment through the provision of emotional and concrete support.[74]

While the impact of COVID-19 on child mental health and sleep is an important area of study, there may be other components of child well-being, both positive and negative, that are impacted by COVID-19 beyond those captured by mental health and psychosomatic measures. Children's education is another major well-being outcome which has been impacted by COVID-19 related to school closures. A recent report identified learning loss during the 2019-2020 academic year among students in grades K-5.[24] In contrast, COVID-19 may have positive impacts on child well-being as children are able to spend more time with their families. The few reports that consider these positive impacts speculate that the pandemic may promote greater independence among children and closer relationships with family.[75,76]

1.4   Theoretical orientation

Norris and colleagues' framework: risk factors for poor mental health

This study is guided by Norris and colleagues' "Individual-level risk factors for poor mental health outcomes" framework. They developed this framework after examining studies from 102 different disaster events that included over 60,000 individuals.[49] Results from this review suggested that a significant proportion of people who experienced disasters had multifaceted mental health outcomes.[49] The authors suggest that there are multiple causal mechanisms underlying the adverse effects of disasters, which involve instinctual arousal, inability to make sense of the world, loss of important attachments, and diminished perceived social support.[49] Children and adolescents may be particularly at risk as they may be less able to cope with disaster than adults.[49] Norris and colleagues also found that recovery or rescue workers from previous disasters were at lower risk of developing impairment compared to other adults.[49] The four-level framework (Figure 1) was designed for children, adolescents, and adults, though the authors note that the family-system variables may be so strong for children that they overpower

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the influence of other factors.[49] The first category of risk is *trauma and stress* which refers to severity of exposure to the disaster with a focus on threat to life, extreme loss, and living in a community that is highly disrupted.[49] The second category is *survivor characteristics* with females, people with a psychiatric history, and low socioeconomic status most at risk.[49] The third category is *family context* with risk factors including parents and children, especially those with a family member who is distressed, as well as interpersonal conflict. The final category is *resource context*, and this category includes the risk factors of losing belief in the ability to control outcomes and few or deteriorating social resources.[49]
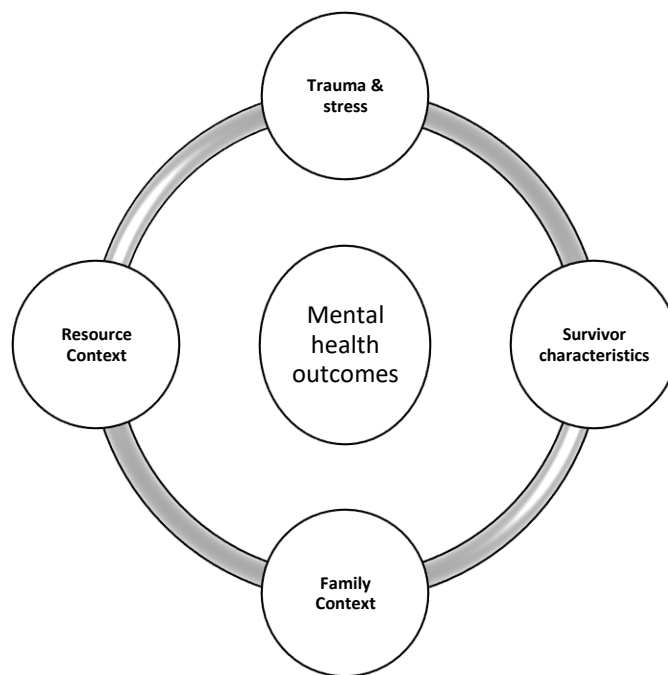
Figure 1.   Norris and colleagues' categories of risk factors for poor mental health outcomes post-disaster

Conservation of Resources Theory

The Norris and colleagues risk factors framework draws on the Conservation of Resource Theory (COR). COR is a theory that describes the motivators of stress and highlights resources as predictors of stress and resilience. The COR Theory asserts that stress is experienced when valued resources are lost or threatened. Resources are defined as anything that is valued by an individual or group and can include objects, conditions (e.g., employment, marriage, social support), personal characteristics (e.g., positive outlook), or energies (e.g., money, knowledge).[77] Key principles of COR Theory include:[77,78]

1. *The primacy of resource loss.* This principle holds that the loss of resources is more salient than the gain of resources.

2. *Resource Investment.* This principle states that people must invest resources in order to protect against resource loss, recover from loss, and to gain resources.

    a. A corollary of this principle is that people with fewer resources are both more vulnerable to resource loss as well as less capable of resource gain.

    b. Similarly, a second corollary of this principle, is that those with greater resources are less vulnerable to resource loss and more capable of resource gain.

3. *Paradox of the power of gain in the face of loss.* This principle acknowledges that resource loss is more salient than resource gain and asserts that the importance of resource gain increases under circumstances of resource loss. This means that in the face of loss, even minimal resource gain can be helpful as it may elicit hopefulness and reinforce efforts for continued resource growth.

Emergent from principles 1 and 2 are the concepts of resource loss and gain spirals. These spirals are explained through two corollaries of the COR principles. One of the corollaries states that those who lack resources are not only more vulnerable to resource loss, but initial losses beget future loss.[78] The other corollary states that those who have resources are more capable of gain and that initial gain begets future gain.[78] Yet, because loss is more potent than gain, loss cycles are more powerful and accelerated than gain cycles.

Another concept from COR theory is resource caravans.[78] Resource caravans are the environmental conditions that support and protect or detract from the resources of individuals and families.[78] This concept holds that the ability of individuals and families to build and maintain or fail to build and maintain resources is a function of their circumstances and largely out of their control.[78] People who are impoverished, for example, are more likely to live in environments with fewer resources such as poorer quality schools and fewer job opportunities. Environments, therefore, provide a reservoir of resources as well as losses.[78]

For children, COR theory focuses on the environments in which children are nested such as families and communities that serve as children's resource pools.[79] Families provide concrete resources like money for food and housing as well as caregiving. Communities also provide support to families and children. One avenue by which communities provide resources is through social support. Social support includes the provision of material and emotional support.[71] COR Theory identifies social support as a major vehicle by which resources are widened beyond the individual and family.[71] A study of parental social networks found that parents with more social network members who could provide support was associated with reduced child behavior

problems and increased prosocial behaviors.[80] During adverse advents, when challenges exceed

individual or family resources, social support can fill this gap.[71]

Attachment Theory

This study also draws on components of Attachment Theory which informed the analysis and the

understanding of relationships between children and their parents as well as their friends.

Attachment Theory is the joint work of John Bowlby and Mary Ainsworth.[81] The Theory draws

from the idea the humans are naturally inclined to form close relationships, and these social

relationships provide a fundamental need for security.[82] Attachment Theory was initially posited

by Bowlby in response to developmental theories of his time, which speculated that child

emotional problems were due to internal conflicts rather than events in the external world.[82-84]

Attachment Theory posits that for healthy socioemotional development, children need to develop

a close and continuous relationship with at least one primary caregiver.[81] This caregiver or

attachment figure is the person who is familiar to the child and responsive to their distress. This

role is often filled by a parent.[82] The theory was originally applied to parents and infants and

young children and assessed the attachment behaviors of proximity seeking, safe haven, and

secure base.[85] Proximity seeking/maintenance refers to approaching and staying near the

attachment figure while safe haven involves turning to the figure for comfort and

reassurance.[82,85] The secure base function involves the use of the attachment figure as a base

from which to explore.[82,85]

The Strange Situation test was developed to assess attachment quality and examined how infants responded to repeated separations from a caregiver in an unfamiliar environment; additionally, in the new environment there were attractive toys available to activate the exploration systems.[82] This test allowed for the observation of proximity maintenance, safe haven, and secure-base behaviors. The behaviors witnessed in this test were assumed to reflect the children's expectations (internal working models) based on their caregivers past responsiveness.[82] The quality of the attachment relationship develops from repeated interaction between the child and adult and is described as *secure, anxious/ambivalent,* or *anxious/avoidance–* in reference to both the child's behavior and the perceived ability of the caregiver. Securely attached children experience their caregiver as available, sensitive, and responsive.[86] In the Strange Situation test, securely attached infants were distressed when the mother left the room, comforted by her return, and engaged in active exploration in her presence (60% of American samples).[82] Caregivers of securely attached infants were observed as consistently available and responsive.[82] Anxious/ambivalent infants were both anxious and angry as well as preoccupied with their caregiver and not engaged in exploration (15% of American samples).[82] Caregivers of anxious/ambivalent infants were often judged as inconsistently responsive.[82] Anxious/avoidant infants did not exhibit distress when separated from their caregiver and tended to avoid contact with them, instead they directed their attention to the toys (25% American sample).[82] Caregivers of anxious/avoidant children consistently deflected their infants' bid for comfort.[82] A fourth category of disorganized/disoriented attachment was later identified when infants did not exhibit a coherent strategy for managing anxiety. It is hypothesized that this attachment style develops when caregivers are depressed, disturbed, or abusive.[87] At older ages, attachment has been assessed through individual narratives.[88] Regardless of measures used, studies of adult

attachment have found that the distribution of adult attachment styles is similar to that of children.[82]

However, attachment is not necessarily consistent over the life course as the caregiving environment (e.g., disruption in family life, economic hardship, decreased availability of caregivers) can cause attachment styles to change throughout the life course.[88] A longitudinal study by Lewis, Feiring, and Rosenthal, which examined children from ages 12 months to 18 years, found that attachment is dependent on family environment and evolves over time.[88] Therefore while some researchers focus on attachment in early life, others argue that continuity of caregiving environment is also an important foundation to attachment relationships.[88]

Attachment Theory has also been applied to understand friendships.[82] It has been hypothesized that in adolescents there is a change in social relationships and attachment hierarchy is broadened to include close friends or romantic partners. Hazan (1994) proposes that beginning in early childhood there is a transfer of attachment to peers.[82] Repeated interactions between individuals and their peers where comfort is sought and provided or distress is expressed and alleviated leads to this transfer.[82] Within this model, parents remain as attachment figures but move down in the attachment hierarchy.[85] This is supported by a study that found that older adolescents turn to peers for the attachment functions of proximity seeking and safe haven, more often than do young children.[85] Thus, for older children, these peer relationships can be conceptualized as attachment relationships.[85]

In the context of COVID-19, school closures and Stay at Home Orders, have resulted in children's loss of connections with their peers. This loss may be particularly problematic for older children and adults who are attached to their peers as disruption of attachment can cause feelings of agitation, anxiety, and depression.[82] Additionally, Attachment Theory posits that when under distress individuals seek contact with attachment figures to reduce anxiety and distress[85] – these attachment figures may not be available to children and parents during a pandemic. Understanding the cause of the relationship loss can bring acceptance and detachment.[82,89] However, this understanding may be more difficult for young children.[90]

1.5 Specific aims of dissertation

Aim 1: To assess change in parental mental health and alcohol use in the early months of the COVID-19 pandemic in the United States.

> **Sub Aim 1a:** To assess the impact of COVID-19 related experiences on parental mental health and alcohol use.

> *H1.1 Parents will show reduced mental distress and alcohol use from March to May 2020 as they are beginning to adapt to the new norm of living in communities with COVID-19.*

> *H1.2 Parents who have experienced significant consequences of the COVID-19 pandemic, such as knowing more people infected with COVID-19 and income loss, will have higher mental distress and increased alcohol use.*

Aim 2: To describe changes in children's psychological and psychosomatic health during the early months of the COVID-19 pandemic in the United States and assess changes based on age groups.

Sub Aim 2a: To examine predictors of change in child psychological and psychosomatic health using the four-level framework proposed by Norris and colleagues.[49]

H2.1 Overall, children will show an increase in mental health problems and sleep disturbances from before COVID-19 to May 2020. Older children will experience greater changes in depression and anxiety.

H2a.2 COVID-19 severity of exposure and family context, such as household discord, will have the greatest impact on increased adverse child mental health and sleep disturbance outcomes.

Aim 3: To use qualitative methods to identify the key domains used by parents to describe the impact of COVID-19 on their children's well-being and to assesses how COVID-19 may differentially impact children based on age.

H3.1. Qualitative analysis will be used to identify the positive and negative impact of COVID-19 on multiple domains of children's well-being.

H3.2 Qualitative analysis will be used to examine how COVID-19 differentially impacts younger and older children's well-being.

1.6 Conceptual model

The following conceptual model (Figure 2) is based on a review of the literature and draws on the Norris and colleague's framework of factors for adverse mental health outcomes as well as from Conservation of Resource and Attachment Theory. The conceptual model proposes potential pathways by which COVID-19 may impact parent and child well-being. This model is used to inform the conceptualization and analysis of this dissertation's specific aims.

Background Characteristics

Household characteristics
- Parent/child age
- Parent/child gender
- Race/ethnicity
- Parent education
- Marital status
- Government assistance

Social network support
- Financial
- Emotional
- Caregiving
- Daily assistance

COVID-19 Exposure

Severity of COVID-19 threat
- Infection prevalence
- Work outside the home
- Perceived likelihood of infection
- Know someone infected

Secondary impact of COVID-19

Family context
- Committed relationship
- Household discord

Resource Loss
- Loss of control
- Caregiving strain
- Income loss
- Loss of social support

Well-Being

Parental mental health
- Worry
- Depression
- Alcohol use

Child mental health
- Anxiety
- Depression
- Sleep disturbance

Figure 2.   Conceptual framework for the dissertation on the impact of COVID-19 on family well-being

1.7 References

1. Shen K, Yang Y, Wang T, et al. Diagnosis, treatment, and prevention of 2019 novel coronavirus infection in children: Experts' consensus statement. *World Journal of Pediatrics*. 2020;16(3):223-231. doi: 10.1007/s12519-020-00343-7.

2. Wu P, Liu X, Fang Y, et al. Alcohol abuse dependence symptoms among hospital employees exposed to a SARS outbreak. *Alcalc*. 2008;43(6):706-712. doi: 10.1093/alcalc/agn073.

3. Ludvigsson JF. Systematic review of COVID-19 in children shows milder cases and a better prognosis than adults. *Acta Paediatrica*. 2020;109(6):1088-1095. doi: 10.1111/apa.15270.

4. Kahn J, McIntosh K. History and recent advances in coronavirus discovery. *The Pediatric Infectious Disease Journal*. 2005;24(11 Suppl):S223-S227. doi:10.1097/01.inf.0000188166.17324.60.

5. Zimmermann P, Curtis N. Coronavirus infections in children including COVID-19. *The Pediatric Infectious Disease Journal*. 2020;39(5):355-368. doi: 10.1097/INF.0000000000002660.

6. Gralinski LE, Menachery VD. Return of the coronavirus: 2019-nCoV. *Viruses*. 2020;12(2):135. doi: 10.3390/v12020135.

7. Ye Z, Yuan S, Yuen K, Fung S, Chan C, Jin D. Zoonotic origins of human coronaviruses. *International Journal of Biological Sciences*. 2020;16(10):1686-1697. doi: 10.7150/ijbs.45472.

8. Liu Y, Gayle AA, Wilder-Smith A, Rocklöv J. The reproductive number of COVID-19 is higher compared to SARS coronavirus. *Journal of Travel Medicine*. 2020;27(2). doi: 10.1093/jtm/taaa021.

9. Dong H, Gardner L. An interactive web-based dashboard to track COVID-19 in real time. *The lancet Infectious Diseases*. 2020;20(5):533-534. doi: 10.1016/S1473-3099(20)30120-1.

10. Centers for Disease Control and Prevention. Interim clinical guidance for management of patients with confirmed coronavirus disease (COVID-19). https://www.cdc.gov/coronavirus/2019-ncov/hcp/clinical-guidance-management-patients.html. Updated 2021. Accessed February 27, 2021.

11. Centers for Disease Control and Prevention. Information for pediatric healthcare providers. https://www.cdc.gov/coronavirus/2019-ncov/hcp/pediatric-hcp.html. Updated 2020. Accessed Jan. 26, 2021.

12. Dong Y, Mo X, Hu Y, et al. Epidemiology of COVID-19 among children in china. *Pediatrics*. 2020;145(6). doi: 10.1542/peds.2020-0702.

13. Kelvin A, Halperin S. COVID-19 in children: The link in the transmission chain. *The Lancet Infectious Diseases*. 2020;20(6):633-634. doi: 10.1016/S1473-3099(20)30236-X.

14. Lee P, Hu Y, Chen P, Huang Y, Hsueh P. Are children less susceptible to COVID-19? *Journal of Microbiology, Immunology and Infection*. 2020;53(3):371-372. doi: 10.1016/j.jmii.2020.02.011.

15. Bi Q, Wu Y, Mei S, et al. Epidemiology and transmission of COVID-19 in 391 cases and 1286 of their close contacts in Shenzhen, China: A retrospective cohort study. *The Lancet Infectious Diseases*. 2020;20(8):911-919. doi: 10.1016/S1473-3099(20)30287-5.

16. Harvard Medical School. Coronavirus outbreak and kids: Advice on playdates, physical distancing, and healthy behaviors to help prevent infection. https://www.health.harvard.edu/diseases-and-conditions/coronavirus-outbreak-and-kids. Updated 2021. Accessed Feb. 27, 2021.

17. Hamming I, Timens W, Bulthuis M, Lely G, Navis G, van Goor H. Tissue distribution of ACE2 protein, the functional receptor for SARS coronavirus. A first step in understanding SARS pathogenesis. *Journal of Pathology*. 2004;203(2):631-637. doi: 10.1002/path.1570.

18. Chen K, Bi J, Su Y, Chappell MC, Rose JC. Sex-specific changes in renal angiotensin-converting enzyme and angiotensin-converting enzyme 2 gene expression and enzyme activity at birth and over the first year of life. *Reproductive Sciences*. 2016;23(2):200-210. doi: 10.1177/1933719115597760.

19. Chen Y, Lanjuan L. SARS-CoV-2: Virus dynamics and host response. *The Lancet Infectious Diseases*. 2020;20(5):515-516. doi: 10.1016/S1473-3099(20)30235-8.

20. National Institutes of Health. Remdesivir. https://www.covid19treatmentguidelines.nih.gov/antiviral-therapy/remdesivir/. Updated 2020. Accessed Jan. 26, 2021.

21. National Institutes of Health. Corticosteroids. https://www.covid19treatmentguidelines.nih.gov/immunomodulators/corticosteroids/. Updated 2020. Accessed Jan. 26, 2021.

22. Viner RM, Russell SJ, Croker H, et al. School closure and management practices during coronavirus outbreaks including COVID-19: A rapid systematic review. *The Lancet Child & Adolescent Health*. 2020;4(5):397-404. doi: 10.1016/S2352-4642(20)30095-X.

23. Moreland A, Herlihy C, Tynan MA, et al. Timing of state and territorial COVID-19 stay-at-home orders and changes in population movement — United States, March 1–May 31, 2020. *Morbidity and Mortality Weekly Report*. 2020;69(35):1198-1203. doi: 10.15585/mmwr.mm6935a2.

24. Dorn E, Hancock B, Sarakatsannis J, Viruleg E. COVID-19 and learning loss—disparities grow and students need help. https://www.mckinsey.com/industries/public-and-social-sector/our-

insights/covid-19-and-learning-loss-disparities-grow-and-students-need-help#. Updated 2020. Accessed December 11, 2020.

25. Lancker W, Parolin Z. COVID-19, school closures, and child poverty: A social crisis in the making. *The Lancet Public Health*. 2020;5(5):E243-E244. doi: 10.1016/S2468-2667(20)30084-0.

26. National Conference of State Legislatures. National employment monthly update. https://www.ncsl.org/research/labor-and-employment/national-employment-monthly-update.aspx. Updated 2020. Accessed October 6, 2020.

27. U.S. Bureau of Labor Statistics. 94 percent of managers, 56 percent of construction and extraction workers had paid sick leave, 2019. https://www.bls.gov/opub/ted/2020/94-percent-of-managers-56-percent-of-construction-and-extraction-workers-had-paid-sick-leave.htm. Updated 2020. Accessed Feb. 27, 2021.

28. Congressional Research Service. Paid family and medical leave in the united states. *Congressional Research Service*. 2020.

29. Centers for Disease Control and Prevention. Health equity considerations and racial and ethnic minority groups. https://www.cdc.gov/coronavirus/2019-ncov/community/health-equity/race-ethnicity.html#fn12. Updated 2020. Accessed August 24, 2020.

30. Lawson M, Piel MH, Simon M. Child maltreatment during the COVID-19 pandemic: Consequences of parental job loss on psychological and physical abuse towards children. *Child Abuse & Neglect*. 2020;110(Pt. 2)(104709). doi: 10.1016/j.chiabu.2020.104709.

31. American Psychological Association. Stress in the time of COVID-19, volume one. 2020.

32. Cénat JM, Mukunzi JN, Noorishad P, Rousseau C, Derivois D, Bukaka J. A systematic review of mental health programs among populations affected by the Ebola virus disease. *Journal of Psychosomatic Research*. 2020;131:109966. doi: 10.1016/j.jpsychores.2020.109966.

33. Jalloh MF, Li W, Bunnell RE, et al. Impact of Ebola experiences and risk perceptions on mental health in sierra leone, july 2015. *BMJ Global Health*. 2018;3(2):e000471. doi: 10.1136/bmjgh-2017-000471.

34. Miller J. *Disasters and mental health.* Vol 1. West Sussex, England: John Wiley & Sons Ltd.; 2005.

35. Borkovec T, Ray W, Stöber J. Worry: A cognitive phenomenon intimately linked to affective, physiological, and interpersonal behavioral processes. *Cognitive Therapy and Research*. 1998;22(6):561-576. doi: 10.1023/A:1018790003416.

36. Kieffer K, Cronin C, Gawet D. Test and study worry and emotionality in the prediction of college students' reasons for drinking: An exploratory investigation. *Journal of Alcohol and Drug Education*. 2006;50(1):57-81.

37. Renner B, Reuter T. Predicting vaccination using numerical and affective risk perceptions: The case of A/H1N1 influenza. *Vaccine*. 2012;30(49):7019-7026. doi: 10.1016/j.vaccine.2012.09.064.

38. Meewisse M, Olff M, Kleber R, Kitchiner NJ, Gersons BPR. The course of mental health disorders after a disaster: Predictors and comorbidity. *Journal of Traumatic Stress*. 2011;24(4):405-413. doi: 10.1002/jts.20663.

39. Lee S, Ward K. Mental health, relationships, and coping during the coronavirus pandemic. *Parenting in context research lab*. 2020.

40. Tang B, Liu X, Liu Y, Xue C, Zhang L. A meta-analysis of risk factors for depression in adults and children after natural disasters. *BMC Public Health*. 2014;14(1):623. doi: 10.1186/1471-2458-14-623.

41. Person C, Tracy M, Galea S. Risk factors for depression after a disaster. *The Journal of Nervous and Mental Disease*. 2006;194(9):659-666. doi: 10.1097/01.nmd.0000235758.24586.b7.

42. Stein MB, Heimberg RG. Well-being and life satisfaction in generalized anxiety disorder: Comparison to major depressive disorder in a community sample. *Journal of Affective Disorders*. 2004;79(1):161-166. doi: 10.1016/S0165-0327(02)00457-3.

43. DiMatteo MR, Lepper HS, Croghan TW. Depression is a risk factor for noncompliance with medical treatment: Meta-analysis of the effects of anxiety and depression on patient adherence. *Arch. Intern Med.* 2000;160(14):2101-2107. doi: 10.1001/archinte.160.14.2101.

44. Lovejoy MC, Graczyk PA, O'Hare E, Neuman G. Maternal depression and parenting behavior: A meta-analytic review. *Clinical Psychology Review*. 2000;20(5):561-592. doi: 10.1016/S0272-7358(98)00100-7.

45. Cerdá M, Tracy M, Galea S. A prospective population-based study of changes in alcohol use and binge drinking after a mass traumatic event. *Drug and Alcohol Dependence*. 2011;115(1):1-8. doi: 10.1016/j.drugalcdep.2010.09.011.

46. Mak IWC, Chu CM, Pan PC, Yiu MGC, Chan VL. Long-term psychiatric morbidities among SARS survivors. *General Hospital Psychiatry*. 2009;31(4):318-326. doi: 10.1016/j.genhosppsych.2009.03.001.

47. Goldmann E, Galea S. Mental health consequences of disasters. *Annual Review of Public Health*. 2014;35(1):169-183. doi: 10.1146/annurev-publhealth-032013-182435.

48. Olson H, O'Connor MJ, Fitzgerald HE. Lessons learned from study of the developmental impact of parental alcohol use. *Infant Mental Health Journal*. 2001;22(3):271-290. doi: 10.1002/imhj.1001.

49. Norris FH, Friedman MJ, Watson PJ. 60,000 disaster victims speak: Part II. summary and implications of the disaster mental health research. *Psychiatry*. 2002;65(3):240-260. doi: 10.1521/psyc.65.3.240.20169.

50. Nordløkken A, Pape H, Heir T. Alcohol consumption in the aftermath of a natural disaster: A longitudinal study. *Public Health*. 2015;132:33-39. doi: 10.1016/j.puhe.2015.11.007.

51. North CS, Ringwalt CL, Downs D, Derzon J, Galvin D. Postdisaster course of alcohol use disorders in systematically studied survivors of 10 disasters. *Archives of General Psychiatry*. 2011;68(2):173-180. doi: 10.1001/archgenpsychiatry.2010.131.

52. Cepeda A, Valdez A, Kaplan C, Hill LE. Patterns of substance use among hurricane Katrina evacuees in Houston, Texas. *Disasters*. 2010;34(2):426-446. doi: 10.1111/j.1467-7717.2009.01136.x.

53. Curtis T, Miller BC, Berry EH. Changes in reports and incidence of child abuse following natural disasters. *Child Abuse & Neglect*. 2000;24(9):1151-1162. doi: 10.1016/S0145-2134(00)00176-9.

54. Norris FH, Friedman MJ, Watson PJ, Byrne CM, Diaz E, Kaniasty K. 60,000 disaster victims speak: Part I. an empirical review of the empirical literature, 1981-2001. *Psychiatry*. 2002;65(3):207-239. doi: 10.1521/psyc.65.3.207.20173.

55. Centers for Disease Control and Prevention. Charing for children in disasters: How are children different from adults? https://www.cdc.gov/childrenindisasters/differences.html. Updated 2020. Accessed September 2, 2020.

56. Imran N, Zeshan M, Pervaiz Z. Mental health considerations for children & adolescents in COVID-19 pandemic. *Pakistan Journal of Medical Sciences*. 2020;36(S4):S67-S72. doi: 10.12669/pjms.36.COVID19-S4.2759.

57. Xie X, Xue Q, Zhou Y, et al. Mental health status among children in home confinement during the coronavirus disease 2019 outbreak in Hubei Province, China. *JAMA Pediatrics*. 2020;174(9):898-900. doi: 10.1001/jamapediatrics.2020.1619.

58. Furr JM, Comer J, Edmunds JM, Kendall PC. Disasters and youth: A meta-analytic examination of posttraumatic stress. *Journal of Consulting and Clinical Psychology*. 2010;78(6):765-780. doi: 10.1037/a0021482.

59. Peek L. Children and disasters: Understanding vulnerability, developing capacities, and promoting resilience — an introduction. *Children, Youth and Environments*. 2008;18(1):1-29.

60. Ivanenko A, Crabtree VM, Obrien LM, Gozal D. Sleep complaints and psychiatric symptoms in children evaluated at a pediatric mental health clinic. *Journal of Clinical Sleep Medicine*. 2006;2(1):42-48. doi: 10.5664/jcsm.26434.

61. Jiao WY, Wang LN, Liu J, et al. Behavioral and emotional disorders in children during the COVID-19 epidemic. *Euorpean Paediatric Association*. 2020;17(3):230-233. doi: 10.15690/pf.v17i3.2127.

62. Usami M, Iwadare Y, Kodaira M, et al. Sleep duration among children 8 months after the 2011 japan earthquake and tsunami. *PloS one*. 2013;8(5):e65398. doi: 10.1371/journal.pone.0065398.

63. Camhi S. Factors affecting sleep disturbances in children and adolescents. *Sleep medicine*. 2000;1(2):117-123. doi: 10.1016/s1389-9457(99)00005-2.

64. Angold A, Costello EJ. Puberty and depression. *Child and Adolescent Psychiatric Clinics of North America*. 2006;15(4):919-937. doi: 10.1016/j.chc.2006.05.013.

65. Weems CF, Pina AA, Costa NM, Watts SE, Taylor LK, Cannon MF. Predisaster trait anxiety and negative affect predict posttraumatic stress in youths after hurricane Katrina. *Journal of consulting and clinical psychology*. 2007;75(1):154-159. doi: 10.1037/0022-006X.75.1.154.

66. Lai BS, La Greca AM, Colgan CA, et al. Sleep problems and posttraumatic stress: Children exposed to a natural disaster. *Journal of Pediatric Psychology*. 2020;45(9):1016-1026. doi: 10.1093/jpepsy/jsaa061.

67. Shannon M, Lonigan C, Finch A, Taylor C. Children exposed to disaster: Epidemiology of post-traumatic symptoms and symptom profiles. *J. Am. Acad. Child Adolesc. Psychiatry*. 1994;33(1):80-93.

68. Vernberg EM, La Greca AM, Silverman WK, Prinstein MJ. Prediction of posttraumatic stress symptoms in children after hurricane andrew. *Journal of Abnormal Psychology*. 1996;105(2):237-248. doi: 10.1037/0021-843X.105.2.237.

69. Bowers ME, Yehuda R. Intergenerational transmission of stress in humans. *Neuropsychopharmacology*. 2016;41(1):232-244. doi: 10.1038/npp.2015.247.

70. Lee S, Ward K. Stress and parenting during the coronavirus pandemic. *Parenting in Context Research Lab*. 2020.

71. Hobfoll S, Freedy J, Lane C, Geller P. Conservation of social resources: Social support resource theory. *Journal of Social and Personal Relationships*. 1990;7:465-478.

72. Sprang G, Silman M. Posttraumatic stress disorder in parents and youth after health-related disasters. *Disaster Medicine and Public Health Preparedness*. 2013;7(1):105-110. doi: 10.1017/dmp.2013.22.

73. Pew Research Center. Most Americans say coronavirus outbreak has impacted their lives. 2020.

74. Sprague C, Sprague C, Kia-Keating M, et al. Youth psychosocial adjustment following wildfire: The role of family resilience, emotional support, and concrete support. *Child Youth Care Forum*. 2015;44(3):433-450. doi: 10.1007/s10566-014-9285-7.

75. Dvorsky MR, Breaux R, Becker SP. Finding ordinary magic in extraordinary times: Child and adolescent resilience during the COVID-19 pandemic. *European Child & Adolescent Psychiatry*. 2020:1-3. doi: 10.1007/s00787-020-01583-8.

76. Gupta S, Jawanda MK. The impacts of COVID-19 on children. *Acta Paediatrica*. 2020;109(11):2181-2183. doi: 10.1111/apa.15484.

77. Hobfoll SE, Stevens N, Zalta A. Expanding the science of resilience: Conserving resources in the aid of adaptation. *Psychological Inquiry*. 2015;26:174-180.

78. Hobfoll SE. Conservation of resource caravans and engaged settings. *Journal of Occupational and Organizational Psychology*. 2011;84(1):116-122. doi: 10.1111/j.2044-8325.2010.02016.x.

79. Hobfoll SE, Spielberger CD. Family stress: Integrating theory and measurement. *Journal of Family Psychology*. 1992;6(2):99-112. doi: 10.1037/0893-3200.6.2.99.

80. Koyama Y, Fujiwara T, Isumi A, Doi S. Association of parental social network diversity with behaviour problems and resilience of offspring in a large population-based study of Japanese children. *BMJ Open*. 2020;10(e035100). doi: 10.1136/ bmjopen-2019-035100.

81. Bretherton I. The origins of attachment theory: John Bowbly and Mary Ainsworth. *Developmental Psychology*. 1992;28(5):759-775. doi: 10.1037/0012-1649.28.5.759.

82. Hazan C, Shaver PR. Attachment as an organizational framework for research on close relationships. *Psychological Inquiry*. 1994;5(1):1-22. doi: 10.1207/s15327965pli0501_1.

83. Ainsworth MS. Attachments beyond infancy. *The American Psychologist*. 1989;44(4):709-716. doi: 10.1037/0003-066X.44.4.709.

84. Moretti MM, Peled M. Adolescent-parent attachment: Bonds that support healthy development. *Paediatrics Child Health*. 2004;9(8):551-555. doi: 10.1093/pch/9.8.551.

85. Nickerson AB, Nagle RJ. Parent and peer attachment in late childhood and early adolescence. *The Journal of Early Adolescence*. 2005;25(2):223-249. doi: 10.1177/0272431604274174.

86. Parolin M, Simonelli A. Attachment theory and maternal drug addiction: The contribution to parenting interventions. *Frontiers in Psychiatry*. 2016;7:152. doi: 10.3389/fpsyt.2016.00152.

87. Carlson V, Cicchetti D, Barnett D, Braunwald K. Disorganized/disoriented attachment relationships in maltreated infants. *Developmental Psychology*. 1989;25(4):525-531. doi: 10.1037/0012-1649.25.4.525.

88. Lewis M, Feiring C, Rosenthal S. Attachment over time. *Child Development*. 2000;71(3):702-720.

89. Harvey J, Orbuch T. A social psychological model of account-making in response to severe stress. *Journal of Language and Social Psychology*. 1990;9(3).

90. Bowlby J. *Attachment and loss: Volume 1 attachment.* New York, NY: Basic Books; 1982.

Chapter 2. Methods

2.1 Study population

Study participants were drawn from the "COVID-19 and Well-Being Study." The "COVID-19 and Well-Being Study" is an ongoing longitudinal study that examines how COVID-19 has affected United States residents.

Participants were recruited into the study through Amazon Mechanical Turk (MTurk). MTurk is an online platform that can be used for subject recruitment and allows for the study of real-time dynamics of large groups.[1,2] Study populations recruited through MTurk are not nationally representative but have been found to be more representative than those that are obtained via convenience-sampling.[1,3] Previous research has supported the reliability of data from MTurk participants.[4] Compared to national samples, MTurk participants tend to be younger, more educated, and underemployed.[2] MTurk study samples collected from United States residents have been found to overrepresent Asians and underrepresent Black and Hispanics relative to the US population.[2]

Participants were eligible for the initial study if they were aged 18 years or above, resided in the United States, spoke and read English, and had heard of the coronavirus. Study protocols were designed following MTurk's best practices.[5,6] Examples of these best practices include clear communication about compensation and time required as well as notification to participants that they will be removed for inattentiveness. Per best practice recommendations, all participants had to have a 97% or higher approval rating and 100 approved HITS to ensure some familiarity with

MTurk.[6] To enhance reliability, eligible participants had to pass attention and validity checks embedded in the survey.[7] Examples of attention checks include questions with low likelihood of true endorsement such as "Have you ever been deep sea fishing in Alaska?" To ensure participant's confidentiality only their unique MTurk Worker ID was collected. The Worker ID is a randomly generated string of thirteen or fourteen alphanumeric characters assigned by Amazon to each MTurk Worker account. The Worker ID was used to assess MTurk qualifications, identify the participant in longitudinal studies, and exclude past participants from repeated attempts.[6] Study materials and procedures were approved by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board.

This dissertation draws on the first two phases of data collection. The initial survey was conducted between March 24th and 27th, 2020 and a second survey between May 5th to May 14th, 2020. For context, the first survey was administered thirteen days after the World Health Organization declared a global pandemic[8] and eight days after the White House provided social distancing guidelines.[9] At the time of the first survey, the United States was experiencing the first surge in COVID-19 cases.[10] By the start of the first study period, 15 states had issued Stay at Home Orders, and 41 States and the District of Columbia ordered schools to be closed while 7 states recommended closing schools.[11,12] The second wave of data collection (May 2020) occurred when a few states were beginning to reopen and/or lift restrictions on certain business types, but 31 states and the District of Columbia still had mandatory Stay at Home Orders.[11] Schools were largely closed with 48 states and the District of Columbia having ordered that schools be closed for the rest of the academic year by early May 2020.[11] In total, 809 eligible study participants completed the first survey and were asked to participate in the second survey.

Retention for the full study population was 84%, which is higher than many MTurk longitudinal studies.[13,14]

Participants who reported having a child under the age of 18 in their household were invited to participate in a supplement during the second survey which focused on child well-being during COVID-19. In this Child Well-Being Supplement, participants were asked to list all the children in the household under the age of 18, to provide demographic information for each child, and to respond to questions about each child's well-being. Retention of participants who reported a child at baseline was 83%. Parents who participated in the follow-up did not differ from parents who did not participate with respect to gender, race, relationship status, receipt of government assistance, and number of children in the household; however, non-respondents were significantly younger than respondents. Willingness to participate in the Child Well-Being Supplement was high with 93% of participants with children consenting to participate. No demographic differences were identified between individuals who elected to participate in the supplement, compared to those who did not.

The goal of this dissertation is to examine in the impact of COVID-19 on family well-being. As some questions for parents were asked in the main "COVID-19 and Well-Being" Survey and some were asked in the Child Well-Being Supplement, eligibility differs by Aim:

- Aim 1: Participants were eligible for Aim 1 if they reported having a child under the age of 18 years co-residing at the time of both surveys (N=243).

- Aim 2: Participants were eligible for Aim 2 if they reported having a child under the age of 18 years in their household co-residing at the time of both surveys and participated in the Child Well-Being Supplement (N=225 parents; 392 children).

- Aim 3: Participants were eligible to participate in Aim 3 if they participated in the Child Well-Being Supplement and completed the supplement's qualitative questions on child well-being (N=234)

2.2 Measures of parent mental health and alcohol use

Aim 1 assesses parental mental health and alcohol use during these early months of the COVID-19 pandemic in the United States. Measures of depressive symptoms, alcohol use, and worry were chosen as the outcomes of interest as these outcomes have been commonly experienced reactions to the acute phases of previous disasters and pandemics.[15-17]

Depressive symptoms

Depressive symptoms were assessed through the ten-item Center for Epidemiological Studies Depression Inventory (CES-D-10). The CES-D-10 is a shortened version of the CES-D, a twenty-item scale with well-established reliability in detecting clinical and non-clinical depressive symptoms.[18,19] The CES-D-10 shows good predictive accuracy when compared to the full CES-D, and the CES-D-10 has been used extensively as a tool to assess depressive symptoms across a number of different populations.[20-22] The CES-D-10 items (Table 1) are assessed using a four-point Likert scale: (0) Rarely or some of the time (less than 1 day), (1) Some or a little of the time (1-2 days), (2) Occasionally or a moderate amount of time (3-4 days),

and (3) All of the time (5-7 days). The items are summed to create a score (0-30) with cutoff

scores of 10 and greater identifying significant depressive symptoms.[20]

Table 1. **CES-D-10 questions to assess depressive symptoms during the past week**

CES-D-10
I was bothered by things that usually don't bother me.
I had trouble keeping my mind on what I was doing.
I felt depressed.
I felt that everything I did was an effort.
I felt hopeful about the future.
I felt fearful.
My sleep was restless.
I was happy.
I felt lonely.
I could not "get going."

Alcohol use

Participant's alcohol use was assessed using the three-item Alcohol Use Disorder Identification

Test- Consumption (AUDIT-C). The AUDIT-C has been used for screening in primary care and

can identify alcohol misuse.[23] Alcohol misuse refers to drinking above the recommended limit

(>14 drinks a week and/or 5 or more drinks on any single occasion for men; >7 drinks a week

and/or 4 or more drinks on any single occasions for women) or DSM-IV alcohol use disorder in

the past year.[23] DMS-IV Alcohol Use Disorder refers to a chronic or maladaptive pattern of

alcohol use that results in clinically significant impairment.[23] To assess alcohol use, the three

items of the AUDIT-C (Table 2) are summed for a composite score ranging from 0-12. Cut off

scores of $\geq$ 4 in men and $\geq$ 3 in women have been identified to indicate alcohol misuse.[23,24]

Table 2. **AUDIT-C questions to assess alcohol misuse**

AUDIT-C
How often do you have a drink containing alcohol?
(0) Never
(1) Monthly or less
(2) Two to four times a month
(3) Two to three times a week
(4) Four or more times a week

How many drinks containing alcohol do you have on a typical day when you are drinking?
(0) 1 or 2
(1) 3 or 4
(2) 5 or 6
(3) 7 to 9
(4) 10 or more
How often do you have six or more drinks on one occasion?
(0) Never
(1) Less than monthly
(2) Monthly
(3) Weekly
(4) Daily or almost daily

General worry

Worries are cognitions associated with perceived threats to well-being. The SARS-CoV-2 Worry (CoV-Wo) scale is a short inventory to assess the content and degree of worry about the COVID-19 pandemic. The scale was designed for the general public to assess universal worry about COVID-19. The six CoV-Wo items (Table 3) were developed based on health and economic domains affected by the COVID-19 pandemic.[25] For each question, participants were asked to rate how strongly they agreed with each worry question on a 5-point Likert-type scale: (1) strongly disagree, (2) disagree, (3) neither agree nor disagree, (4) agree and, (5) strongly agree. Items were summed with a possible range of 6 to 30. The scale exhibited good reliability and discriminant validity with depressive symptoms.[25]

Table 3.   **CoV-Wo questions to assess general worry related to COVID-19**

CoV-Wo
I am very worried about getting the coronavirus.
I am very worried about my family/friends getting the coronavirus.
I am very worried about giving someone else the coronavirus.
I am worried about money because of the coronavirus.
I am worried about having enough food because of the coronavirus.
I am worried about medical bills if I get sick from the coronavirus.

Worry about children

To assess worry about children in the context of the COVID-19 pandemic, a four-item measure

was created. The items assessed parents' concern about their children becoming infected with

COVID-19, emotional health, being out of school, and childcare (Table 4). Participants rated

how strongly they agreed with each worry question on a 5-point Likert-type scale: (1) strongly

disagree, (2) disagree, (3) neither agree nor disagree, (4) agree and, (5) strongly agree. The items

were created based on face validity. Items were summed with a possible range of 4 to 20.

Table 4.   **Parental worries about children questions**

Parental worries about children
I am worried about my children getting the coronavirus
I am worried about my children's emotional health because of the coronavirus
I am worried because my children are out of school because of the coronavirus
I am worried about childcare because of the coronavirus

2.3   Measures of child well-being

In Aim 2, child mental health and sleep were assessed through parent rating of children's

anxiety, depression, and sleep disturbance. Parents reported on each child living in their

household under the age of 18 years and were asked questions about each child's mental health

and sleep prior to COVID-19 and about their functioning in the past month (Table 5). The

questions were assessed for every child in the household, and response options were a

dichotomous "yes" or "no." Questions were adapted from the National Survey of Children's

Health and the Gulf Coast Child and Family Health surveys.[26,27] Notably, the National Survey of

Children's Health asks if a doctor or health care provider ever told the parent that their child had

anxiety or depression while the questions used in the Gulf Coast Child and Family Health

Surveys ask about parental impressions of children's feelings. The later approach was used in

this study in order to detect sub-clinical or not-yet diagnosed change. Studies have identified that

most children and adolescents in the United States who need mental health evaluation do not

receive any, with one study finding that only 21% of children who need a mental health

evaluation receive services.[28-30] Further accessing services during the COVID-19 may be

especially challenging as schools, many of which have closed during COVID-19, are often a

source of mental health assessment and care with 13.2% of adolescents receiving school-based

mental health services.[31]

Table 5.   **Child depression, anxiety and sleep questions**

COVID-19 & Child Well-Being Study
In the past month, has this child felt sad or depressed?
Before the coronavirus, did this child feel sad or depressed?
In the past month, has this child felt anxious or afraid?
Before the coronavirus, did this child feel anxious or afraid?
In the past month, has this child had trouble sleeping?
Before the coronavirus, did this child have problems sleeping?

In Aim 3, qualitative methods were used to further elucidate domains of children's well-being.

Parents were asked: "Please describe what concerns you have about the impact of COVID-19 on

your child(ren)?" Additionally, parents who responded that the coronavirus had led to "some" or

"only to a few" positive changes in their children's health were asked: "What are these positive

changes?" Thematic analysis was used to identify child well-being domains generated through these qualitative responses as described in Chapter 2 of this dissertation.

2.4   Co-Variates

Co-variates assessed in this study were drawn from previous research and from hypothesized factors impacting child and parent well-being during the COVID-19 pandemic.

Personal characteristics

Norris and colleagues identified personal characteristics associated with mental health outcomes including age, sex, race, mental health history, and economic status.[32,33]

Age, sex, race, and education (Aims 1 & 2)

For both parents and children, age was assessed and analyzed as a continuous measure. Parents reported their sex and their children's sex. Parents self-reported race compared those who identified as "White," "Non-Hispanic Black," "Asian," or "Other." Due to small sample size, the "Other" category included participants who identified as "Hispanic," "Mixed," or "Other." Parents who had some college or above were compared to those who had completed high school or less.

Mental health history (Aims 1 & 2)

For parents, mental health history compared those who had ever been told by a health professional that they had a mental illness such as, depression, schizophrenia, or bipolar disorder to those who did not report a mental health history. For Aim 2, child mental health history was accounted for in the outcome variable which was a measure of change of mental health prior to COVID-19 and during the pandemic.

Government assistance (Aims 1 & 2)

Receipt of government assistance was assessed as responding affirmatively to the question: "Do any of your children qualify for free/reduced meals at school?" or "Does anyone in your household get food stamps or checks from the government (including yourself)?"

Family context

The Risk Factors for Poor Mental Health Post-Disaster framework, differentiates salient features of the family context for parents and children.[32,33] For parents, the presence of young children can heighten stress.[32,33] Being in a relationship was also identified as affecting well-being after a disaster.[32,33] For children, parental distress can impact their well-being.[32,33] Additionally, Norris and colleagues posit that interpersonal conflict can affect both parents and children.[32,33]

Young child (Aim 1)

To identify households with young children, participants were asked the age of each child living in their household. Participants reporting having at least one child under 5 years of age living in their household were compared to parents without a young child.

Parent mental health and alcohol use (Aim 2)

Parental well-being was assessed by the reporting parent having significant depression symptoms and engaging in alcohol misuse. Parental depression was assessed using the CES-D-10 scale.[22] The CES-D-10 scale was dichotomized at 10 or higher which indicates the presence of significant depressive symptoms.[22] Alcohol misuse was assessed using the AUDIT-C.[24] Cut points of 3 and 4 were used for women and men, respectively, to indicate alcohol misuse.[23,24]

Household discord (Aims 1 & 2)

Household discord was assessed through a question from the Coronavirus Impact Scale.[34] Participants were asked: "Have you experienced stress or discord in your household?" Response

options were: "No, none;" "Yes, household members occasionally short-tempered with one another; no physical violence;" "Yes, household members frequently short-tempered with one another; or children in the home getting in physical fights with one another;" and "Yes, household members frequently short-tempered with one another and adults in the home throwing things at one another, knocking over furniture, hitting or harming."[34] To examine the presence versus absence of household discord, the measure was dichotomized to compare no discord with any household discord.

Severity of COVID-19 exposure

Norris and colleagues (2002) refer to severity of exposure as the trauma and stress experienced by the event including threat to life and living in a neighborhood or community that has been affected by the event.[32]

Perceived likelihood of contraction (Aim 1)

To assess perceived threat of contracting the coronavirus, parents were asked: "How likely do you think it is that you will get the coronavirus?" and responses ranged from "Extremely unlikely" to "Extremely likely."

Parent works outside the home (Aims 1 & 2)

Working outside of the home can increase exposure to COVID-19; therefore parents who had to work outside of the home were compared to those who did not have to work outside the home. To identify participants who were required to work outside the home, and thus at elevated risk of COVID-19 exposure, respondents were asked: "Are you currently required to report to work outside of your home?"

Know someone infected (Aims 1 & 2)

To assess stress related to exposure of salient others, participants were asked the yes/no question, "Do you personally know anyone who has had the coronavirus?" Personal COVID-19 exposure was not included as a measure because no one in the sample reported testing positive for COVID-19 at either wave of data collection.

Live in a state with high COVID-19 risk (Aims 1 & 2)

Severity of COVID-19 in the community was assessed at the state level. A measure was created to assess the number of new COVID-19 cases per 100,000 using a 7-day rolling average.[35] This variable was used as it is a widely-used measure to assess risk of spread and used to inform policy response.[35] Case data by state were drawn from USAFacts[36] in the seven-day period prior to the start of the second wave of data collection. States with 10 or more new daily cases per 100,000 were considered high-risk as they represented dangerous community spread and were compared to states with lower incidence.[35]

Resource context

In the Risk Factors for Poor Mental Health Post-Disaster framework, the resource context refers to personal beliefs (e.g., belief in ability to cope) as well as tangible resources such as income and social support.

Loss of control (Aim 1)

Personal resources loss refers to the loss of one's belief in the ability to cope or control outcomes.[32] Feelings of loss of control were assessed in relation to parental mental health. To assess loss of perceived control, parents responded to the item: "I am confident that I can prevent becoming infected with the coronavirus." Responses of "Strongly disagree" and "Disagree" were compared to "Strongly agree," "Agree," and "Neither agree nor disagree."

Income loss (Aims 1 & 2)

Both parents and children are affected by income loss.[37,38] Income loss was assessed with the item: "My income has already been reduced by the coronavirus." The response options included: "A lot," "A little," and "Not at all." Responses of "A lot" or "A little" were compared to "Not at all."

Caregiving resources (Aim 2)

Due to school and daycare closures, childcare arrangements were disrupted for many families. Caregiving resources was assessed with the item: "I am worried about childcare because of the coronavirus." Responses of "Strongly Agree" and "Agree" were compared to "Strongly disagree," "Disagree," and "Neither agree nor disagree."

Social network support (Aims 1 & 2)

Social support is an important resource as it can protect individuals and families from the mental effects of stress and provide concrete resources which can lessen or alleviate stressors.[39] In this study, we assess how parents are impacted by a change in social networks and how children are differentially affected given the resources available to their families.

To assess change in parents' social network due to COVID-19, participants were asked: "How has your access to family and non-family social supports changed since the coronavirus?" Response options included: "No change"; "Mild: Continued visits with social distancing and/or remote communication (phone, social media, etc.);" "Moderate: Loss of in-person and remote contact with a few people, but not all supports;" "Severe: Loss of in-person and remote contact with all supports." This question was modified from the Coronavirus Impact Scale.[34]

For children, social support can come from their families' support networks.[40] To gain a better understanding of how much families were physically isolated from support networks, parents were also asked the yes/no question, "Are you trying to spend less time around other people to prevent getting the coronavirus?" Network social support was assessed across four domains based on Barrera's model of social support: financial, instrumental, childcare, and emotional.[41] Financial support was assessed with the question, "How many family members or friends can provide you financial support, if needed?" Network support to help with daily tasks was examined by asking, "How many family members or friends can help you with errands, if needed?" Childcare network support was elicited by the question, "How many family members or friends could provide childcare for your kids, if needed?" Received emotional support was assessed with the question, "How many family or friends do you talk to weekly about things that are personal or private?" The response categories for all four network social support questions were "0," "1-2," "3-4," "5-8," and "9+." To assess if any support was available compared to no available support, responses of "0" were compared to all other responses to examine the presence of having at least 1 person available to provide support. The domains of financial, instrumental, and childcare social support were assessed as perceived availability, if needed (perceived social support). Whereas emotional support was assessed as recently provided support (received support). Received support is a situational factor that, in the face of stress, is sought and provided.[42] In determining measurements, it has been suggested that is important to take into account the need for support.[39] Given the uncertainty of the COVID-19 pandemic, it was hypothesized that many people would require emotional support whereas fewer may require financial, instrumental, and childcare support. Notably, while there is a well-established link between social support and positive well-being, there can also be an inverse relationship as those

under severe stress may require more support than those under less stress and thus report greater levels of support.[42]

2.5 Aim 1: Analytical approach

Assessing scale reliability and validity

The goal of Aim 1 was to examine parental mental health and alcohol use at two time points: March and May 2020. In this Aim, 4 scales were utilized. The scales used were largely adopted from existing scales but also consisted of assessing a new scale. Both scale validity (the extent to which the scale measures what it was designed to measure) and the reliability (the extent to which the scale can be expected to consistently measure the same thing) were considered.[43] The reliability of the scales was assessed using the Cronbach's alpha statistic. The alpha statistic provides a measure of internal consistency.[44] The coefficient ranges from 0 to 1 and helps provide insight into the similarity of data sets, with 0 indicating no similarity and 1 indicating that they are identical.[45] The coefficient alpha provides an index of reliability and may differ across studies as it reflects the particular test scores of the given study sample.[45] Interpretations of alphas vary across studies.[44] Values of greater than both 0.60 and 0.70 have been reported as acceptable.[43] Some authors argue that an alpha value above 0.90 may indicate item redundancy.[45] Well-established scale measures such as the CES-D have been studied extensively to assess other measures of reliability such as test-retest reliability.[19]

The validity of the scales used in this Aim was already established or assessed. Face validity refers to how relevant the items are.[45] For the scale assessing parents' worry about children, a qualitative open-ended question about what parents were worried about was also asked to see if the quantitative measures reflected actual sources of parental worries. Content validity refers to

the extent to which the scale measures the construct.[45] For the CES-D and AUDIT-C, content validity was assessed based on whether the scale items reflected clinically relevant symptoms.[19,23] Criterion-oriented validity measures how well the scale predicts an outcome from another measure.[45] For the CES-D and AUDIT-C this form of validity was assessed by correlations with other valid self-reported depression and alcohol misuse scales.[19,23] Finally, construct validity examines whether the scale measures what it is supposed to measure by comparing it with scales that have similar and different constructs. For example, for the CES-D, construct validity was based on assessment of the scale in relationship to other variables which align with the epidemiology of depression.[19] For the CoV-Wo scale, content validity was assessed by examining its discriminant validity in relation to depression.

Examining parental mental health and alcohol from March to May 2020

One of the sub-goals of Aim 1 was to assess how parental mental health and alcohol use changed between March and May 2020 and to examine factors associated with parental mental health. Overall change in parental mental health between March and May 2020 was assessed with paired t-tests for parametric outcomes and Wilcoxon matched-pairs signed-rank test for non-parametric outcomes.

A second sub-goal of Aim 1 was to assess factors associated with mental health and alcohol use outcomes in May 2020. Methods for analyzing successive measurements have been proposed by many researchers.[46-48] The approach used in the Aim 2 examines mental health outcomes in May 2020 controlling for mental health outcomes in March 2020.[48] This approach is often used in experimental research as it produces groups that are equivalent at the initial assessment and then

allows for the examination of the effect produced by an intervention.[46] In so doing, the focus is more on the outcome at the second timepoint rather than the process of change.[46,48]

2.6 Aim 2: Analytical approach

Generalized estimating equations

The goal of Aim 2 was to assess child mental health from before COVID-19 to May 2020. In this Aim, the unit of analysis was children who were grouped within families. To account for the clustering of children within families with a dichotomous outcome variable, generalized estimating equations (GEE) were used.[49] GEE accounts for clustering by estimating within-cluster similarity of the residuals. This approach then uses this estimated correlation to re-estimate the regression parameters and calculate standard errors.[50] An exchangeable correlation matrix was used as it was the simplest structure that fit the data.[49] The robust estimators for the variance were used to account for any misspecification of the association structure.

Assessing change in child mental health and sleep from before COVID-19 to May 2020

To assess change in child mental health and sleep, the McNemar Test was used. The McNemar Test is used for matched binary outcomes and assesses the null hypothesis that the two proportions are the same. To assess predictors of change in child mental health and sleep, new change score outcome measures were created where pre-COVID-19 functioning outcomes were subtracted from May 2020 outcomes.[48] While this approach is widely used, a limitation is that the magnitude of the change score may be mitigated by regression towards the mean; regression towards the mean occurs because high scores cannot continue to rise and low scores cannot fall due to the nature of assessment measures which have upper and lower bounds.[48]

2.7   Aim 3: Analytical approach

Thematic analysis

The goal of Aim 3 was to understand how parents described the positive and negative effects of COVID-19 on their children's well-being. Parents responded to two open-ended questions and their responses were analyzed using a thematic analytic approach. Thematic analysis is a process by which patterns or themes are identified across people.[51] The first step of thematic analysis is data familiarization. In this step, two data analysts immersed themselves in the reading of the participants' responses and took informal notes on key ideas and recurrent themes which arose from the data. The second step is generating initial codes. In this phase, the two analysts developed a codebook which reflected a consensus on the codes that had emerged during the initial review. They then independently coded the transcripts, and discrepancies in coding were resolved through consensus. The next phase of thematic analysis is searching for and defining themes. In this stage, the two analysts and another member of the study team identified child well-being themes by examining commonalities or clusters among the codes. To augment the credibility of their findings, reflective journaling was used to help ensure that interpretations of the researchers reflected the perspectives of participants.[52] Reflective journaling throughout the analytical process entailed documentation of what the analysts understood from the data and how they came to this understanding. This process involved documenting their biases, feelings, and thoughts which provided more information to better evaluate the study findings.[52]

2.8   References

1. Berinsky AJ, Huber GA, Lenz GS. Evaluating online labor markets for experimental research: Amazon.com's mechanical Turk. *Political Analysis*. 2012;20(3):351-368. doi: 10.1093/pan/mpr057.

2. Paolacci G, Chandler J. Inside the Turk: Understanding mechanical turk as a participant pool. *Current directions in psychological science : A journal of the American Psychological Society*. 2014;23(3):184-188. doi: 10.1177/0963721414531598.

3. Huff C, Tingley D. "Who are these people?" evaluating the demographic characteristics and political preferences of MTurk survey respondents. *Research & Politics*. 2015;2(3):205316801560464. doi: 10.1177/2053168015604648.

4. Follmer D, Sperling R, Suen H. The role of MTurk in education research: Advantages, issues, and future directions. *Educational Researcher*. 2017;46(6):329-334. doi: 10.3102/0013189X17725519.

5. Chandler J, Shapiro D. Conducting clinical research using crowdsourced convenience samples. *Annual review of clinical psychology*. 2016;12(1):53-81. doi: 10.1146/annurev-clinpsy-021815-093623.

6. Young J, Young K. Don't get lost in the crowd: Best practices for using amazon's mechanical Turk in behavioral research. *Journal of the Midwest Association for Information Systems*. 2019(2):7-34. doi: 10.17705/3jmwa.000050.

7. Rouse S. A reliability analysis of mechanical Turk data. *Computers in Human Behavior*. 2015;43:304-307. doi: 10.1016/j.chb.2014.11.004.

8. World Health Organization. WHO director-general's opening remarks at the media briefing on COVID-19 - 11 march 2020. https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020. Updated 2020. Accessed August 24, 2020.

9. Whitehouse.gov. 15 days to slow the spread. https://www.whitehouse.gov/articles/15-days-slow-spread/. Updated 2020. Accessed August 24, 2020.

10. Schuchat A, CDC COVID-19 Response Team. Public health response to the initiation and spread of pandemic COVID-19 in the United States, February 24-April 21, 2020. *MMWR. Morbidity and mortality weekly report*. 2020;69(18):551-556. doi: 10.15585/mmwr.mm6918e2.

11. Education Week. Map: Coronavirus and school closures in 2019-2020. https://www.edweek.org/ew/section/multimedia/map-coronavirus-and-school-closures.html. Updated 2020. Accessed September 22, 2020.

12. Moreland A, Herlihy C, Tynan MA, et al. Timing of state and territorial COVID-19 stay-at-home orders and changes in population movement — United States, March 1–May 31, 2020. *Morbidity and Mortality Weekly Report*. 2020;69(35):1198-1203. doi: 10.15585/mmwr.mm6935a2.

13. Daly TM, Nataraajan R. Swapping bricks for clicks: Crowdsourcing longitudinal data on Amazon Turk. *Journal of business research*. 2015;68(12):2603-2609. doi: 10.1016/j.jbusres.2015.05.001.

14. Stoycheff E. Please participate in part 2: Maximizing response rates in longitudinal MTurk designs. *Methodological innovations*. 2016;9:205979911667287. doi: 10.1177/2059799116672879.

15. Cénat JM, Mukunzi JN, Noorishad P, Rousseau C, Derivois D, Bukaka J. A systematic review of mental health programs among populations affected by the ebola virus disease. *Journal of psychosomatic research*. 2020;131:109966. doi: 10.1016/j.jpsychores.2020.109966.

16. Jalloh MF, Li W, Bunnell RE, et al. Impact of Ebola experiences and risk perceptions on mental health in Sierra Leone, July 2015. *BMJ Global Health*. 2018;3(2):e000471. doi: 10.1136/bmjgh-2017-000471.

17. Miller J. *Disasters and Mental Health.* Vol 1. West Sussex, England: John Wiley & Sons Ltd.; 2005.
18. Gotlib IH, Lewinsohn PM, Seeley JR. Symptoms versus a diagnosis of depression. *Journal of consulting and clinical psychology*. 1995;63(1):90-100. doi: 10.1037/0022-006X.63.1.90.

19. Radloff LS. The CES-D scale. *Applied Psychological Measurement*. 1977;1(3):385-401. doi: 10.1177/014662167700100306.

20. Andresen E, Malmgren J, Carter W, Patrick D. Screening for depression in well older adults: Evaluation of a short form of the CES-D . *Am J Prev Med*. 1994;10(2):77-84.

21. Labelle LE, Campbell TS, Carlson LE. Mindfulness-based stress reduction in oncology: Evaluating mindfulness and rumination as mediators of change in depressive symptoms. *Mindfulness*. 2010;1(1):28. doi: 10.1007/s12671-010-0005-6.

22. Zhang W, O'Brien N, Forrest JI, et al. Validating a shortened depression scale (10 item CES-D) among HIV-positive people in British Columbia, Canada. *PloS One*. 2012;7(7):e40793. doi: 10.1371/journal.pone.0040793.

23. Bradley KA, DeBenedetti AF, Volk RJ, Williams EC, Frank D, Kivlahan DR. AUDIT-C as a brief screen for alcohol misuse in primary care. *Alcoholism, Clinical and Experimental research*. 2007;31(7):1208-1217. doi: 10.1111/j.1530-0277.2007.00403.x.

24. Khadjesari Z, White IR, McCambridge J, et al. Validation of the AUDIT-C in adults seeking help with their drinking online. *Addiction Science & Clinical Practice*. 2017;12(1):2. doi: 10.17863/CAM.6949.

25. Dayton L, Schneider K, Strickland J, Latkin C. Determinants of worry using the SARS-CoV-19 worry (CoV-wo) scale among united states residents. Under Review.

26. U.S. Department of Health and Human Services. National survey of children's health. 2019.

27. Abramson D, Stehling-Ariza T, Garfield R, Redlener I. Prevalence and predictors of mental health distress post-Katrina: Findings from the gulf coast child and family health study. *Disaster Medicine and Public Health Preparedness*. 2008;2(2):77-86. doi: 10.1097/DMP.0b013e318173a8e7.

28. González M. Access to mental health services: The struggle of poverty affected urban children of color. *Child Adolesc Soc Work J*. 2005;22(3):245-256. doi: 10.1007/s10560-005-0036-3.

29. Sarvet B, Gold J, Bostic J, et al. Improving access to mental health care for children: The Massachusetts child psychiatry access project. *Pediatrics*. 2010;126(6):1191-1200. doi: 10.1542/peds.2009-1340.

30. Kataoka SH, Zhang SL, Wells K. Unmet need for mental health care among U.S. children: Variation by ethnicity and insurance status. *Am J Psychiatry*. 2002;159(9):1548-1555.
31. Golberstein E, Wen H, Miller B. Coronavirus disease (COVID-19) and mental health for children and adolescents. *JAMA Pediatrics*. 2020;174(9):819-820.

32. Norris FH, Friedman MJ, Watson PJ. 60,000 disaster victims speak: Part II. summary and implications of the disaster mental health research. *Psychiatry*. 2002;65(3):240-260. doi: 10.1521/psyc.65.3.240.20169.

33. Norris FH, Friedman MJ, Watson PJ, Byrne CM, Diaz E, Kaniasty K. 60,000 disaster victims speak: Part I. an empirical review of the empirical literature, 1981-2001. *Psychiatry*. 2002;65(3):207-239. doi: 10.1521/psyc.65.3.207.20173.

34. Stoddard J, Kaufman J. Coronavirus impact scale. *Johns Hopkins University*. 2020.

35. Harvard Global Health Institute and Harvard's Edmond J. Safra Center for Ethics. Key metrics for COVID suppression. 2020.

36. USAFacts. US coronavirus cases and deaths track COVID-19 data daily by state and county. https://usafacts.org/visualizations/coronavirus-covid-19-spread-map/. Updated 2020. Accessed Sept 6, 2020.

37. Kiernan FM. Income loss and the mental health of young mothers: Evidence from the recession in Ireland. *J Ment Health Policy Econ*. 2019;22(4):131-149.

38. Strohschein L. Household income histories and child mental health trajectories. *Journal of Health and Social Behavior*. 2005;46(4):359-375. doi: 10.1177/002214650504600404.

39. Melrose KL, Brown GDA, Wood AM. When is received social support related to perceived support and well-being? When it is needed. *Personality and Individual Differences*. 2015;77:97-105. doi: 10.1016/j.paid.2014.12.047.

40. Koyama Y, Fujiwara T, Isumi A, Doi S. Association of parental social network diversity with behaviour problems and resilience of offspring in a large population-based study of Japanese children. *BMJ Open*. 2020;10(e035100). doi: 10.1136/ bmjopen-2019-035100.

41. Barrera M, Sandler IN, Ramsay TB. Preliminary development of a scale of social support: Studies on college students. *American journal of community psychology*. 1981;9(4):435-447. doi: 10.1007/bf00918174.

42. Uchino B. Understanding the links between social support and physical health: A life-span perspective with emphasis on the separability of perceived and received support. *Perspectives on psychological science*. 2009;4(3):236-255. doi: 10.1111/j.1745-6924.2009.01122.x.

43. Taber K. The use of cronbach's alpha when developing and reporting research instruments in science education. *Res Sci Educ*. 2018;48(6):1273-1296. doi: 10.1007/s11165-016-9602-2.

44. Peterson R. A meta-analysis of cronbach's coefficient alpha. *Journal of Consumer Research*. 2015;21(2):381-391. doi: 10.1177/1094428114555994.

45. Cohen R, Swerdlik M. *Psychological testing and assessment: An introduction to tests and measurement* . 7th ed. New York: McGraw Hill; 2009.

46. Gillespie D, Streeter C. Fitting regression models to research questions for analyzing change in nonexperimental research. *Social Work Research*. 1994;18(4):239-245. doi: 10.1093/swr/18.4.239.

47. Cronbach L, Furby L. How we should measure "change" - or should we? . 1970;74(1):68-80.

48. Dalecki M, Willits FK. Examining change using regression analysis: Three approaches compared. *Sociological Spectrum*. 1991;11(2):127-145. doi: 10.1080/02732173.1991.9981960.

49. Twisk J. Longitudinal data analysis. A comparison between generalized estimating equations and random coefficient analysis. *Eur J Epidemiol*. 2004;19(8):769-776. doi: 10.1023/B:EJEP.0000036572.00663.f2.

50. Hanley J, Negasse A, Edwardee M, Forrester J. Statistical analysis of correlated data using generalized estimating equations: An orientation. *American Journal of Epidemiology*. 2003;157(4):364-375. doi: 10.1093/aje/kwf215.

51. Braun V, Clarke V. Using thematic analysis in psychology. *Qualitative Research in Psychology*. 2006;3(2):77-101. doi: 10.1191/1478088706qp063oa.

52. Watt D. On becoming a qualitative researcher: The value of reflexivity. *Qualitative Report*. 2007;12(1):82.

Chapter 3.   Aim 1: Parental mental health and alcohol use during the early months of the COVID-19 pandemic in the United States

3.1   Abstract

Background: COVID-19 has had a dramatic effect on family health and well-being. The goal of this study is to describe parental mental health and alcohol use during the early months of the COVID-19 pandemic in the United States and to identify factors associated with these mental health outcomes in order to inform the development of tailored interventions.

Methods: Parents (N=243) participated in an online survey at two time points. The first was conducted a few weeks into the initial surge of COVID-19 cases in the United States when Stay at Home Orders were being enacted (late March 2020), and the second survey was completed a few months later when these orders were beginning to be lifted for the first time (early May 2020). Descriptive statistics were used to assess four outcomes at the two time periods: (1) general COVID-19-related worry, (2) worry about children, (3) depressive symptoms, and (4) alcohol use. Internal consistency of the scales was measured by Cronbach's alpha. Paired *t*-tests and Wilcoxon matched-pairs signed-rank test assessed change in symptoms. Bivariate and multivariable linear regression models assessed correlates of May 2020 mental health and alcohol use outcomes.

Results: Overall, there was a significant reduction in parental worries and depressive symptoms during the early months of the COVID-19 pandemic and no significant change in alcohol use. Worry about family and friends getting COVID-19 was the most endorsed worry expressed by parents in both March (77%) and May (67%) 2020. Household discord was associated with increased worry about children (aB: 1.02; 95% CI: 0.25-1.79) and depressive symptoms (aB:

1.63, 95% CI: 0.52-2.75). Working outside the home was associated with increased alcohol use (aB: 0.44, 95% CI: 0.03-0.86). Alcohol use and depressive symptoms increased among participants reporting severe loss of social network support.

Conclusions: As the COVID-19 pandemic continues in the United States, families are likely to be highly vulnerable to economic and social challenges causing mental health sequalae to continue to change. Interventions for parents that provide financial support, promote social connections, and reduce household discord may help ensure a continued reduction in mental health symptoms.

3.2   Introduction

COVID-19 was first detected in the United States in mid-January 2020, soon after an initial outbreak in Wuhan, China.[1] By the end of March 2020, the United States had experienced a surge in viral spread with over 192.1 thousand confirmed cases and 5.3 thousand deaths.[2,3] This rapid spread was accompanied by unprecedented uncertainty with little known about the novel pandemic's etiology and management. Efforts to mitigate the spread may have also heightened anxiety and fear with 25 states implementing Stay at Home orders and 41 states ordering school closures by the end of March 2020.[4,5] A rapid economic fallout created further uncertainty as unemployment rates soared from 4.4% in March to 14.7% in April 2020.[6] Additionally, uncoordinated governmental responses and lockdowns led to disrupted supply chains leading to concerns about food and medical supply shortages.[7]

Adults with children are especially vulnerable to the adverse psychological and social consequences of COVID-19. A study commissioned by the American Psychological Association

found that during the COVID-19 pandemic, parents in the United States experienced higher stress than adults without children, with 46% of parents reporting high stress related to COVID-19 compared to 28% of adults who did not have children under the age of 18 between April 24th and May 4th, 2020.[8] There are several reasons that may help to explain these findings. Parents may experience additional challenges as there is uncertainty about how COVID-19 affects the health of children as well as increased caregiving and educational demands with the closures of schools and daycare facilities. Additionally, many families face economic insecurity and reduced social support due to social distancing regulations. However, as compared to the clinical features of COVID-19 infection, [9-11] the family mental health consequences of COVID-19 have been less well documented, and it is unclear how exposure to the pandemic and associated consequences have influenced mental and behavioral health outcomes.

This study examines how COVID-19 has impacted three of the most commonly experienced reactions to the acute phases of previous disasters and pandemics among parents, including worry, depressive symptoms, and alcohol use.[12-14] Worry is a common cognitive response to events and factors that are perceived as uncontrollable.[15] COVID-19 is likely associated with the exacerbation of several sources of worry. For example, some individuals may experience general worries related to COVID-19, such as worrying about the health of self and others as well as uncertainty across economic domains.[16] Among parents, COVID-19 can ignite additional worries around children's emotional health, caregiving, education, and risk of a child becoming infected. Worries can result in different outcomes ranging from motivating proactive behaviors to mental health problems such as depression and anxiety, or substance use.[17-19] While worry is a natural response to a stressful event and can be a motivating emotion, determining sources of worry

during COVID-19 is a critical need in order to identify intervention targets to mitigate worries and reduce negative mental health outcomes such as depression and problematic alcohol use, which can result from heightened or prolonged worry.[17,18]

Depressive symptoms are a second common consequence of experiencing a disaster.[20] A meta-analysis found that the prevalence of depression after a disaster ranged from 4.9% to 54%.[21] A review focused on individuals affected by the Ebola virus disease identified a range from 12% to 75%.[12] The variability in depression prevalence after a disaster is partially associated with the use of different diagnostic tools, sampling frames, and study designs.[21,22] Additionally, variability is related to differences in the type and characteristics of the disaster studied as well as post-trauma resources such as social support that is available after a disaster.[21,22] Despite large variability in findings, the prevalence of depression in response to a disaster is often much higher than the 7.1% adults in the United States with major depressive disorders.[23] Depression is associated with diminished health status and noncompliance with medical treatment, which can be of particular importance during the COVID-19 pandemic if people do not comply with COVID-19 prevention behaviors and treatment regimens.[24,25] The relationship between parental depression and negative parenting behavior such as increased hostility and higher rates of negative interactions has also been well established.[26]

Alcohol use has also been found to be associated with exposure to disasters; however, findings have been inconsistent.[27-29] For example, one study of severe acute respiratory syndrome (SARS) survivors did not identify an increase in substance use disorders following the outbreak. [30] However, a study of hospital employees found that those who were exposed to the SARS

outbreak were more likely to report alcohol abuse, compared to health provider who were not exposed.[10] One study conducted in the early months of COVID-19 identified high levels of alcohol use among parents.[31] Alcohol use may increase in response to COVID-19 as alcohol is sometimes used as means of coping with stress and self-medicating feelings of distress. Problematic alcohol use among parents can result in difficulty in social relationships and fulfilling obligations at work as well as heightened risk of cognitive and social-emotional difficulties among children.[27,32]

Mental health and alcohol use trajectories can vary among individuals following a disaster. Research on previous disasters has found that mild transient concerns and anxiety are a common response to abnormal events which, for some people, resolve when safe and reliable routines are reestablished; however, a smaller portion may experience persistent mental health stress and disorder.[27,33] Norris and colleagues have identified six trajectories for the course of psychological symptoms after experiencing a disaster: resistance (minimal or no dysfunction), resilience (initial symptoms that taper rapidly), recovery (extended dysfunction with gradual return to functioning), delayed dysfunction (symptoms appear much later), relapsing/remitting (cyclical course of symptoms), and chronic dysfunction (moderate or severe symptoms over time).[34]

Norris and colleagues' post-disaster risk framework and the Conservation of Resources theory highlight that stress from the COVID-19 pandemic is not a stand-alone event but a complicated sequence of events that occur over time.[35,36] During the COVID-19 pandemic, individual characteristics as well as current experiences, may impact mental health and alcohol use

outcomes. Four categories of risk factors include: personal characteristics, exposure severity, family context, and resource context.[35] Following a disaster, higher psychological symptomology has been identified among people who are younger, female, lower socioeconomic status, minority group member, and have a pre-disaster psychiatric history.[27,35] Heightened alcohol use post-disaster has been found to be associated with unmarried individuals; mixed effects have been identified by age and gender.[37,38] The severity of exposure is the second category of risk factors. Previous research on disasters has identified the severity of exposure as the most predictive factor of post-disaster poor mental health outcomes[27,35] and weakly associated with alcohol use.[39] Severity of exposure refers to the experience of life threat or injury. In the context of COVID-19, severity of COVID-19 pandemic exposure can be conceptualized at the individual and community-levels. At the individual-level severity of COVID-19 exposure can include perceived risk of being infected or having to work outside the home, which would increase exposure. At the community-level, severity of COVID-19 exposure can include knowing someone who has been infected or living in a state with high rates of infection.

The third category of risk factors is family context. Family context has changed dramatically as a result of COVID-19, with the closing of schools and daycare centers, parents face increased caregiving and educational demands. Additionally, research suggests that household stress escalates after major disasters[40] which can, in turn, impact mental health outcomes.[35] The fourth category of risk is the resource context. Psychosocial resources can serve as a protective factor and promote resilience; however, the loss of these resources during a disaster is a risk factor for poor mental and behavioral health outcomes.[35,38] Conservation of Resources theory suggests that the loss of personal, material, and social resources may hinder mental health recovery.[36] Personal resources loss refers to the loss of one's belief in the ability to cope or control outcomes.[35]

COVID-19 has caused loss of material resources through high rates of unemployment and underemployment leading to financial strain; and, social resources have been affected by COVID-19 Stay at Home Orders which have limited social interactions.

The goal of the current study is to describe parental mental health and alcohol use during the early months of the COVID-19 pandemic in the United States and to identify factors associated with mental health and alcohol use outcomes in order to inform the development of tailored interventions. In this analysis, we assess the influence of a several factors on post-disaster mental health and alcohol use guided by Norris and colleagues' framework.[35] By using two timepoints during the early months of the COVID-19 pandemic in the United States, we are able to examine changes in mental health symptomology and assess the psychological consequences of COVID-19 related experiences.

3.3   Methods
Study population

This study includes participants who completed an initial survey conducted between March 24th and 27th, 2020 (Time 1; T1) and a second survey between May 5th to May 14th, 2020 (Time 2; T2). For context, the T1 survey was administered thirteen days after the World Health Organization declared a global pandemic[41] and eight days after the White House provided social distancing guidelines.[42] At this time, the United States was experiencing the first surge in COVID-19 cases.[43] By the start of the T1 study period, 15 states had issued Stay at Home orders, and 41 States and the District of Columbia ordered schools to be closed while 7 states recommended closing schools.[4,5] The second wave of data collection (T2) occurred at the

beginning of May when a few states were beginning to reopen and/or lift restrictions on certain business types, but 31 states and the District of Columbia still had mandatory Stay at Home Orders.[5] By May 5th, 48 states and the District of Columbia, had ordered that schools be closed for the rest of academic year.[5]

Study participants were recruited through Amazon Mechanical Turk (MTurk), an online platform that can be used for subject recruitment and allows for the study of real-time dynamics of large groups.[44,45] Study samples recruited through MTurk are not nationally representative but are often more representative than those that are obtained via convenience-sampling.[44,46] Previous research has supported the reliability of data from MTurk participants.[47] Study protocols were designed following MTurk's best practices.[48,49] Participants were eligible for the initial study if they were aged 18 years or above, resided in the United States, spoke and read English, and had heard of the coronavirus. Additionally, to enhance reliability, eligible participants had to pass attention and validity checks embedded in the survey.[50] In total, 809 participants were eligible, passed all attention and validity checks, and were asked to participate in the T2 survey. Retention at T2 for the full study population was 84%, which is higher than many MTurk longitudinal studies.[51,52] Study materials and procedures were approved by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board.

The current study examines participants who reported having a child under the age of 18 years co-residing at both T1 and T2 (N=243). At T1, 304 participants reported having a child in their household, and 84% of these individuals participated in the T2 survey. Twelve participants reporting a child at T1 were excluded from the sample because they did not report having a child

living in their household at T2; which may be due to residential transitions between the study periods. Parents participating in the second survey did not significantly differ from parents who did not participate in the second survey based on sex, race, relationship status, receipt of government assistance, and mental health history; however, parents who did not participate in the second survey were significantly younger than those who did participate (p=0.001), which may be associated with childcare demands.

Measures

Mental health

Worries, depressive symptoms, and alcohol use were assessed at both T1 and T2. General COVID-19-related worries were examined using the six-item SARS-CoV-2 Worry Scale (CoV-Wo Scale; Range: 6-30).[16] The six questions in the SARS-CoV-2 Worry Scale assessed worry about: getting COVID-19, family/friends becoming infected, giving someone else the virus, as well as worry related having enough food because of COVID-19 and medical bills if infected. All items were assessed using Likert scale with 5 response options: (1) "Strongly disagree," (2) "Disagree," (3) "Neither agree nor disagree," (4) "Agree," (5) "Strongly agree." The CoV-Wo scale showed good internal consistency at both timepoints (T1α: 0.78, T2α: 0.79).

To address parents' COVID-19-related worries specific to their children, four additional questions were summed to create a scale (Range: 4-20). These items included worry about children becoming infected as well as children's emotional health, schooling, and childcare because of the COVID-19. The response categories for each of these four questions ranged from (1) "Strongly disagree," to (5) "Strongly agree." The measure of worry about children during the

coronavirus was found to have acceptable internal reliability at both periods of data collection (T1α: 0.60, T2α: 0.64).[53] Depressive symptoms were examined using the ten-item Center for Epidemiologic Studies Depression Scale (CESD-10; Range:0-30).[54] Average imputation was used to account for two participants who were each missing one response on the CESD-10 question battery at T1. Parental depression symptoms, as assessed through the CESD-10, showed strong internal reliability at both time periods (T1α: 0.90, T2α: 0.92). A cut score of 10 or greater was used to dichotomize the scale and identify elevated depression symptomology.[54]

Alcohol use

Alcohol use was assessed using the abbreviated Alcohol Use Disorder Identification Test for Consumption (AUDIT-C; Range: 0-12) scale.[55] AUDIT-C score showed good internal consistency at both data collection time points (T1 α:0.74, T2α: 0.78). To assess problematic alcohol use, a cut score of greater than or equal to 3 for women and 4 for men was used.[56,57]

Personal characteristics

Personal characteristics were collected at T1. Age was assessed and analyzed as a continuous measure. Participants self-reported race compared those who identified as "White," "Non-Hispanic Black," "Asian," or "Other." Due to small sample size, the "Other" category included participants who identified as "Hispanic," "Mixed," or "Other." Educational attainment compared participants who had some college or above to those who had completed high school or less. Mental health history compared those who had ever been told by a health professional that they had a mental illness such as, depression, schizophrenia, or bipolar to those who did not report a mental health history. Receiving government assistance included endorsing that their children qualified for free/reduced meals at school or anyone in their household receiving food

stamps or checks from the government. Three respondents reported that they were "Unsure" if anyone in their household received government assistance and were coded as "No."

Family context

Three questions assessed family context at T2. A committed relationship was defined as identifying as "married" or "in a committed relationship." Parents reporting having at least one child under 5 years of age living in their household were compared to parents without a young child. This measure was used as measure of caregiving stress, as higher parenting-related exhaustion during COVID-19 was associated with having younger children.[58] Household discord was assessed through one question, "Have you experienced stress or discord in your household?" Response options were: "No, none;" "Yes, household members occasionally short-tempered with one another; no physical violence;" "Yes, household members frequently short-tempered with one another; or children in the home getting in physical fights with one another;" "Yes, household members frequently short-tempered with one another and adults in the home throwing things at one another, knocking over furniture, hitting or harming." To examine the presence versus absence of household discord, the measure was dichotomized to compare those who reported no discord with those who reported some household discord.

Severity of COVID-19 exposure

Four questions assessed severity of COVID-19 exposure at the individual and community-level during T2 data collection. Perceived threat of contracting COVID-19 was assessed with the question, "How likely do you think it is that you will get the coronavirus?" and responses ranged from "Extremely unlikely" to "Extremely likely." To identify participants who were required to work outside the home, and thus at elevated risk of COVID-19 exposure, respondents were asked, "Are you currently required to report to work outside of your home?" Those who were

required to work outside the home were compared to those who were not. The exposure of salient others was assessed with the yes/no question, "Do you personally know anyone who has had the coronavirus?" Personal COVID-19 exposure was not included in the analysis because no one in the sample reported testing positive for COVID-19 at either timepoints. Severity of COVID-19 by state of residence was assessed by number of new COVID-19 cases per 100,000 using a 7-day rolling average.[59] Case data by state were drawn from USAFacts[60] in the seven-day period prior to the start of the second wave of data collection. Five participants moved from one state to another between the two survey periods and were coded based on state of residence at the time of the second wave of data collection. States with 10 or more new daily cases per 100,000 were considered high-risk as they represented dangerous community spread and were compared to states with lower incidence.[59]

Resource context

At T2, three questions assessed impact of COVID-19 on personal, material, and social resources. Personal resource loss or loss of perceived control was examined with the question, "I am confident that I can prevent becoming infected with the coronavirus." Responses of "Strongly disagree" and "Disagree" were compared to "Strongly agree," "Agree," and "Neither agree nor disagree." Income loss was assessed with the question, "My income has already been reduced by the coronavirus." The response options included: "A lot," "A little," and "Not at all." Responses of "A lot" or "A little" were compared to "Not at all." A third question assessed the loss of social resources. Participants were asked, "How has your access to family and non-family social supports changed since the coronavirus?" Response options included: "No change"; "Mild: Continued visits with social distancing and/or remote communication (phone, social media,

etc.);" "Moderate: Loss of in-person and remote contact with a few people, but not all supports;"

"Severe: Loss of in- person and remote contact with all supports."

Analysis

Descriptive statistics were used to assess parental worry, depressive symptoms, and alcohol use at the two time periods. Internal consistency of the scales was measured by Cronbach's alpha. To determine change in symptomology, paired *t*-tests were used to assess change in mean rank between T1 and T2 for parametric outcomes and Wilcoxon matched-pairs signed-rank test was used for non-parametric outcomes.

We next assessed factors associated with mental health and alcohol use in early May (T2). Bivariate and multivariable linear regression was used to model four outcomes at T2: (1) general COVID-19-related worry, (2) worry about children, (3) depressive symptoms, and (4) alcohol use. Linearity assumptions were assessed using adjusted variable plots. Variables significant at $p<0.10$ in any of the bivariate analysis models and all demographic characteristics were included in the multivariable models to assess if these variables have distinct or common pathways on mental health and alcohol use during the COVID-19 pandemic. Additionally, in multivariate models, T1 levels of psychological sequelae and alcohol use were controlled for in their respective models to account for un-equal T1 levels.[61] A supplementary analysis assessed similarity and differences between continuous and dichotomized measures of depression and alcohol use (Table 9, Figure 5)

3.4 Results

The average age of participants was 38 years (Standard Deviation [SD]: 8.24; Range: 19-63).

Participants were primarily white (78%) and 89% reported more than a high school education.

The majority of respondents were female (65%), and 34% lived in households receiving

government assistance. Respondents reported an average of 1.73 children living in their

household (SD: 0.98; Range: 1-8), and 19% had a child under 5 years of age living in their

household. Half (51%) of study participants reported income loss due to coronavirus.

Respondents experienced variability in changes in friendships due to coronavirus, with 34%

reporting no change, 35% mild change, 21% moderate change, and 9% severe change. Table 6

provides detailed description information of the sample

**Change in parental mental health and alcohol use during the early stages of the COVID-19
pandemic in the United States**

Measures of parental mental health showed a significant decrease from late March to early May

as assessed by the measure of general COVID-19-related worries, concerns about children due to

coronavirus, and depressive symptoms (Figure 3 and Table 7). Mean CoV-Wo scores

significantly decreased from 20.54 (SD: 4.92) in March to 18.36 (SD: 5.26) in May ($p<0.001$).

At both data collection periods, concern that family/friends would get COVID-19 had the highest

mean score of all the general worry items and 76.54% endorsed this worry in March and 66.67%

in May (Supplemental Figure 4). Worry about medical bills was the only item on the CoV-Wo

scale that did not change across the two study periods with approximately 48% expressing this

worry at each time point. Mean scores on the worry about children scale significantly decreased

over the two time periods (T1: 12.68 ± 3.44; T2: 12.10 ± 3.59; $p=0.002$). An examination of the

individual items of concern about children found that worry about children getting the

coronavirus significantly decreased over the two time periods ($p<0.001$) and 67.90% of parents

reported this worry in March and 58.44% in May. However, parents' concerns about their

children's emotional health, being out of school, and childcare did not significantly change from

March to May 2020. Mean depression scores significantly decreased from 9.47 (SD: 6.70) in

March to 8.55 (SD: 6.83) in May ($p=0.002$) and the number of respondents with depression

reduced from 44.44% to 39.51% over the two study periods. With respect to alcohol use, mean

AUDIT-C scores were not significantly different at the two time points. Problematic alcohol use

was identified in 33.33% of participants in March (31.45% women; 36.90% men) and 31.69% in

May (32.08% women; 30.95% men).

Factors associated with changes in parental mental health and alcohol use

Risk and protective factors associated with COVID-19 had different associations with parental

worries, depressive symptoms, and alcohol use across models (see Table 8). March measures of

mental health and alcohol use were consistent predictors of heightened mental health symptoms

and alcohol use in May for all models.

Personal characteristics were associated with general worry and depressive symptoms. In

bivariate analysis, female gender was associated with a greater likelihood of reporting depressive

symptoms and higher alcohol use; however, these relationships did not remain significant in

multivariate models. Race did not have a significant association with parental mental health and

alcohol use with the exception of Black participants having a higher likelihood than white

participants to report depressive symptoms in the multivariate model (aB: 1.93, 95% CI: 0.04-

3.81). Mental health history was associated with higher general worry and depressive symptoms

in bivariate analysis, and this relationship retained significance in the multivariate model for depression (aB: 1.36, 95% CI: 0.10-2.62). Receipt of government assistance was associated with higher general worry and depressive symptoms in bivariate models, but this relationship only retained significance in the adjusted model for depressive symptoms (aB: 1.21, 95% CI: 0.10-2.33).

Family context was significantly associated with all parental mental health and alcohol use outcomes. Being in a committed relationship was a significant predictor of lower depression in both bivariate and adjusted models (aB: -1.58, 95%: -3.02- -0.14). Having a child under 5 in the household reduced worry about children in bi- and multivariate models (aB:-0.95, 95% CI:-1.91- -0.02). Household discord was associated with elevation of all parental mental health outcomes, and the relationship remained significant in adjusted models for worry about children (aB:1.02, 95% CI:0.25-1.79) and depressive symptoms (aB:1.63, 95% CI:0.52-2.74).

Severity of COVID-19 exposure was significantly associated with general COVID-19 worry, depressive symptoms, and alcohol use. In bivariate models, perceived likelihood of infection was associated with increased general worry and depressive symptoms, but these did not remain significant in multivariate models. Knowing someone infected with COVID-19 increased alcohol use in the bivariate model. Working outside the home was significantly related to increased alcohol use in multivariable models (aB: 0.44; 95% CI: 0.03-0.86) and a reduction in general worry and depressive symptoms in bivariate models.

The resource context was associated with all mental health and substance use outcomes. Loss of perceived control, assessed by the perceived inability to prevent COVID-19 infection, and income loss were associated with increasing all mental health outcomes in bivariate models. In multivariable models, loss of perceived control was associated with increased depressive symptoms (aB:1.51, 95% CI:0.15-2.88), and income loss was associated with increased general COVID-19 worry (aB:2.10, 95% CI: 1.09-3.12). Reductions in social resources were associated with all mental health and alcohol use outcomes. Reductions in social network support were associated with increased general worry, worry about children, and depression in bivariate models but did not remain significant predictors of worry in multivariate models. In multivariate models, severe loss of social network support was associated with increased depressive symptoms (severe change compared to no change: aB: 2.00, 95% CI: 0.06- 3.93) and to alcohol use (severe change compared to no change: aB:0.80, 95% CI:0.10-1.51).

3.5 Discussion

A primary finding from this study was the identification of an overall downward trend in parental distress during the first few months of COVID-19 in the US suggesting that many parents were experiencing some degree of resilience or recovery. Between late March and early May 2020, mean parental COVID-19-related worry, worry about children, and depressive symptoms were reduced. These findings align with previous research which identifies mental health distress in response to a disaster as a normative response followed by a reduction of symptoms for the majority of people.[35]

The reduction of mental health symptoms in May suggests what Norris and colleagues call a trajectory of resilience or recovery.[34] The distinction between resilience and recovery lies in the

rate of recovery with resilience indicating only a few weeks of symptomology and recovery indicating a few months of symptomology before returning to pre-event functioning.[34] The one-and-a-half month interval between the T1 and T2 of this study make it difficult to determine the exact timing of symptom decline as well as experiences of protective and adverse events. It is also unclear if this trend is a result of adaptation or situations improving. The COVID-19 pandemic is ongoing with potential psychological ramifications from continuing changes in policies, employment, and school openings. In the ensuing months and years, it is possible that the participants' downward trajectory in mental health symptomology will not continue and mental health dysfunction will be delayed, or re-emerge, resulting in trajectories of relapsing/remitting or chronic dysfunction.

Notably, while all the mental health scales measures and a majority of the individual worry items showed a significant downward trajectory between late March and early May 2020, there were some exceptions. No change was identified in worry about medical bills nor worry about children's emotional health and concern about children being out of school. This finding may suggest unique trajectories for certain worries particularly those related to finances and child well-being. With the beginning of the new school year and changes to school structures, such as virtual learning or new class arrangements, parental concerns for their children's education and emotional well-being may remain high or even increase.

Interestingly, there was no change in alcohol use identified in this study. Although alcohol use can be viewed as a negative coping strategy that is utilized in the face of stress and isolation, the finding of no overall change is consistent with prior disaster research.[27,28,62] This is also

consistent with findings of a reduction in alcohol sales in May 2020 compared to the prior 3-year May average.[63] One explanation may be that alcohol is an expensive commodity, which may be a cost prohibitive coping strategy in the face of COVID-19-related job loss or economic decline. Alcohol may also be more difficult to acquire due to the closure of bars and prohibition of on-site consumption, a policy which the majority of states had implemented by mid-April[64]. Additionally, while off-premise outlets have mostly been allowed to stay open during COVID-19[64] it may be more difficult to access stores when individuals are trying to stay at home. Alternatively, parents may be engaging in positive coping skills to deal with pandemic stressors and rely less on substance use as a stress mitigation strategy.

This study also has identified a number of factors associated with psychological distress in early May 2020, which can help identify vulnerable populations and mitigate the impact of the epidemic on parental mental health. First, having a child under five years of age was related to reduced worry about children. This finding may be explained by parents, on average, being less worried about COVID-19 affecting the development of younger children whose routines and risk exposure are likely less altered by COVID-19 compared to older children. For example, parents of young children may have been staying at home with their children prior to COVID-19. A 2018 survey found that stay-at-home parents are more common in household with a child under the age of 5 years.[65] Parents with younger children may also be less worried about disruptions in their children's social relationships or educational gains. While future research using qualitative methods should further explore the relationship between child age and worry about children, these finding suggests that parents with school-aged children are a potential intervention target who likely will need additional support. Parents of school-aged children may have different

worries than parents of young children, with parents of school-aged concerned about their children's education and loss of peer connections. Parents who are worried about their children's social relationships and/or education may benefit from forming pods. Pods are partnerships between small groups of families which can provide childcare, improve socialization, and support educational assistance. As part of the partnership agreement socialization is often limited to the families within the pods in order to reduce risk of COVID-19 exposure.[66]

A second intervention target identified by this study is families who are experiencing discord and violence. We found that parents with higher household discord were more likely to report worry about children and depressive symptoms. COVID-19, as with other disasters that elevate stress and isolation, has been found to elevate family discord and violence[67] which is closely linked to mental health functioning.[68] For many families, COVID-19 has caused people to be in confined spaces for prolonged periods which can heighten conflict. There is likely variation in discord and families experiencing mild forms of conflict could benefit from trainings on interpersonal skills which can be offered virtually. For a subset of families experiencing severe discord and violence, professional services and access to shelters is important. For families needing safe spaces, shelters must have sufficient space which adheres with social-distancing guidelines. Within the context of COVID-19, identification of household discord and violence can be more difficult as parents and children are staying at home and isolated from friends, health professionals, and other services which can help identify families experiencing discord which are in need of additional support.[69,70] Innovative social media or text-based programs may help identify hard-to-reach families who are experience discord or violence. Strengthened partnerships with schools and public safety may also help identify families experiencing violence and severe discord.

Additionally, families where household discord has already been identified should be assessed for well-being and provided with programs to reduce conflict as stressors related to COVID-19 may amplify existing household discord.

Third, our study findings indicate that people who are required to work outside the home during the COVID-19 pandemic may be a group who require tailored interventions. This study found that participants who worked outside the home reported higher alcohol consumption in May 2020, compared to participants who did not work outside the home. Working outside the home and being a parent during COVID-19 are stressful roles and can conflict with each other.[71] As the vast majority of states had closed schools during the study period,[5] children were at home, and parents have increased caregiving responsibilities. This can heighten stress for parents working outside the home as it can be difficult to accommodate caregiving when they cannot work from home. Interestingly, this study identified a negative relationship between working outside the home with worry and depression, suggesting that the stress pathway is not the only pathway linking working outside the home and elevated alcohol use. Worry and depression scores may be lower for people are who are required to work outside the home because participants who reported working outside the home in May 2020 were likely to be essential workers as many states had Stay at Home Order implemented at the time of the reporting. As an essential worker, these participants may feel a greater sense of purpose and job security as well as less social isolation. Additionally, childcare services often remained open for essential workers therefore mitigating this concern. Alcohol use may be higher among people who work outside the home because they feel more comfortable visiting alcohol outlets compared to people who do not work outside the home and trying to stay home to prevent exposure to COVID-19.

Fourth, our findings point to the negative ramifications related to the loss of personal, material, and social resources. Feelings of loss of control and loss of social relationships were both associated with higher depressive symptoms. Additionally, income loss was associated with increased general worry among parents. This relationship between loss of resources and a negative mental health response aligns with the Conservation of Resources Theory which highlights resource loss as a primary driver of the stress response.[36] Resources can also help prevent resource loss; therefore, the loss of some resources heightens vulnerability to future resource loss as well as mental health sequelae.[36] For example, loss of income may make it more difficult to visit friends and promote a feeling of loss of control. Parents may be particularly susceptible to income loss compared to adults without children as they must manage increased caregiving, which can reduce time available for work activities, with half of participants reporting income loss in this study. To help families cope with the economic fallout of the coronavirus pandemic, the Coronavirus Aid, Relief, and Economic Security (CARES) Act provides most families up to $1,200 per adult and $500 per child in relief payments; however, this may not be sufficient to address ongoing income loss.[72] Families also need to be supported with emergency paid sick leave, paid family leave policies, housing assistance, and access to quality low-cost childcare.[73] Additionally, interventions that promote social connections may also help improve psychological health. Community-based interventions that activate natural support networks can promote social connectedness and the provision of social support, such as the formation of pods or virtual social support groups. Increased communication among peers may also help identify households experiencing discord.

Fifth, psychological interventions may need to be tailored for certain racial and ethnic groups. In this study, Black participants, compared to White participants, reported higher depressive symptoms in May 2020 when controlling for all covariates. This finding is consistent with other recent research, which has identified that COVID-19 is exacerbating already existing inequalities.[74,75] Racial disparities in depression-related risk and protective factors experienced during COVID-19 is a critical area of study and warrants further investigation. Employment is a possible pathway through which racial identity may impact mental health. For example, research indicates that racial minorities are disproportionally represented in essential service industries[76,77] which may heighten certain worries such as getting infected with COVID-19 or concerns related to caregiving. Disparities in access to quality education and discrimination can result in racial minority groups holding lower pay or less stable jobs[76] which can heighten financial uncertainty and anxiety during COVID-19. Economic challenges may also play a role in racial differences in depression outcomes as it is well documented that Blacks Americans face persistent material disadvantage compared to White Americans, and the COVID-19 pandemic has exacerbated this trend.[78] Future empirical research can provide additional insights into the causes of mental health racial disparities in response to the COVID-19 pandemic and inform the development of tailored interventions.

This study is not without limitations. As participants were recruited through an online platform, which requires Internet and access to a computer, this sample may not be representative of more vulnerable populations who do not have access to electronic resources. Further, this study, like other studies conducted with MTurk, underrepresents United States residents who are Black and Hispanic.[79] It is unclear why this population is less often represented on the MTurk platform but

factors such as awareness of the platform, access to reliable internet, or mistrust may play a role.[80] Future studies should work to combine online samples with community-based samples to ensure representativeness. This study is also limited to two points in time and does not have pre-pandemic levels of mental health. COVID-19 research studies that are embedded into ongoing longitudinal research programs may be better able to assess change in relation to pre-pandemic measures. Finally, additional outcome measures of parental mental health should be examined such as, psychosomatic or stress-related illness as well as positive well-being measures.

In sum, this study is one of the first to look at change parental mental health during COVID-19 pandemic and to identify risk and protective factors. Further, another strength of this study is that it assessed indicators across multiple mental health outcomes and multiple levels in order to identify intervention targets. The results of this study point to an overall downward trajectory in mental health symptomology from late March to early May 2020 among parents living with minors. This trajectory echoes findings of other post disaster research as it indicates that many parents may experiences less distress overtime. As the COVID-19 pandemic continues in the United States, families are likely to be highly vulnerable to economic and social challenges causing mental health sequalae to continue to change. The risk and protective factors identified in this study had differential effects depending on the mental health outcome assessed. This may indicate that each of these outcomes has unique pathways of influence. Future research should further examine the relationship among the outcomes used in this study to define better the unique pathways of influence and temporal ordering. Interventions for parents that provide financial support, promote social connections, and reduce household discord may help ensure a continued reduction in mental health symptomology.

3.6   Tables for Chapter 3

Table 6.   **Sociodemographic and COVID-19-related characteristics of study population (N=243)**

	n(%) Mean ± SD
Personal characteristics*	
Age	38.39 ± 8.24
Sex (Female)	159 (65.43)
Race (White)	190 (78.19)
Non-Hispanic Black	20 (8.23)
Asian	19 (7.82)
Other	14 (5.76)
> High school education	217 (89.30)
Mental health history	64 (26.34)
Committed relationship	206 (84.77)
Receives government assistance	82 (33.74)
Family context	
Committed relationship	206 (84.77)
Child <5 years	45 (18.52)
Household discord	129 (53.09)
Severity of COVID-19 exposure	
Perceived likelihood of contraction	41 (16.87)
Work outside the home	70 (28.81)
Know someone infected	63 (25.93)
Live in state with high COVID-19 risk	56 (23.05)
Resource context	
Loss of perceived control	47 (19.34)
Income loss	123 (50.62)
Change in friends (none)	82 (33.74)
Mild	86 (35.39)
Moderate	52 (21.40)
Severe	23(9.47)

* these variables were assessed in March 2020 (T1)

Table 7.   **Change in parental mental health and alcohol use between late March and early May 2020 (N=243)**

	Mean Scores			Percentage Change		
	March 2020 mean ± SD	May 2020 mean ± SD	*p*-value*	% Decrease	% No Change	% Increase
General COVID-19-related worry						
General COVID-19 Worry Scale (CoV-Wo) *	20.54 ± 4.92	18.36± 5.26	<0.001	67.08	8.23	24.69
Individual scale variables						
Getting the coronavirus*	3.45 ± 1.12	3.12 ± 1.18	<0.001	35.80	51.03	13.17
Family/friends getting the coronavirus*	3.95 ± 0.97	3.60 ± 1.15	<0.001	36.63	51.85	11.52
Giving someone else the coronavirus*	3.60 ± 1.19	3.40 ± 1.29	0.012	33.74	44.86	21.4
Money because of the coronavirus*	3.47 ± 1.21	3.00 ± 1.35	<0.001	41.15	42.80	16.05
Having enough food because of the coronavirus*	2.98 ± 1.26	2.14 ± 1.12	<0.001	55.56	33.74	10.7
Medical bill if I get sick from coronavirus*	3.09 ± 1.42	3.12 ± 1.45	0.489	23.87	47.74	28.39
Worry about children						
Worry about children scale*	12.68 ± 3.44	12.10 ± 3.59	0.002	51.03	17.28	31.69
Individual scale variables						
My children getting coronavirus*	3.75 ± 1.16	3.44 ± 1.25	<0.001	36.63	49.38	12.75
My children's emotional health because of the coronavirus*	3.29 ± 1.16	3.21 ± 1.28	0.312	31.28	42.80	25.92
My children are out of school because of the coronavirus*	3.24 ± 1.32	3.19 ± 1.34	0.348	28.81	46.91	24.28
Childcare because of the coronavirus*	2.39 ± 1.35	2.26 ± 1.31	0.047	31.28	47.74	20.98
Depression						
Parental depression (CESD10)*	9.47 ± 6.70	8.55 ± 6.83	0.002	49.79	16.05	33.74
Alcohol Use						
Alcohol use (AUDIT-C)*	2.16 ± 1.97	2.13± 3.34	0.5852	30.45	41.98	27.57

* Wilcoxon matched-pairs signed-rank test

** Paired t-test

Table 8. **Linear regression models of parental mental health and alcohol use in early May, 2020**

	Model 1: General COVID-19 worry		Model 2: Worry about children		Model 3: Depressive symptoms		Model 4: Alcohol use	
	B	**aB**	**B**	**aB**	**B**	**aB**	**B**	**aB**
Personal Characteristics								
Age	0.06 (-0.02-0.14)	0.06 (-0.01- 0.12)	0.02 (-0.04-0.07)	-0.01 (-0.06-0.03)	-0.06 (-0.16-0.05)	0.02 (-0.04-0.09)	**-0.04 (-0.07- 0.00)**	**-0.03 (-.06- -0.01)**
Sex (ref: male)	1.07 (-0.32-2.47)	0.16 (-0.89-1.20)	0.51 (-0.44-1.46)	0.41 (-0.37-1.19)	**2.23 (0.43-4.02)**	-0.31 (-1.43-0.81)	**-0.88 (-1.49- -0.27)**	0.14 (-0.28-0.56)
Race (white)	ref	Ref	Ref	Ref	Ref	Ref	ref	Ref
Non-Hispanic Black	-0.49 (-2.93- 1.94)	0.81 (-0.96-2.57)	0.24 (-1.42-1.90)	0.62 (-0.70-1.94)	-0.08 (-3.26-3.10)	**1.93 (0.04- 3.81)**	-0.54 (-1.63-0.54)	-0.04 (-0.72-0.65)
Asian	-0.51 (-3.00- 1.99)	0.48 (-1.29-2.25)	-0.17 (-1.87-1.54)	0.31 (-1.01-1.63)	-0.58 (-3.84-2.68)	0.79 (-1.10-2.68)	-0.35 (-1.46-0.76)	-0.08 (-0.76-0.61)
Other	*2.49 (-0.38-5.36)*	**2.30 (0.25- 4.36)**	1.42 (-0.54-3.38)	0.13 (-1.41-1.68)	-0.49 (-4.24-3.26)	0.64 (-1.55-2.83)	0.09 (-1.19-1.37)	0.00 (-0.79-0.80)
> High school education	0.96 (-1.19- 3.11)	---	0.84 (-0.62-2.31)	---	-0.42 (-3.21-2.38)	---	0.32 (-0.64-1.27)	---
Mental health history	**1.78 (0.29- 3.28)**	0.24 (-0.89-1.36)	0.86 (-0.16-1.88)	0.16 (-0.68-1.00)	**5.76 (3.94-7.59)**	**1.36 (0.10-2.62)**	-0.15 (-0.82-0.52)	0.23 (-0.21-0.66)
Government assistance	**2.11 (0.73-3.49)**	0.70 (-0.35-1.75)	0.55 (-0.41-1.51)	-0.09 (-0.87-0.68)	**2.90 (1.11-4.70)**	**1.21 (0.10-2.33)**	0.23 (-0.39-0.86)	-0.21 (-0.62-0.20)
Family Context								
Committed relationship	-1.27 (-3.11-0.58)	-1.19 (-2.49-0.11)	1.04 (-0.22-2.30)	0.17 (-0.81-1.16)	**-4.35 (-6.70- -2.01)**	**-1.58 (-3.02- -0.14)**	0.56 (-0.26-1.39)	-0.02 (-0.53-0.48)
Child <5yrs in household	-0.97 (-2.46-0.52)	0.75 (-0.53-2.03)	**-1.37 (-2.37- -0.37)**	**-0.95 (-1.91- -0.02)**	-1.42 (-3.35-0.51)	0.84 (-0.54-2.21)	0.15 (-0.51- 0.81)	-0.37 (-0.87- 0.12)
Household discord	**2.59 (1.30-3.89)**	0.62 (-0.41-1.65)	**2.19 (1.32-3.05)**	**1.02 (0.25-1.79)**	**4.77 (3.15-6.40)**	**1.63 (0.52-2.74)**	0.09 (-0.50-0.68)	-0.27 (-0.67-0.13)
Severity of COVID-19 Exposure								
Perceived likelihood of infection	**2.83 (1.08-4.57)**	1.06 (-0.26-2.38)	0.67 (-0.54-1.88)	-0.18 (-1.16-0.80)	**4.03 (1.78-6.28)**	1.01 (-0.41-2.43)	-0.24 (-1.03-0.55)	-0.39 (-0.90-0.12)
Work outside the home	**-1.65 (-3.10- -0.19)**	-0.35 (-1.43-0.73)	-0.28 (-1.28-0.72)	-0.23 (-1.04-0.57)	**-3.24 (-5.11- -1.38)**	-0.74 (-1.90-0.42)	0.60 (-0.05-1.25)	**0.44 (0.03-0.86)**
Know person with COVID-19	0.78 (-0.74-2.30)	0.23 (-0.85-1.31)	0.72 (-0.31-1.76)	0.31 (-0.50-1.11)	1.57 (-0.39-3.53)	0.40 (-0.76-1.55)	**0.68 (0.01-1.35)**	0.21 (-0.21-0.63)
Live in state with high COVID-19 risk	-0.77 (-2.35-0.81)	---	-0.04 (-1.11-1.04)	---	-0.67 (-2.72-1.38)	---	0.18 (-0.52-0.88)	---
Resource Context								
Loss of perceived control	**2.88 (1.23-4.53)**	0.54 (-0.74-1.82)	**1.57 (0.43-2.70)**	0.48 (-0.47-1.42)	**4.93 (2.84-7.03)**	**1.51 (0.15-2.88)**	0.47 (-0.27-1.22)	0.29 (-0.20-0.77)
Income loss	**4.44 (3.24-5.65)**	**2.10 (1.09-3.12)**	**1.69 (0.81-2.58)**	0.53 (-0.21-1.28)	**3.76 (2.09-5.42)**	0.22 (-0.85-1.30)	0.07 (-0.52-0.66)	0.03 (-0.36-0.41)
Loss of social network support (none)	Ref	Ref	Ref	ref	Ref	Ref	ref	Ref

Mild	**3.02 (1.48-4.57)**	0.47 (-0.70 -1.63)	**1.15 (0.08-2.22)**	0.09 (-0.77-0.95)	**3.17 (1.14-5.20)**	**1.42 (0.19- 2.65)**	0.04 (-0.67-0.76)	0.27 (-0.18-0.71)
Moderate	**3.31 (1.54-5.08)**	0.82 (-0.54- 2.17)	**1.77 (0.54-3.00)**	0.25 (-0.75-1.26)	**3.48 (1.15-5.82)**	0.48 (-0.96-1.93)	0.05 (-0.77-0.87)	0.42 (-0.10-0.94)
Severe	**3.30 (0.94- 5.66)**	0.25 (-1.58-2.08)	**2.29 (0.66-3.93)**	-0.02 (-1.39-1.35)	**4.00 (0.90-7.10)**	**2.00 (0.06- 3.93)**	0.56 (-0.53-1.65)	**0.80 (0.10-1.51)**
T1 mental health and alcohol use								
T1 general COVID-19 worry	**0.74 (0.64-0.84)**	**0.60 (0.49-0.70)**	---	---	---	---	---	---
T1 worry about children	---	---	**0.70 (0.60-0.80)**	**0.62 (0.50-0.73)**	---	---	---	---
T1 depressive symptoms	---	---	---	---	**0.81 (0.74-0.89)**	**0.68 (0.59-0.77)**	---	---
T1 alcohol use	---	---	---	---	---	---	0.95 (0.85-1.04)	0.96 (0.86-1.06)

Bold: *p*-value<0.05
---: not included in the model

3.7 Figures for Chapter 3

Figure 3. Parental mental health and substance use in late March and early May 2020 (N=243)
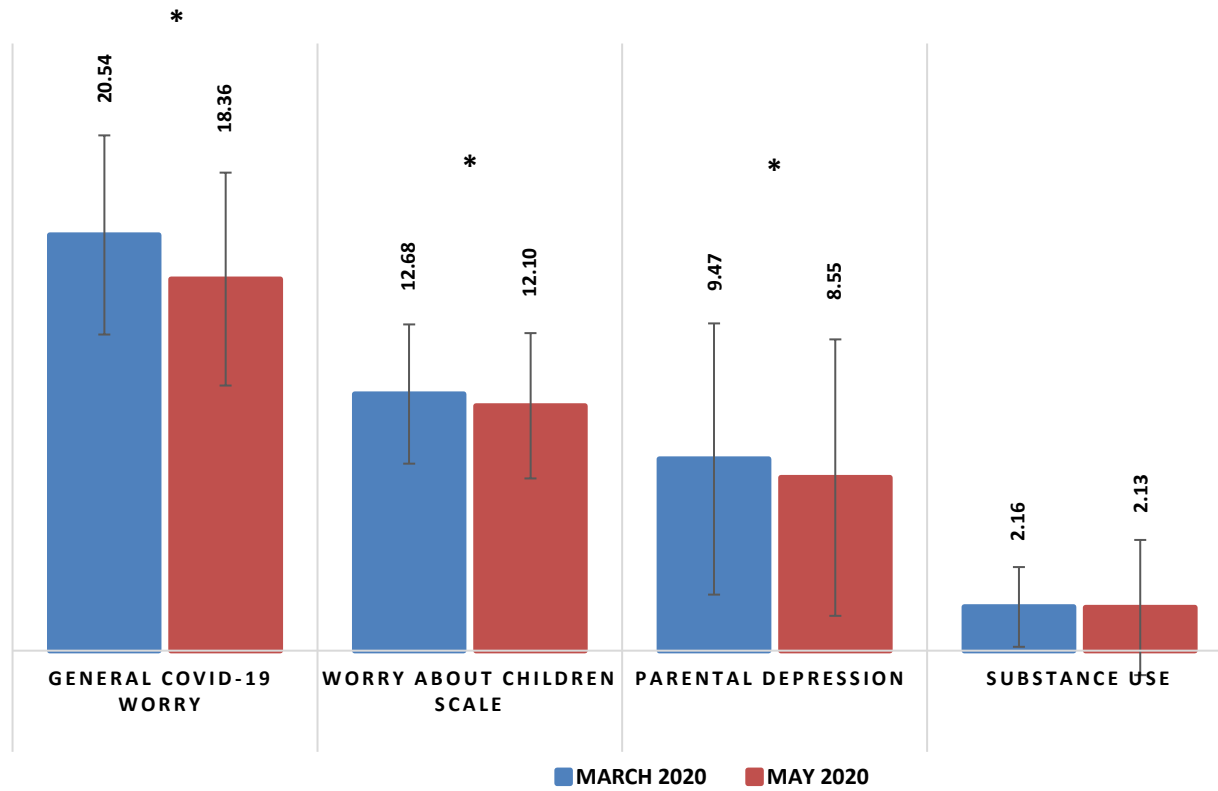
*p<0.05

3.8 Supplements for Chapter 3

Figure 4.   [Supplement] Sources of parental worries in late March and early May, 2020

------------ Worry about Children Scale items -----------   ---------------------- General COVID-19 Worry Scale items ----------------

Supplement: Comparison of scale and dichotomized measures of parental depression and problematic substance use during the early months of the COVID-19 pandemic.

This section assesses (A) change in depression and problematic substance use from March to May 2020 using validated cutoff sco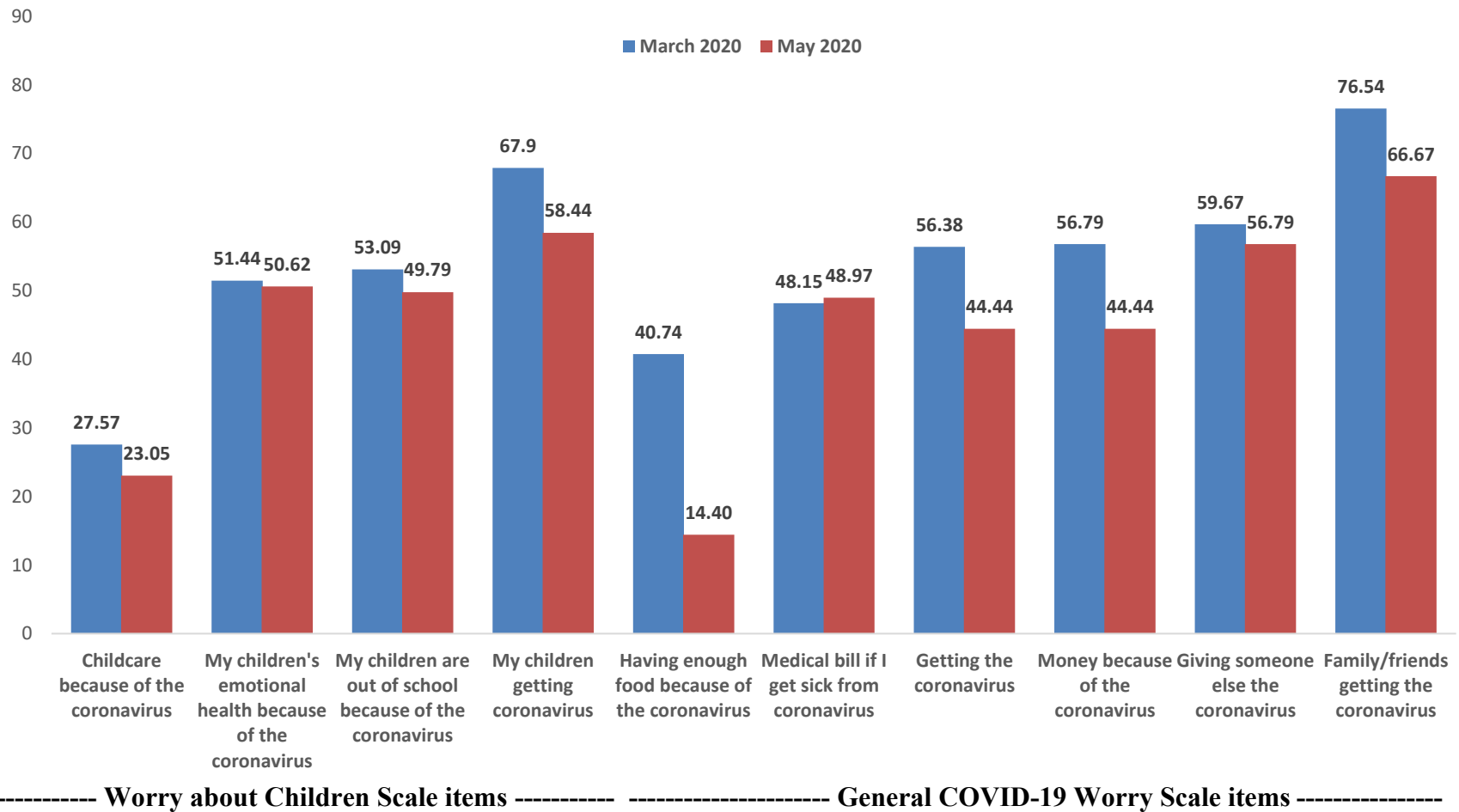res compared to a scale measures and (B) predictors of depression and problematic substance use in May 2020 compared to scale measures. This study identified a significant reduction in depression but not in problematic alcohol use. This trend aligns with scale measure of depression and alcohol use.

Predictors

In both linear and dichotomized models, predictors of depression and depressive symptoms were highly consistent. Differences included that multivariate models of scale measures of depression, Black participants had higher odds of depression. However, this was not seen in models of dichotomized depression. Additionally, in multivariable models of scale measured depression, mental health history and receipt of government assistance were significant predictors of increased depression. However, in multivariable models of dichotomized depression, these predictors did not retain significance. In bivariate models of scale measured alcohol use, female gender was significantly associated with reduced alcohol use. However this relationship was not significant in bivariate models of alcohol use. Further, in models of alcohol use using continuous measures, alcohol use increased among people who work outside the home, those who know people who COVID-19, and among those with severe disruptions in their social networks. However, these relationships were not identified in dichotomized measures of alcohol use.

Figure 5. **[Supplement] Dichotomized measures of depression and problematic alcohol use in late March and early May 2020 (N=243)**
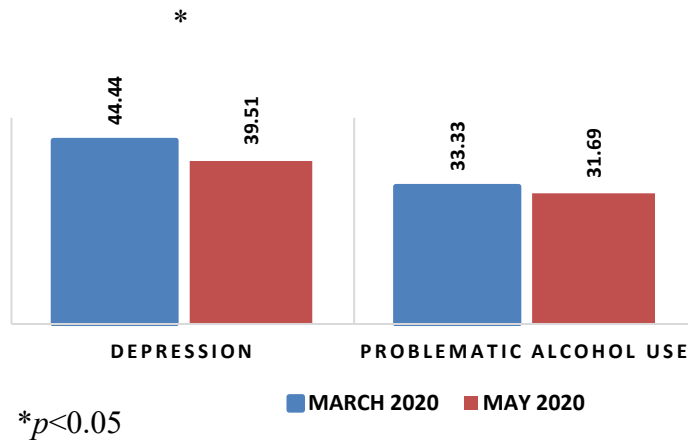

*p<0.05

Table 9. **[Supplement] Comparison of predictors of scale and dichotomized depression and alcohol use outcomes in May, 2020**

	Model 1A: Depression		Model 1B: Depressive Symptoms		Model 2A: Problematic Alcohol use		Model 2B: Alcohol use	
	OR	aOR	B	aB	OR	aOR	B	aB
Personal Characteristics								
Age	0.99 (0.96-1.02)	1.03 (0.97-1.09)	-0.06 (-0.16-0.05)	0.02 (-0.04-0.09)	**0.96 (0.93-1.00)**	0.96 (0.92-1.01)	**-0.04 (-0.07- 0.00)**	**-0.03 (-.06- -0.01)**
Sex (ref: male)	**2.07 (1.17-3.65)**	1.51 (0.61-3.74)	**2.23 (0.43-4.02)**	-0.31 (-1.43-0.81)	1.05 (0.60-1.86)	1.38 (0.60-3.15)	**-0.88 (-1.49- -0.27)**	0.14 (-0.28-0.56)
Race (white)	ref	Ref	ref	Ref	ref	Ref	ref	Ref
Non-Hispanic Black	1.00 (0.39- 2.56)	2.04 (0.34-12.41)	-0.08 (-3.26-3.10)	**1.93 (0.04- 3.81)**	0.88 (0.32-2.41)	1.13 (0.28- 4.47)	-0.54 (-1.63-0.54)	-0.04 (-0.72-0.65)
Asian	0.88 (0.33-2.32)	2.56 (0.63-10.34)	-0.58 (-3.84-2.68)	0.79 (-1.10-2.68)	0.55 (0.18-1.73)	0.70 (0.16-3.03)	-0.35 (-1.46-0.76)	-0.08 (-0.76-0.61)
Other	0.83 (0.27-2.58)	1.59 (0.30-8.48)	-0.49 (-4.24-3.26)	0.64 (-1.55-2.83)	1.15 (0.37-3.57)	1.19 (0.26-5.44)	0.09 (-1.19-1.37)	0.00 (-0.79-0.80)
> High school education	1.26 (0.54- 2.96)	---	-0.42 (-3.21-2.38)	---	0.71 (0.31-1.66)	---	0.32 (-0.64-1.27)	---
Mental health history	**3.66 (2.02- 6.65)**	1.97 (0.80-4.85)	**5.76 (3.94-7.59)**	**1.36 (0.10-2.62)**	1.07 (0.58-1.97)	0.97 (0.39-2.41)	-0.15 (-0.82-0.52)	0.23 (-0.21-0.66)
Government assistance	**1.93 (1.12-3.31)**	1.63 (0.67-3.97)	**2.90 (1.11-4.70)**	**1.21 (0.10-2.33)**	1.29 (0.73-2.27)	0.86 (0.38-1.96)	0.23 (-0.39-0.86)	-0.21 (-0.62-0.20)
Family Context								
Committed relationship	**0.29 (0.14- 0.61)**	**0.21 (0.07-0.64)**	**-4.35 (-6.70- -2.01)**	**-1.58 (-3.02- -0.14)**	1.83 (0.79- 4.21)	1.55 (0.53- 4.52)	0.56 (-0.26-1.39)	-0.02 (-0.53-0.48)
Child <5yrs in household	0.61 (0.34-1.12)	1.51 (0.49- 4.66)	-1.42 (-3.35-0.51)	0.84 (-0.54-2.21)	1.30 (0.71-2.35)	0.78 (0.29-2.14)	0.15 (-0.51- 0.81)	-0.37 (-0.87- 0.12)
Household discord	**3.71 (2.13-6.44)**	**2.86 (1.19-6.87)**	**4.77 (3.15-6.40)**	**1.63 (0.52-2.74)**	1.37 (0.80-2.37)	1.14 (0.49-2.62)	0.09 (-0.50-0.68)	-0.27 (-0.67-0.13)
Severity of COVID-19 Exposure								
Perceived likelihood of infection	**3.27 (1.63-6.57)**	2.41 (0.77-7.49)	**4.03 (1.78-6.28)**	1.01 (-0.41-2.43)	0.76 (0.36-1.60)	0.44 (0.15-1.33)	-0.24 (-1.03-0.55)	-0.39 (-0.90-0.12)
Work outside the home	**0.38 (0.20- 0.71)**	0.50 (0.19-1.34)	**-3.24 (-5.11- -1.38)**	-0.74 (-1.90-0.42)	1.18 (0.65- 2.13)	1.33 (0.58-3.03)	0.60 (-0.05-1.25)	**0.44 (0.03-0.86)**
Know person with COVID-19	**2.04 (1.14-3.65)**	1.36 (0.54-3.42)	1.57 (-0.39-3.53)	0.40 (-0.76-1.55)	1.78 (0.98-3.23)	1.60 (0.70-3.65)	**0.68 (0.01-1.35)**	0.21 (-0.21-0.63)
Live in state with high COVID-19 risk	0.73 (0.39-1.37)	---	-0.67 (-2.72-1.38)	---	1.72 (0.92-3.19)	---	0.18 (-0.52-0.88)	---
Resource Context								
Loss of perceived control	**4.40 (2.22-8.70)**	**3.59 (1.22-10.61)**	**4.93 (2.84-7.03)**	**1.51 (0.15-2.88)**	1.61 (0.84-3.12)	1.60 (0.61-4.18)	0.47 (-0.27-1.22)	0.29 (-0.20-0.77)
Income loss	**2.77 (1.62-4.72)**	1.42 (0.61-3.29)	**3.76 (2.09-5.42)**	0.22 (-0.85-1.30)	1.17 (0.68-2.00)	1.20 (0.55-2.63)	0.07 (-0.52-0.66)	0.03 (-0.36-0.41)

Loss of social network support (none)	Ref	ref	ref	Ref	ref	Ref	ref	Ref
Mild	1.96 (1.03-3.76)	2.08 (0.77-5.65)	3.17 (1.14-5.20)	1.42 (0.19- 2.65)	0.83 (0.43-1.62)	0.73 (0.29- 1.83)	0.04 (-0.67-0.76)	0.27 (-0.18-0.71)
Moderate	2.16 (1.04-4.50)	1.01 (0.32-3.16)	3.48 (1.15-5.82)	0.48 (-0.96-1.93)	1.05 (0.50-2.20)	1.05 (0.38-2.93)	0.05 (-0.77-0.87)	0.42 (-0.10-0.94)
Severe	5.11 (1.91- 13.73)	5.96 (1.23-28.87)	4.00 (0.90-7.10)	2.00 (0.06- 3.93)	1.66 (0.64-4.27)	1.35 (0.33- 5.44)	0.56 (-0.53-1.65)	0.80 (0.10-1.51)
T1 depression	24.00 (12.02-47.91)	19.83 (7.99-49.19)	---	---	---	---	---	---
T1 depressive symptoms	---	---	0.81 (0.74-0.89)	0.68 (0.59-0.77)	---	---	---	---
T1 problematic alcohol use	---	---	---	---	21.45 (10.73-42.89)	22.61 (10.58-48.31)	---	---
T1 Alcohol use							0.95 (0.85-1.04)	0.96 (0.86-1.06)

3.9 References

1. Centers for Disease Control and Prevention. First travel-related case of 2019 novel coronavirus detected in united states. https://www.cdc.gov/media/releases/2020/p0121-novel-coronavirus-travel-case.html. Updated 2020. Accessed August 15, 2020.

2. Keni R, Alexander A, Nayak PG, Mudgal J, Nandakumar K. COVID-19: Emergence, spread, possible treatments, and global burden. *Frontiers in Public Health*. 2020;8:216. doi: 10.3389/fpubh.2020.00216.

3. Johns Hopkins Center for Systems Science and Engineering. COVID-19 United States cases. https://coronavirus.jhu.edu/us-map. Updated 2020. Accessed October 13, 2020.

4. Moreland A, Herlihy C, Tynan MA, et al. Timing of state and territorial COVID-19 stay-at-home orders and changes in population movement — United States, ,arch 1–May 31, 2020. *Morbidity and Mortality Weekly Report*. 2020;69(35):1198-1203. doi: 10.15585/mmwr.mm6935a2.

5. Education Week. Map: Coronavirus and school closures in 2019-2020. https://www.edweek.org/ew/section/multimedia/map-coronavirus-and-school-closures.html. Updated 2020. Accessed September 22, 2020.

6. National Conference of State Legislatures. National employment monthly update. https://www.ncsl.org/research/labor-and-employment/national-employment-monthly-update.aspx. Updated 2020. Accessed October 6, 2020.

7. Nicola M, Alsafi Z, Sohrabi C, et al. The socio-economic implications of the coronavirus pandemic (COVID-19): A review. *International Journal of Surgery*. 2020;78:185–193.

8. American Psychological Association. Stress in the time of COVID-19, volume one. 2020.

9. Shen K, Yang Y, Wang T, et al. Diagnosis, treatment, and prevention of 2019 novel coronavirus infection in children: Experts' consensus statement. *World Journal of Pediatrics*. 2020;16(3):223-231. doi: 10.1007/s12519-020-00343-7.

10. Wu P, Liu X, Fang Y, et al. Alcohol abuse dependence symptoms among hospital employees exposed to a SARS outbreak. *Alcalc*. 2008;43(6):706-712. doi: 10.1093/alcalc/agn073.

11. Ludvigsson JF. Systematic review of COVID-19 in children shows milder cases and a better prognosis than adults. *Acta Paediatrica*. 2020;109(6):1088-1095. doi: 10.1111/apa.15270.

12. Cénat JM, Mukunzi JN, Noorishad P, Rousseau C, Derivois D, Bukaka J. A systematic review of mental health programs among populations affected by the Ebola virus disease. *Journal of Psychosomatic Research*. 2020;131:109966. doi: 10.1016/j.jpsychores.2020.109966.

13. Jalloh MF, Li W, Bunnell RE, et al. Impact of ebola experiences and risk perceptions on mental health in sierra leone, july 2015. *BMJ Global Health*. 2018;3(2):e000471. doi: 10.1136/bmjgh-2017-000471.

14. Miller J. *Disasters and mental health.* Vol 1. West Sussex, England: John Wiley & Sons Ltd.; 2005.

15. Dugas MJ, Schwartz A, Francis K. Brief report: Intolerance of uncertainty, worry, and depression. *Cogn Ther Res*. 2004;28(6):835-842. doi: 10.1007/s10608-004-0669-0.

16. Dayton L, Schneider K, Strickland J, Latkin C. Determinants of worry using the SARS-CoV-19 worry (CoV-wo) scale among united states residents. Under Review.

17. Borkovec T, Ray W, Stöber J. Worry: A cognitive phenomenon intimately linked to affective, physiological, and interpersonal behavioral processes. *Cognitive Therapy and Research*. 1998;22(6):561-576. doi: 10.1023/A:1018790003416.

18. Kieffer K, Cronin C, Gawet D. Test and study worry and emotionality in the prediction of college students' reasons for drinking: An exploratory investigation. *Journal of Alcohol and Drug Education*. 2006;50(1):57-81.

19. Renner B, Reuter T. Predicting vaccination using numerical and affective risk perceptions: The case of A/H1N1 influenza. *Vaccine*. 2012;30(49):7019-7026. doi: 10.1016/j.vaccine.2012.09.064.

20. Meewisse M, Olff M, Kleber R, Kitchiner NJ, Gersons BPR. The course of mental health disorders after a disaster: Predictors and comorbidity. *Journal of Traumatic Stress*. 2011;24(4):405-413. doi: 10.1002/jts.20663.

21. Tang B, Liu X, Liu Y, Xue C, Zhang L. A meta-analysis of risk factors for depression in adults and children after natural disasters. *BMC Public Health*. 2014;14(1):623. doi: 10.1186/1471-2458-14-623.

22. Person C, Tracy M, Galea S. Risk factors for depression after a disaster. *The Journal of Nervous and Mental Disease*. 2006;194(9):659-666. doi: 10.1097/01.nmd.0000235758.24586.b7.

23. National Institute of Mental Health. Prevalence of major depressive episode among adult. https://www.nimh.nih.gov/health/statistics/major-depression.shtml. Updated 2019. Accessed August 16, 2020.

24. Stein MB, Heimberg RG. Well-being and life satisfaction in generalized anxiety disorder: Comparison to major depressive disorder in a community sample. *Journal of Affective Disorders*. 2004;79(1):161-166. doi: 10.1016/S0165-0327(02)00457-3.

25. DiMatteo MR, Lepper HS, Croghan TW. Depression is a risk factor for noncompliance with medical treatment: Meta-analysis of the effects of anxiety and depression on patient adherence. *Arch. Intern Med.* 2000;160(14):2101-2107. doi: 10.1001/archinte.160.14.2101.

26. Lovejoy MC, Graczyk PA, O'Hare E, Neuman G. Maternal depression and parenting behavior: A meta-analytic review. *Clinical Psychology Review*. 2000;20(5):561-592. doi: 10.1016/S0272-7358(98)00100-7.

27. Goldmann E, Galea S. Mental health consequences of disasters. *Annual Review of Public Health*. 2014;35(1):169-183. doi: 10.1146/annurev-publhealth-032013-182435.

28. North C, Kawasaki A, Spitznagel E, Hong B. The course of PTSD, major depression, substance abuse, and somatization after a natural disaster. *The Journal of Nervous and Mental Disease*. 2004;192(12):823-829. doi: 10.1097/01.nmd.0000146911.52616.22.

29. Vetter S, Rossegger A, Rossler W, Bisson JI, Endrass J. Exposure to the tsunami disaster, PTSD symptoms and increased substance use – an internet based survey of male and female residents of Switzerland. *BMC Public Health*. 2008;8(1):92. doi: 10.1186/1471-2458-8-92.

30. Mak IWC, Chu CM, Pan PC, Yiu MGC, Chan VL. Long-term psychiatric morbidities among SARS survivors. *General Hospital Psychiatry*. 2009;31(4):318-326. doi: 10.1016/j.genhosppsych.2009.03.001.

31. Lee S, Ward K. Mental health, relationships, and coping during the coronavirus pandemic. *Parenting in Context Research Lab*. 2020.

32. Olson H, O'Connor MJ, Fitzgerald HE. Lessons learned from study of the developmental impact of parental alcohol use. *Infant Mental Health Journal*. 2001;22(3):271-290. doi: 10.1002/imhj.1001.

33. Freedy JR, Saladin ME, Kilpatrick DG, Resnick HS, Saunders BE. Understanding acute psychological distress following natural disaster. *Journal of Traumatic Stress*. 1994;7(2):257-273. doi: 10.1007/BF02102947.

34. Norris FH, Tracy M, Galea S. Looking for resilience: Understanding the longitudinal trajectories of responses to stress. *Social Science & Medicine*. 2009;68(12):2190-2198. doi: 10.1016/j.socscimed.2009.03.043.

35. Norris FH, Friedman MJ, Watson PJ. 60,000 disaster victims speak: Part II. summary and implications of the disaster mental health research. *Psychiatry*. 2002;65(3):240-260. doi: 10.1521/psyc.65.3.240.20169.

36. Hobfoll SE, Halbesleben J, Neveu J, Westman M. Conservation of resources in the organizational context: The reality of resources and their consequences. *Annual Review of Organizational Psychology and Organizational Behavior*. 2018;5(1):103-128. doi: 10.1146/annurev-orgpsych-032117-104640.

37. North CS, Ringwalt CL, Downs D, Derzon J, Galvin D. Postdisaster course of alcohol use disorders in systematically studied survivors of 10 disasters. *Archives of General Psychiatry*. 2011;68(2):173-180. doi: 10.1001/archgenpsychiatry.2010.131.

38. Cepeda A, Valdez A, Kaplan C, Hill LE. Patterns of substance use among hurricane Katrina evacuees in Houston, Texas. *Disasters*. 2010;34(2):426-446. doi: 10.1111/j.1467-7717.2009.01136.x.

39. Nordløkken A, Pape H, Heir T. Alcohol consumption in the aftermath of a natural disaster: A longitudinal study. *Public Health*. 2015;132:33-39. doi: 10.1016/j.puhe.2015.11.007.

40. Curtis T, Miller BC, Berry EH. Changes in reports and incidence of child abuse following natural disasters. *Child Abuse & Neglect*. 2000;24(9):1151-1162. doi: 10.1016/S0145-2134(00)00176-9.

41. World Health Organization. WHO director-general's opening remarks at the media briefing on COVID-19 - 11 march 2020. https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020. Updated 2020. Accessed August 24, 2020.

42. Whitehouse.gov. 15 days to slow the spread. https://www.whitehouse.gov/articles/15-days-slow-spread/. Updated 2020. Accessed August 24, 2020.

43. Schuchat A, CDC COVID-19 Response Team. Public health response to the initiation and spread of pandemic COVID-19 in the United States, February 24-April 21, 2020. *Morbidity and Mortality Weekly Report*. 2020;69(18):551-556. doi: 10.15585/mmwr.mm6918e2.

44. Berinsky AJ, Huber GA, Lenz GS. Evaluating online labor markets for experimental research: Amazon.com's mechanical turk. *Political Analysis*. 2012;20(3):351-368. doi: 10.1093/pan/mpr057.

45. Paolacci G, Chandler J. Inside the turk: Understanding mechanical turk as a participant pool. *Current Directions in Psychological Science*. 2014;23(3):184-188. doi: 10.1177/0963721414531598.

46. Huff C, Tingley D. "Who are these people?" evaluating the demographic characteristics and political preferences of MTurk survey respondents. *Research & Politics*. 2015;2(3):205316801560464. doi: 10.1177/2053168015604648.

47. Follmer D, Sperling R, Suen H. The role of MTurk in education research: Advantages, issues, and future directions. *Educational Researcher*. 2017;46(6):329-334. doi: 10.3102/0013189X17725519.

48. Chandler J, Shapiro D. Conducting clinical research using crowdsourced convenience samples. *Annual Review of Clinical Psychology*. 2016;12(1):53-81. doi: 10.1146/annurev-clinpsy-021815-093623.

49. Young J, Young K. Don't get lost in the crowd: Best practices for using amazon's mechanical turk in behavioral research. *Journal of the Midwest Association for Information Systems*. 2019(2):7-34. doi: 10.17705/3jmwa.000050.

50. Rouse S. A reliability analysis of mechanical turk data. *Computers in Human Behavior*. 2015;43:304-307. doi: 10.1016/j.chb.2014.11.004.

51. Daly TM, Nataraajan R. Swapping bricks for clicks: Crowdsourcing longitudinal data on amazon turk. *Journal of business research*. 2015;68(12):2603-2609. doi: 10.1016/j.jbusres.2015.05.001.

52. Stoycheff E. Please participate in part 2: Maximizing response rates in longitudinal MTurk designs. *Methodological innovations*. 2016;9:205979911667287. doi: 10.1177/2059799116672879.

53. Taber K, Taber K. The use of cronbach's alpha when developing and reporting research instruments in science education. *Res Sci Educ*. 2018;48(6):1273-1296. doi: 10.1007/s11165-016-9602-2.

54. Zhang W, O'Brien N, Forrest JI, et al. Validating a shortened depression scale (10 item CES-D) among HIV-positive people in British Columbia, Canada. *PloS One*. 2012;7(7):e40793. doi: 10.1371/journal.pone.0040793.

55. Khadjesari Z, White IR, McCambridge J, et al. Validation of the AUDIT-C in adults seeking help with their drinking online. *Addiction Science & Clinical Practice*. 2017;12(1):2. doi: 10.17863/CAM.6949.

56. Bradley KA, DeBenedetti AF, Volk RJ, Williams EC, Frank D, Kivlahan DR. AUDIT-C as a brief screen for alcohol misuse in primary care. *Alcoholism, Clinical and Experimental Research*. 2007;31(7):1208-1217. doi: 10.1111/j.1530-0277.2007.00403.x.

57. Frank D, DeBenedetti AF, Volk RJ, Williams EC, Kivlahan DR, Bradley KA. Effectiveness of the AUDIT-C as a screening test for alcohol misuse in three race/ethnic

groups. *Journal of General Internal Medicine*. 2008;23(6):781-787. doi: 10.1007/s11606-008-0594-0.

58. Marchetti D, Fontanesi L, Mazza C, Di Giandomenico S, Roma P, Verrocchio MC. Parenting-related exhaustion during the italian COVID-19 lockdown. *Journal of Pediatric Psychology*. 2020;45(10):1114-1123. doi: 10.1093/jpepsy/jsaa093.

59. Harvard Global Health Institute and Harvard's Edmond J. Safra Center for Ethics. Key metrics for COVID suppression. 2020.

60. USAFacts. US coronavirus cases and deaths track COVID-19 data daily by state and county. https://usafacts.org/visualizations/coronavirus-covid-19-spread-map/. Updated 2020. Accessed Sept 6, 2020.

61. O'Connell NS, Dai L, Jiang Y, et al. Methods for analysis of pre-post data in clinical research: A comparison of five common methods. *Journal of Biometrics & Biostatistics*. 2017;8(1):1-8. doi: 10.4172/2155-6180.1000334.

62. Clay JM, Parker MO. Alcohol use and misuse during the COVID-19 pandemic: A potential public health crisis? *The Lancet. Public health*. 2020;5(5):e259. doi: 10.1016/S2468-2667(20)30088-8.

63. National Institute on Alcohol Abuse and Alcoholism. Surveillance report COVID-19: Alcohol sales during the COVID-19 pandemic. https://pubs.niaaa.nih.gov/publications/surveillance-covid-19/COVSALES.htm. Updated 2020. Accessed August 28, 2020.

64. National Institute on Alcohol Abuse and Alcoholism. State alcohol-related laws during the COVID-19 emergency for on-premise and off-premise establishments as of april 13, 2020. https://alcoholpolicy.niaaa.nih.gov/sites/default/files/static/apis_covid-19_memo_4.22.20_508c_(3).pdf. Updated 2020. Accessed August 24, 2020.

65. Livingston G. Stay-at-home moms and dads account for about one-in-five U.S. parents. Pew Research Center Web site. https://www.pewresearch.org/fact-tank/2018/09/24/stay-at-home-moms-and-dads-account-for-about-one-in-five-u-s-parents/. Updated 2018. Accessed August 26, 2020.

66. Johns Hopkins School of Public Health. Pod agreement: Guiding principles. https://www.jhsph.edu/covid-19/_documents/pod-agreement-example-FINAL-10-15.pdf. Updated 2020. Accessed December 23, 2020.

67. Bradbury-Jones C, Isham L. The pandemic paradox: The consequences of COVID-19 on domestic violence. *Journal of Clinical Nursing*. 2020;29(13-14):2047-2049. doi: 10.1111/jocn.15296.

68. Hedtke KA, Ruggiero KJ, Fitzgerald MM, et al. A longitudinal investigation of interpersonal violence in relation to mental health and substance use. *Journal of Consulting and Clinical Psychology*. 2008;76(4):633-647. doi: 10.1037/0022-006X.76.4.633.

69. Kenny MC. Child abuse reporting: Teachers' perceived deterrents. *Child Abuse & Neglect*. 2001;25(1):81-92. doi: 10.1016/s0145-2134(00)00218-0.

70. Ragavan MI, Culyba AJ, Muhammad FL, Miller E. Supporting adolescents and young adults exposed to or experiencing violence during the COVID-19 pandemic. *Journal of Adolescent Health*. 2020;67(1):18-20. doi: 10.1016/j.jadohealth.2020.04.011.

71. Grandey AA, Cropanzano R. The conservation of resources model applied to Work–Family conflict and strain. *Journal of Vocational Behavior*. 1999;54(2):350-370. doi: 10.1006/jvbe.1998.1666.

72. Quakenbush C, McKernan S. What amount of cash can help buffer families against COVID-19's economic impacts? *Urban Institute*. 2020.

73. Moore Q, Beebe J, Bakhiet Z. Hidden figures: The economic impact of covid-19 on low-income women and their children. 2020.

74. Webb Hooper M, Nápoles AM, Pérez-Stable EJ. COVID-19 and racial/ethnic disparities. *JAMA*. 2020;323(24):2466-2467. doi: 10.1001/jama.2020.8598.

75. Novacek D, Hampton-Anderson J, Ebor M, Loeb T, Wyatt G. Mental health ramifications of the COVID-19 pandemic for black americans: Clinical and research recommendation. *Psychological Trauma: Theory, Research, Practice, and Policy*. 2020;12(5):449-451. doi: 10.1037/tra0000796.

76. Centers for Disease Control and Prevention. Health equity considerations and racial and ethnic minority groups. https://www.cdc.gov/coronavirus/2019-ncov/community/health-equity/race-ethnicity.html#fn12. Updated 2020. Accessed August 24, 2020.

77. Rho H, Brown H, Fremstad S. A basic demographic profile of workers in frontline industries. *Center for Economic and Policy Research*. 2020.

78. Shuey KM, Willson AE. Cumulative disadvantage and black-white disparities in life-course health trajectories. *Research on Aging*. 2008;30(2):200-225. doi: 10.1177/0164027507311151.

79. Hitlin P. Research in the crowdsourcing age, a case study. *Pew Research Center*. 2016.

80. Watson B, Robinson DHZ, Harker L, Arriola KRJ. The inclusion of African-American study participants in web-based research studies: Viewpoint. *Journal of Medical Internet Research*. 2016;18(6):e168. doi: 10.2196/jmir.5486.

Chapter 4.   Aim 2: Child mental health and sleep during the early months of the COVID-19 pandemic in the United States

4.1   Abstract

Background: COVID-19 has been a stressful experience for many children as the pandemic has caused excess morbidity and mortality as well as school closures and economic shutdowns, straining societal and household resources. The goal of this study is to examine children's mental health and sleep during the early months of the COVID-19 pandemic in the United States and to assess risk and protective factors which can be the target for future interventions supporting children's mental health during the COVID-19 outbreak.

Methods: Two hundred and twenty-five parents participated in online surveys conducted in late March and early May 2020. Parents reported on the mental health and sleep of each child (under the age of 18 years; N=392 children) living in their household prior to COVID-19 and about their functioning in the past month. Descriptive statistics were used to assess the prevalence of child mental health and sleep disturbances in May 2020 and prior to COVID-19. McNemar's test was used examine change in mental health and sleep disturbance across developmental stage. Bivariate and multivariate generalized estimating equations examined predictors of change in psychological health and sleep.

Results: Parents reported a significant increase in mental health difficulties and sleep disturbances in children in May 2020 compared to pre-COVID-19. A higher proportion of older children developed mental health issues than young children (<5 years). Parental

caregiving strain (aOR: 2.42, 95% CI:1.11-5.27) was identified as a risk factor associated with children developing anxiety during COVID-19 and income loss was associated with developing sleep disturbances (aOR: 2.34, 95% CI: 1.06-5.17). Provision of weekly emotional support from at least one person to parents was identified as a protective factor for all child mental health and sleep outcomes (depression aOR: 0.36, 95% CI: 0.14-0.92; anxiety aOR: 0.20; 95% CI: 0.07-0.58; sleep disturbance aOR: 0.29, 95% CI: 0.11-0.78).

Conclusion: Policies that provide financial safety nets to families and interventions which strengthen social support networks are needed. To address elevated distress while complying with social distancing protocols, online comprehensive family mental health services must be developed and expanded.

4.2   Introduction

Although fewer cases of COVID-19 have been reported in children (0-17 years) than adults,[1,2] children may be at high risk for psychological stress. The Center for Disease Control and Prevention identifies children as vulnerable to mental stress in the face of disasters as children may experience uncertainty, fear, disrupted routines, physical and social isolation, as well as high levels of parental stress.[3,4] COVID-19 has been a stressful experience for many children as the pandemic has caused sickness and death as well as school closures and economic shutdowns, straining societal and household resources. School closures alone have affected 55.1 million school-aged children and restrictions on social contact and gatherings have further impinged on social support systems.[5] While there is little empirical evidence on the impact of COVID-19 on children's mental health, a large body of research has identified anxiety, depression, and impaired sleep as common manifestations of psychological stress in children.[4,6-8] In one study conducted

among primary school students in the Hubei province of China, where the pandemic originated, about a month into lockdown mandates, 22.6% children reported depressive symptoms and 18.9% reported symptoms of anxiety, indicating a higher prevalence of symptoms than pre-pandemic studies of school-aged children in China.[9]

COVID-19 may also affect psychosomatic responses, such as sleep outcomes as sleep patterns are linked with emotional well-being in children. The presence of sleep disturbances has also been found to predict subsequent emotional and behavioral problems in children.[10] The goal of the current study is to examine changes in children's mental health and sleep during the early months of the COVID-19 pandemic in the United States and to assess risk and protective factors which can be the target for future interventions supporting children's mental health during the COVID-19 outbreak and future disaster response efforts.

Children's mental health and sleep during the early months of COVID-19 may be impacted by a range of factors. This study is guided by the framework proposed by Norris and colleagues and assesses four categories of risk and protective factors for mental health outcomes among disaster-exposed children including personal characteristics, exposure severity, family context, and resource context.[11] Previous research on disasters has found that personal characteristics of the child (e.g., gender, age, pre-exiting psychopathology) are associated with children's mental health response to a disaster.[7] Analysis of age-related outcomes has resulted in mixed findings with some studies showing that older children have greater psychological responses to stress and sleep disturbances than younger children and other studies finding no effect of age.[6,7,12]

Many studies have found that girls exhibit more symptoms of stress than boys; however, not all studies have documented this relationship.[7] Given that gender differences in internalizing symptoms generally emerge at puberty, it may be that gender effects are more pronounced among older children.[7,13] Studies of natural disasters also suggest that pre-existing child psychopathology, specifically anxiety and depression, predicts children's psychological response to a disaster.[7,14] A study on sleep outcomes after a disaster identified that female gender, younger age, and history of sleep problems heightened the risk of a sleep disturbance.[15] A few studies found inconsistent associations between racial and/or ethnic differences in children's psychological responses to disasters,[7,16,17] which may be due to variations in access to resources associated with ethnic-minority status across different regions in the United States.[7]

The extent of exposure to a disaster has been found to be a strong predictor of child psychopathology.[6-8] A preliminary online study conducted in the Shaanxi providence in February 2020 among 320 children aged 3-18 years found higher rates of fear, anxiety, and other emotions in children residing in areas that had a high prevalence of COVID-19, but the level of epidemic risk was not statistically significant.[18] Although there is limited research on children's sleep outcomes during COVID-19, research on previous disasters has found that children with greater exposure to disasters exhibited shorter durations of sleep compared to unexposed children.[19]

A salient risk factor for children is family context.[11] Dependent children rely on parents to provide stable environments and may worry about their parents if they are stressed.

The COVID-19 outbreak has caused excess sickness and death and isolated families at home, and many are under tremendous emotional and financial stress and unable to receive in-person support. Due to these challenging circumstances, some parents may also experience mental health disorders or engage in problematic substance use. Studies conducted in the early months of COVID-19 have found high levels of depressive symptoms among parents[20] and some studies also show high levels of alcohol use.[20] Parent mental health and substance use can influence child health through parent-child relationships.[21] A study conducted in late March, 2020 found that more than 50% of parents reported financial concerns and social isolation as getting in the way of their parenting.[22] Major disruptive events, like COVID-19, can also heighten violence in the household and create unsafe household environments which activate child stress responses.[23]

Additionally, psychosocial resources play a central role in mental health response to a disaster.[11,24] Conservation of Resources Theory posits that individuals strive to protect the resources they value. This theory identifies resource loss or the threat of loss as a primary driver of the stress response; whereas available resources can serve as protective factors.[25] For children, families serve as their resource pools. COVID-19 has impacted families' financial, social, and caregiving resources. High levels of job loss associated with the pandemic have led to increased economic strain which can limit children's resources and cause food and housing insecurity. A systematic review of mental health following economic recessions found higher levels of sleep disturbances among children experiencing economic stress.[26] Families' social resources are another important element

of risk and protection. Social supports can provide a major reservoir of resources and can limit the depletion of personal resources.[27] A study of parental social networks found that parents with more social network members who could provide support was associated with reduced child behavior problems and increased prosocial behaviors.[28] However, unlike other disasters, pandemics uniquely affect social interactions by demanding isolation and quarantine rather than the typical mobilization of social support, which involves convergence and gathering.[29] These social distancing measures can impact child resilience and recovery by inhibiting peer and community support. A study of children in locales with high H1N1 prevalence found that children experiencing isolation or quarantine exhibited higher psychological distress than those who did not have these experiences.[29]

COVID-19 has also dramatically altered caregiving structures through the closure of schools and daycares, causing many parents to juggle full-time work and caregiving responsibilities. A PEW study conducted in late March 2020 found that 32% of adults with children 12 and younger in the household reported that it was very or somewhat difficult to handle childcare responsibilities during the coronavirus outbreak.[30] Family resources can also serve as protective factors. For example, support systems can help buffer children from the impact of a negative event and provide a safe recovery environment through the provision of emotional and concrete support.[31]

The goal of the current study is to provide empirical evidence to understand how COVID-19 has impacted child well-being. The first aim of this study is to describe

change in children's mental health and sleep during the early months of the COVID-19 pandemic in the United States. Second, we aim to assess change in child mental health and sleep based on age groups. Finally, we examine predictors of change in child psychological health and sleep using a four-level framework proposed by Norris and colleagues.[11]

4.3 Methods

Study population

Study participants were drawn from the online longitudinal COVID-19 and Well-Being Study. Participants completed a baseline survey conducted between March 24th and 27th, 2020 and a follow-up survey between May 5th to May 14th, 2020. During the follow-up survey, participants who reported having a child under the age of 18 in their household were invited to participate in a supplement focused on child well-being during COVID-19. In the Child Well-Being Supplement, participants were asked to list all the children in the household under the age of 18 and provide demographic information for each child as well as respond to questions on their well-being. For context, the first survey was administered thirteen days after the World Health Organization declared a global pandemic[32] and eight days after the White House provided social distancing guidelines.[33] At this time, the United States was experiencing the first surge in COVID-19 cases, and 15 states had issued Stay at Home orders while 41 States and the District of Columbia ordered schools to be closed.[5,34,35] The second wave of data collection occurred at the beginning of May when a few states were beginning to reopen and/or lift restrictions on certain business types, but 31 states and the District of Columbia had mandatory Stay at Home Orders and 48 states and the District of Columbia, had recently ordered that

schools would be closed for the rest of academic year.[5,35] This study was approved by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board.

Study participants were recruited through Amazon Mechanical Turk (MTurk), an online crowdsourcing platform. MTurk allows for the study of real-time dynamics of large groups and data collected through MTurk has been found to be reliable.[36-38] Study samples recruited through MTurk are not nationally representative but are often more representative than convenience- sampling.[36,39] Compared to national samples, MTurk participants tend to be younger, more educated, and underemployed.[37] MTurk study samples collected from United States (US) residents have been found to overrepresent Asians and underrepresent Black and Hispanics relative to the US population.[37]

Participants were eligible for the baseline study if they were aged 18 years or above, resided in the United States, spoke and read English, and had heard of the coronavirus. MTurk best practices were used to design study protocols,[40,41] and eligible participants had to pass attention and validity checks embedded into the survey.[42] Both the baseline and follow-up surveys took approximately 15 minutes, and participants were paid $2.50 for the baseline and $3 for completion of the follow-up survey. The supplement took approximately 6 minutes to complete, and participants were paid an extra dollar for its completion. The current study examines participants who reported having a child under the age of 18 years in their household and who participated in the Child Well-Being Supplement (N=225 parents; 392 children). Retention of participants who reported a child at baseline was 83% with twelve participants reporting a child at baseline but not at

follow-up excluded from the sample. Parents who participated in the follow-up did not differ from parents who did not participate on gender, race, relationship status, receipt of government assistance, and number of children in the household; however, non-respondents were significantly younger than respondents. Participation in the Child Well-Being supplement was high with 93% of participants with children consenting to participate. No demographic differences were identified between individuals who elected to participate in the supplement, compared to those who did not.

Measures

Child mental health and sleep

Child mental health and sleep measures were collected through parent-rating of children's anxiety, depression, and sleep disturbance. Parents reported on the mental health and sleep of each child living in their household under the age of 18 years in the Child Well-Being Supplement. Parents were asked questions about each child's mental health and sleep prior to COVID-19 and about their functioning in the past month. Questions were adapted from the National Survey of Children's Health and the Gulf Coast Child and Family Health surveys.[43,44] For each child, parents were asked about experiences of depression with the questions, "In the past month, has this child felt sad or depressed?" and "Before the coronavirus, did this child feel sad or depressed?" To assess child anxiety, each parent responded to the questions, "In the past month, has this child felt anxious or afraid?" and "Before the coronavirus, did this child feel anxious or afraid?" Sleep disturbances were examined through the questions, "In the past month, has this child had trouble sleeping?" and "Before the coronavirus, did this child have

problems sleeping?" Each question was assessed for every child in the household, and response options were a dichotomous "yes" or "no." To assess predictors of increased mental health or sleep troubles, a dichotomous variable was created for each of the three outcomes. The variable compared children whose symptomology increased (no symptomology before COVID-19 to symptomology in May 2020) to children who did not experience change. The small number of children who transitioned from having symptomology before COVID-19 to no symptomology in May 2020 (sad/depressed: n=2; anxious/afraid: n=0; trouble sleeping: n=5) were included in the no-change group.

Child and parent demographics

The age and gender of each child under the age of 18 in the household was assessed in the follow-up survey. Age was assessed continuously, and female children were compared to male children. Parent demographic characteristics were collected at the baseline survey. Age was assessed and analyzed as a continuous measure. Participants self-reported their race as "White," "Non-Hispanic Black," "Hispanic," "Asian," "Mixed," or "Other." Due to the small sample size, "Hispanic" and "Mixed" responses were collapsed with "Other." Educational attainment compared participants who had some college or above to those who had completed high school or less. Receiving government assistance was measured as reporting "yes" to the question, "Do any of your children qualify for free/reduced meals at school?" or "Does anyone in your household get food stamps or checks from the government (including yourself)?" Three respondents reported that they were "unsure" if anyone in their household received government assistance and were coded as "no." The number of children in the household was collected as a continuous measure.

Family context

Four questions assessed family context. Parents were classified as being in a committed relationship if they reported their relationship status as "married" or "in a committed relationship" in the baseline survey. In the second wave survey, household discord was assessed through the question, "Have you experienced stress or discord in your household?" Response options were: "No, none;" "Yes, household members occasionally short-tempered with one another; no physical violence;" "Yes, household members frequently short-tempered with one another; or children in the home getting in physical fights with one another;" "Yes, household members frequently short-tempered with one another and adults in the home throwing things at one another, knocking over furniture, hitting or harming."[45] To examine the presence versus absence of household discord, the measure was dichotomized to compare no discord with any household discord. Parental depression was examined using the ten-item Center for Epidemiologic Studies Depression scale (CES-D-10).[46] The CES-D-10 scale was dichotomized at 10 or higher which indicates the presence of significant depressive symptoms.[46] Alcohol use was assessed using the abbreviated Alcohol Use Disorder Identification Test Consumption scale (AUDIT-C).[47] Cut points of 3 and 4 were used for women and men, respectively, to indicate the presence of alcohol misuse.[48]

Severity of COVID-19 exposure

Three questions assessed COVID-19 severity at the second wave of data collection. Risk by state of residence was assessed by number of new COVID-19 cases per 100,000 using a 7-day rolling average.[49] Case data by state were drawn from USAFacts [50] in the seven-day period prior to the start of the second wave of data collection. Five participants

moved from one state to another between the two survey periods and were coded based on state of residence at the time of the second wave of data collection. States with 10 or more new daily cases per 100,000 were considered high-risk as they represented dangerous community spread and were compared to states with lower incidence.[49] To identify parents who were required to work outside the home, respondents were asked "Are you currently required to report to work outside of your home?" To assess COVID-19 exposure among peers, participants responded to the yes/no question, "Do you personally know anyone who has had the coronavirus?"

Resource context

Material and social resources were assessed in the second wave survey. Income loss was assessed with the question, "My income has already been reduced by the coronavirus." Responses of "A lot" or "A little" were compared to "Not at all." Caregiving strain was assessed with the question, "I am worried about childcare because of the coronavirus." Responses of "Strongly Agree" and "Agree" were compared to "Neither agree nor disagree," "Disagree," and "Strongly Disagree." Loss of social contact was probed with the yes/no question, "Are you trying to spend less time around other people to prevent getting the coronavirus?" Network social support was assessed across four domains based on Barrera's model of social support: financial, instrumental, childcare, and emotional.[51] Financial support was assessed with the question, "How many family members or friends <u>can</u> provide you financial support, if needed?" Network support to help with daily tasks was examined through asking, "How many family members or friends <u>can</u> help you with errands, if needed?" Childcare network support was elicited by the questions, "How many family members or friends could provide childcare for your kids, if needed?"

Received emotional support was assessed with "How many family or friends do you talk to weekly about things that are personal or private?" The response categories for all four network social support questions were "0," "1-2," "3-4," "5-8," and "9+." Responses of "0" were compared to all other responses to examine the presence of having at least 1 person available to provide support.

Analysis

The outcome measures were emergence of psychological distress and sleep disturbances of children under the age of 18 years. Descriptive statistics were used to assess the prevalence of child mental health and sleep disturbances. To examine change in mental health and sleep disturbance across developmental stage from May 2020 to before COVID-19, we used McNemar's test.

We next examined predictors of increased mental health and sleep disturbances using bivariate generalized estimating equations using outcome measures that assessed change from no symptomology pre-COVID-19 to symptomology during the early months of COVID-19. Change in child mental health and sleep was assessed with three models: (1) change in sadness/depression (2) change in anxiety/fear, (3) change in sleep. Bivariate and multivariable generalized estimating equations were used to account for clustering of children within families. Covariates that were associated ($p<0.10$) with change in children's depression, anxiety, or sleep disturbance were include in multivariable models.[52] We modeled each child mental health and sleep outcome using the same covariates to assess specificity of risk and protective factors across models. Pre-COVID-

19 functioning was accounted for in the outcome measure and could not be estimated in bivariate and multivariable models as there was close to no children who transitioned from having mental health or sleep disturbances pre-COVID-19 to not having this symptomology in May 2020. In the sleep model, spending less time around others was omitted from the analysis as it was not possible to estimate the relationship due to the fact that everyone who reported not trying to spend less time around others also reported no change in child sleep causing a zero cell count. Analyses were conducted using Stata 14.[53]

4.4   Results

As seen in Table 10, the majority (41.58%) of children were between the ages of 5 and 11 years with the remaining children being fairly equally distributed across the other age groups (0-4 years: 23.98%; 12-14 years: 17.60%; 15-17 years: 16.84%). Half of the children were female (49.74%). Children's parents were, on average, 38 years old (SD: 7.72) and the majority were female (65.56%), White (77.81%), had greater than a high school education (85.97%), and were in a committed relationship (87.76%). Children lived in households with an average of 2.30 kids (SD: 1.28). Approximately half (55.10%) of children's families experienced discord and 40.31% received government assistance. More than 30% of children's parents had depression symptoms (37.76%) and alcohol misuse (31.89%). One in five children (22.19%) lived in states with high COVID-19 risk. Within the sample, 26% of children had a parent working outside of the home or a parent who knew someone infected with COVID-19. Children had differential access to resources, with 49.74% living in households who had experienced income loss since COVID-19, 93.11% living in households where less time was spent around others,

and 25.51% in households experiencing caregiving strain. More than three quarters of children's parents reported at least one network member who could provide financial support (79.34%), errand support (84.18%), or childcare support (77.55%); and, 89.29% of children's parents reported receiving emotional support weekly.

Children had significantly higher mental health and sleep disturbances during the early months of COVID-19 (Figure 6; sad/depressed: 32.14%; anxious/afraid: 27.81%; sleep trouble: 22.70%) compared to prior to COVID-19 (sad/depressed: 13.52%; anxious/afraid: 11.48%; sleep trouble: 12.24%). When change in mental health and sleep was assessed by age (Table 11), each age group showed a significant change in all outcomes. More older children changed from no anxiety and depression symptomology pre-COVID-19 to having symptomology during the early months of COVID-19 compared to younger children (0-4 years). For example, 24.24% of children in the 15-17 year age group transitioned from no reports of sadness/depression pre-COVID-19 to having sadness/depression in early May, compared to only 9.57% of children 0-4 years making this same transition. However, change in sleep troubles was relatively equally distributed across age groups with approximately 10% children in all age groups transitioning from no sleep troubles pre-COVID-19 to having sleep troubles in May.

Bivariate and multivariable generalized estimating models (see Table 12) identified factors associated with change in child psychological and psychosomatic health. In bi- and multivariable models, older child age was associated with developing feelings of

depression (5-11 years v. 0-4 years: aOR=3.00; 95% CI= 1.46-6.15) and anxiety (5-11 years v. 0-4 years: aOR=2.96, 95% CI=1.24-7.01) during the early months of COVID-19.

Family context factors also impacted child psychological health and sleep with parental depression increasing the odds of developing all three outcomes during COVID-19 (depression: aOR=2.61, 95% CI=1.35-5.04; anxiety: aOR= 2.54, 95% CI=1.16-5.56; sleep trouble: aOR=3.14, 95% CI=1.42-6.95). In bivariate analysis, children in households experiencing discord were more likely to develop sleep trouble; however, this relationship did not remain significant in multivariable models. Severity of COVID-19 exposure measures was not associated with increased anxiety, depression, or sleep disturbances in this study.

The impact of resources depended on the child outcome measured. Children in households with parental emotional support resources reduced odds of children developing all child psychological distress outcomes, with children whose parents reported receiving emotional support from at least one person having lower odds of developing depression (aOR=0.36, 95% CI=0.14-0.92), anxiety (aOR=0.20, 95% CI=0.07-0.58), and sleep trouble (aOR=0.29, 95% CI=0.11-0.78) compared to children whose parents reported no receipt of emotional support. Other resources had differential influences on child mental health and sleep outcomes. Additionally, children in households experiencing caregiving strain had higher odds of developing anxiety symptoms (aOR=2.42, 95% CI=1.11-5.27) and marginally higher odds of depression (aOR=1.90, 95% CI=0.96-3.76). Children whose parents reported spending less time

around others had marginally higher odds of developing depressive symptoms (aOR=5.25, 95% CI= 0.78-35.21), and children in households experiencing income loss was significantly associated with developing sleep disturbances (aOR=2.34, 95% CI=1.06-5.17).

4.5   Discussion

The current study examined change in child mental health and sleep during the early months of the COVID-19 pandemic in the United States and identified that a significant proportion of children experienced an increase in mental health and sleep issues compared to pre-COVID-19 functioning. This study identified demographic, family context, and resource-related risk and protective factors associated with child mental distress during COVID-19.[11] We echo findings from a study in China that identified a higher prevalence of mental health symptomology among children during COVID-19 than before.[54] Experiencing elevated psychological sequelae is a normative response to stressful events; however it is imperative to mitigate serious and lasting psychological problems in the wave of COVID-19. Identifying subgroups of children and families to target and intervening on these factors may help mitigate the long-term impact of COVID-19 on child psychological health.

A key finding from this study is that the COVID-19 pandemic has differentially affected children's mental health and sleep based on age. Study finding indicates that older children may be at higher risk of developing mental health symptoms during COVID-19 compared to younger children. This could be the result of parents being better able to detect symptomology in older children compared to younger children.[55] However, the

finding is consistent with a recent study conducted in China using child-reported

outcomes. This study from China found that anxiety levels in adolescents during COVID-

19 were significantly higher than those of younger children.[54] Additional qualitative

research is needed to understand age-related differences in mechanisms leading to higher

distress among older children. The higher level of mental health symptoms in older

children during COVID-19 may be attributable to the fact that school-aged children are

more likely to have disrupted routines as a result of school closures compared to younger

children. Interestingly, our research did not identify a relationship between the

development of sleep disturbances and children's age. Perhaps this lack of age-related

differences in sleep was because among children, sleep disturbances are highly prevalent

in all age groups whereas mental health disturbances are more often identified in older

children.[55-57]

Another key finding from this study was that parental depression was identified as a

strong and consistent risk factor for child mental health and sleep disturbances during the

early months of COVID-19. It may be that parents with depression are more sensitive to

their children's well-being and more apt to identify when they are distressed.[58] However,

it has also been argued that parents with depression who are withdrawn and hopeless may

have decreased effectiveness at identifying child depression.[58] This finding of a

significant relationship between parental and child depression, is consistent with previous

studies that identify parental post-traumatic stress as significantly associated with child

distress after a disaster using independent reports from parents and children.[59] Four of ten

children in this study lived with at least one parent with depression, indicating a need for

accessible mental health services to promote both child and parent psychological health. Previous research has identified that there is limited access to and underutilization of mental health services among children and families.[60-62] To address this gap, access to affordable and convenient mental health services must be expanded for families. During the COVID-19 pandemic, when access to in-person services is limited, expansion of tele-mental health services for children and parents can help reduce psychological stress as telemedicine has been found to be similarly effective as in-person services.[59,63] However, provision of telemedicine care can heighten disparities as not all families have access to the needed technology.[64] Universal prevention strategies should also be considered. As schools and workplaces re-open, organizations should embed services and policies which promote mental well-being. One strategy is for school systems to integrate social and emotional learning (SEL) for all students to provide universal socioemotional support.[65] SEL refers to the capacity to recognize and manage emotions, solve problems effectively, and establish positive relationships with others.[65] SEL instruction involves teaching social and emotional skills for daily life and involves the establishment of school-family-community partnerships.[65]

This study also identified economic and caregiving strain as risk factors associated with child mental health and sleep during COVID-19. These factors have also been found to be associated with poor parent mental health in previous research.[66] Socioeconomic safety nets and caregiving supports should be strengthened to address the causes of stress during COVID-19. Comprehensive care teams can administer online screening tools to assess economic hardship and provide lists of aligned resources.[67] Some have argued that

parents are being pushed out of the workforce because they need to provide childcare.[68] To support caregiving, policies such as paid parental leave and practices for parents that allow for flexible work arrangements are needed.[68-70]

Provision of weekly emotional support from at least one person to parents was identified as a protective factor for all child mental health and sleep outcomes. Additionally, having at least one person in the network who could provide caregiving support was associated with reduced change in sleep troubles. Our research indicates that during COVID-19 many social relationships and caregiving structures have been disrupted. This finding highlights the importance of support networks for parents and their potential for enhancing child well-being. From an intervention perspective, communication campaigns that encourage families and peers to connect via social media, phone, or through socially distanced interactions could promote child well-being.

In contrast to previous research,[54] no association was identified between severity of COVID-19 exposure and change in child mental health outcomes. These contrasting findings may be a product of the outcome measure as this study examines change in child anxiety, whereas Duan and colleagues looked at child anxiety at one time point. It may also be due to how anxiety was measured. Duan and colleagues used a scale measure which was reported by the child. This measure of anxiety may be better able to detect anxiety than the single-item measure collected through parent self-report used in this study. Alternatively, it may be that the other factors that were included in the models have more valence in relation to child mental health than does severity of exposure to

COVID-19. Our findings are aligned with Jiao and colleagues (2020), who found that living in a state with a high level of epidemic risk was not significantly associated with child well-being outcomes.[18] More proximal measures of epidemic risk such as measures collected by zip code may have a different relationship than the state-level measure utilized in this study.

This study is one of the first studies to our knowledge that has examined change in child mental health during the early months of the COVID-19 pandemic in the United States. Study findings have identified both risk and protective factors which can be the target of interventions to address child well-being during the pandemic. Additionally, through collecting data on all children in the household we are able to assess age-related changes in child mental health and sleep and identify age-related differences in the impact of COVID-19 on child health. There are also a number of limitations to this study. First, this study uses parent-reported outcomes. Parental report only has moderate concordance with child-reported mental health outcomes.[71,72] With school closures and children's vulnerability status, it was difficult to access samples of children and to ensure parental consent during the early stages of the COVID-19 pandemic. Future studies should work with schools to educate families about the importance of including the perspective of children in order to collect information from both parents and children. Additionally, alternative methods of severity of COVID-19 exposure should be utilized. For example, this study used a state level measure of community risk and more localized measures may have different relationships with child mental health. This study may also be affected by social desirability and recall bias. We asked parents to think retrospectively about their

children's mental health pre-COVID-19; this approach may provide differential estimates than data collected prior to COVID-19. Additionally, future studies should use scale measures of child mental health and sleep to increase specificity. The purpose of the questionnaire used in this study was not to establish a final diagnosis of a mental health or sleep disorder but to screen for initial signs of emotional and psychosomatic disturbances.

The trajectory of the COVID-19 pandemic is unclear, and children may continue to experience household stress, the loss of socioeconomic resources, and fear of becoming infected or losing a loved one. On the basis of these results, we advocate for policies that provide a financial safety net to families and for interventions which strengthen social support networks. To address elevated distress, more comprehensive systems of care are needed which integrate primary care, psychiatric care, and socioeconomic support resources in order to identify and address both children and family needs. In the face of the ongoing pandemic and social distancing guidelines, online comprehensive family mental health services must be developed and expanded. Continued longitudinal research on child and family psychological health and access to psychosocial resources is imperative to inform tailored and developmentally appropriate interventions.

4.6 Tables for Chapter 5

Table 10. **Demographics & COVID-19 related economic and social changes (N=392 children)**

	n (%) mean ± SD
Child & parent demographics*	
Child age (0-4 years)	94 (23.98)
5-11	163 (41.58)
12-14	69 (17.60)
15-17	66 (16.84)
Child sex (Female)	195 (49.74)
Parent age	38.16 ± 7.72
Parent sex (Female)	257 (65.56)
Parent race (White)	305 (77.81)
Non-Hispanic Black	35 (8.93)
Asian	29 (7.40)
Other	23 (5.87)
> High school education	337 (85.97)
Government assistance	158 (40.31)
Family context	
Parent in committed relationship	344 (87.76)
Household discord	216 (55.10)
Parent depression	148 (37.76)
Parent alcohol misuse	125 (31.89)
Severity of COVID-19 exposure	
Live in high-risk state	87 (22.19)
Parent works outside the home	103 (26.28)
Know someone infected	102 (26.02)
Resource context	
Income loss	195 (49.74)
Caregiving strain	100 (25.51)
Less time around others	365 (93.11)
Financial support (at least 1 person)	311 (79.34)

	330 (84.18)
Errand support (at least 1 person)	330 (84.18)
Childcare support (at least 1 person)	304 (77.55)
Emotional support (at least 1 person)	350 (89.29)

* Parent demographics were assessed in March 2020 (T1)

Table 11. **Change in children's mental health and sleep disturbance by age from before COVID-19 to May 2020 (N=392)**

|	n (%)				Change from pre-COVID-19 to May 2020
Age	**'No' at both times**	**'Yes' at both times**	**'Yes' to 'No'**	**'No' to 'Yes'**	***p*-value**
Child sad or depressed					
0-4 years	83 (88.30)	2 (2.13)	0 (0.00)	9 (9.57)	0.003
5-11 years	106 (65.03)	20 (12.27)	1 (0.61)	36 (22.09)	<0.001
12-14 years	37 (53.62)	17 (24.64)	1 (1.45)	14 (20.29)	0.001
15-17 years	38 (57.58)	12 (18.18)	0 (0.00)	16 (24.24)	0.001
All Ages (0-17 years)	*264 (67.34)*	*51 (13.01)*	*2 (0.51)*	*75 (19.13)*	*<0.001*
Child anxious or afraid					
0-4 years	83 (88.30)	3 (3.19)	0 (0.00)	8 (8.51)	0.005
5-11 years	108 (66.26)	22 (13.50)	0 (0.00)	33 (20.25)	<0.001
12-14 years	44 (63.77)	13 (18.84)	0 (0.00)	12 (17.39)	0.001
15-17 years	48 (72.73)	7 (10.61)	0 (0.00)	11 (16.67)	0.001
All Ages (0-17 years)	*283 (72.19)*	*45 (11.48)*	*0 (0.00)*	*64 (16.33)*	*<0.001*
Child has trouble sleeping					
0-4 years	82 (87.23)	3 (3.19)	1 (1.06)	8 (8.51)	0.020
5-11 years	122 (74.85)	21 (12.88)	1 (0.61)	19 (11.66)	<0.001
12-14 years	48 (69.57)	13 (18.84)	1 (1.45)	7 (10.14)	0.034
15-18 years	46 (69.70)	8 (12.12)	2 (3.03)	10 (15.15)	0.021
All Ages (0-17 years)	298 (76.02)	43 (10.97)	5 (1.28)	46 (11.73)	<0.001

Table 12. **Bivariate and multivariable generalized estimating equations models assessing change in child mental health and sleep from before COVID-19 to May 2020 (N=392)**

	Model 1: Child sad/depressed		Model 2: Child anxious or afraid		Model 3: Child has trouble sleeping	
	OR	aOR	OR	aOR	OR	aOR
Child & parent demographics						
Child age (0-4 years)	REF	REF	REF	REF	REF	REF
5-11	**2.61 (1.28-5.30)**	**3.00 (1.46-6.15)**	**3.16 (1.37-7.25)**	**2.96 (1.24-7.01)**	1.57 (0.75-3.26)	1.43 (0.62-3.30)
12-14	**2.39 (1.03-5.51)**	**2.72 (1.07-6.89)**	1.70 (0.53-5.46)	2.20 (0.73-6.63)	1.07 (0.34-3.36)	0.87 (0.25-2.96)
15-17	*2.11 (0.74-5.96)*	*2.64 (0.90-7.68)*	0.88 (0.14-5.49)	1.66 (0.50-5.52)	1.30 (0.42-4.07)	1.53 (0.49-4.79)
Child sex (Male)	1.23 (0.77-1.94)	--	1.28 (0.77-2.12)	--	0.87 (0.51-1.55)	--
Parent sex (Female)	1.16 (0.62-2.20)	--	0.83 (0.42-1.64)	--	1.19 (0.56-2.53)	--
Parent race (White)	REF	REF	REF	REF	REF	REF
Non-Hispanic Black	0.82 (0.26-2.61)	--	1.10 (0.34-3.51)	--	1.04 (0.27-3.80)	--
Asian	0.64 (0.21-1.90)	--	0.88 (0.24-3.26)	--	1.36 (0.43-4.35)	--
Other	1.83 (0.53-6.29)	--	2.15 (0.63-7.41)	--	0.95 (0.20-4.54)	--
Parent > High school edu.	*4.12 (0.88-19.24)*	2.04 (0.41-10.12)	*4.90 (0.92-26.02)*	3.60 (0.78-16.60)	2.28 (0.62-8.41)	1.67 (0.46-6.04)
Government assistance	0.60 (0.30-1.18)	**0.39 (0.18-0.82)**	0.82 (0.41-1.65)	0.51 (0.22-1.20)	1.18 (0.57-2.46)	0.66 (0.30-1.44)
Family Context						
Parent in committed relationship	2.33 (0.78-6.95)	--	1.10 (0.44-2.79)	--	1.75 (0.51-6.02)	--
Household discord	1.51 (0.81-2.79)	1.01 (0.53-1.91)	1.69 (0.86-3.31)	0.88 (0.41-1.89)	**2.58 (1.15-5.80)**	1.74 (0.75-4.01)
Parent depression	**2.96 (1.62-5.39)**	**2.61 (1.35-5.04)**	**2.91 (1.50-5.62)**	**2.54 (1.16-5.56)**	**4.69 (2.23-9.88)**	**3.14 (1.42-6.95)**
Parent alcohol misuse	1.00 (0.53-1.90)	--	1.25 (0.63-2.48)	--	1.21 (0.57-2.55)	--
Severity of COVID-19 Exposure						
Live in high-risk state	0.81 (0.40-1.66)	--	1.37 (0.67-2.82)	--	0.54 (0.21-1.40)	--
Parent works outside home	*0.54 (0.26-1.12)*	0.71 (0.32-1.58)	0.65 (0.30-1.42)	0.93 (0.39-2.21)	0.72 (0.31-1.68)	1.17 (0.49-2.78)
Know someone infected	1.48 (0.77-2.84)	--	1.39 (0.68-2.82)	--	1.23 (0.56-2.70)	--
Resource Context						
Income loss	1.26 (0.70-2.29)	1.10 (0.56-2.15)	1.20 (0.63-2.31)	1.21 (0.59-2.47)	**2.70 (1.27-5.70)**	**2.34 (1.06-5.17)**
Caregiving strain	**1.88 (0.99-3.58)**	*1.90 (0.96-3.76)*	0.64 (0.30-1.36)	**2.42 (1.11-5.27)**	**0.41 (0.19-0.87)**	1.71 (0.79-3.74)
Less time around others	**9.91 (1.41-69.54)**	*5.25 (0.78-35.21)*	2.28 (0.46-11.24)	1.47 (0.33-6.58)	xx	xx
Financial support	1.25 (0.58-2.71)	--	1.40 (0.57-3.44)	--	0.54 (0.24-1.25)	--
Errand support	0.83 (0.35-1.94)	--	0.62 (0.26-1.50)	--	0.62 (0.24-1.66)	--
Childcare support	0.72 (0.35-1.46)	1.02 (0.47-2.22)	0.64 (0.30-1.36)	0.97 (0.38-2.45)	**0.41 (0.19-0.87)**	0.62 (0.29-1.34)
Emotional support	**0.33 (0.14-0.77)**	**0.36 (0.14-0.92)**	**0.21 (0.08-0.51)**	**0.20 (0.07-0.58)**	**0.24 (0.09-0.64)**	**0.29 (0.11-0.78)**

4.7   Figures for Chapter 5

Figure 6.   **Percent of children experiencing mental health and sleep disturbance from before COVID-19 to May 2020 (N=392)**
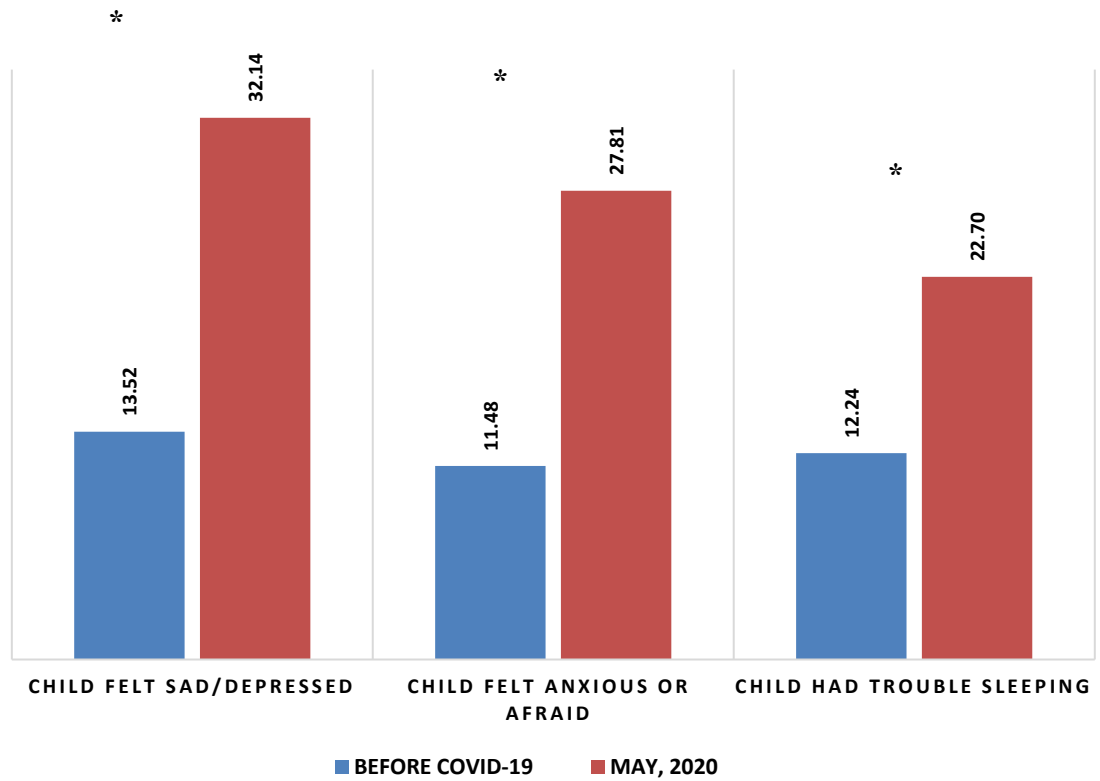
*p<0.05

4.8 References

1. Wu Z. Characteristics of and important lessons from the coronavirus disease 2019 (COVID-19) outbreak in China. *JAMA*. 2020;323(13):1239-1242.

2. Stokes EK, Zambrano LD, Anderson KN, et al. Coronavirus disease 2019 case surveillance — United States, January 22–May 30, 2020. *MMWR*. 2020;69(24):759-765. doi: 10.15585/mmwr.mm6924e2.

3. Centers for Disease Control and Prevention. Charing for children in disasters: How are children different from adults? https://www.cdc.gov/childrenindisasters/differences.html. Updated 2020. Accessed September 2, 2020.

4. Imran N, Zeshan M, Pervaiz Z. Mental health considerations for children & adolescents in COVID-19 pandemic. *Pakistan Journal of Medical Sciences*. 2020;36(S4):S67-S72. doi: 10.12669/pjms.36.COVID19-S4.2759.

5. Education Week. Map: Coronavirus and school closures in 2019-2020. https://www.edweek.org/ew/section/multimedia/map-coronavirus-and-school-closures.html. Updated 2020. Accessed September 22, 2020.

6. Tang B, Liu X, Liu Y, Xue C, Zhang L. A meta-analysis of risk factors for depression in adults and children after natural disasters. *BMC Public Health*. 2014;14(1):623. doi: 10.1186/1471-2458-14-623.

7. Furr JM, Comer J, Edmunds JM, Kendall PC. Disasters and youth: A meta-analytic examination of posttraumatic stress. *Journal of Consulting and Clinical Psychology*. 2010;78(6):765-780. doi: 10.1037/a0021482.

8. Peek L. Children and disasters: Understanding vulnerability, developing capacities, and promoting resilience — an introduction. *Children, Youth and Environments*. 2008;18(1):1-29.

9. Xie X, Xue Q, Zhou Y, et al. Mental health status among children in home confinement during the coronavirus disease 2019 outbreak in Hubei Province, China. *JAMA Pediatrics*. 2020;174(9):898-900. doi: 10.1001/jamapediatrics.2020.1619.

10. Ivanenko A, Crabtree VM, Obrien LM, Gozal D. Sleep complaints and psychiatric symptoms in children evaluated at a pediatric mental health clinic. *Journal of Clinical Sleep Medicine*. 2006;2(1):42-48. doi: 10.5664/jcsm.26434.

11. Norris FH, Friedman MJ, Watson PJ. 60,000 disaster victims speak: Part II. summary and implications of the disaster mental health research. *Psychiatry*. 2002;65(3):240-260. doi: 10.1521/psyc.65.3.240.20169.

12. Camhi S. Factors affecting sleep disturbances in children and adolescents. *Sleep Medicine*. 2000;1(2):117-123. doi: 10.1016/s1389-9457(99)00005-2.

13. Angold A, Costello EJ. Puberty and depression. *Child and Adolescent Psychiatric Clinics of North America*. 2006;15(4):919-937. doi: 10.1016/j.chc.2006.05.013.

14. Weems CF, Pina AA, Costa NM, Watts SE, Taylor LK, Cannon MF. Predisaster trait anxiety and negative affect predict posttraumatic stress in youths after hurricane katrina. *Journal of Consulting and Clinical Psychology*. 2007;75(1):154-159. doi: 10.1037/0022-006X.75.1.154.

15. Lai BS, La Greca AM, Colgan CA, et al. Sleep problems and posttraumatic stress: Children exposed to a natural disaster. *Journal of Pediatric Psychology*. 2020;45(9):1016-1026. doi: 10.1093/jpepsy/jsaa061.

16. Shannon M, Lonigan C, Finch A, Taylor C. Children exposed to disaster: Epidemiology of post-traumatic symptoms and symptom profiles. *J. Am. Acad. Child Adolesc. Psychiatry*. 1994;33(1):80-93.

17. Vernberg EM, La Greca AM, Silverman WK, Prinstein MJ. Prediction of posttraumatic stress symptoms in children after hurricane andrew. *Journal of Abnormal Psychology*. 1996;105(2):237-248. doi: 10.1037/0021-843X.105.2.237.

18. Jiao WY, Wang LN, Liu J, et al. Behavioral and emotional disorders in children during the COVID-19 epidemic. *Euorpean Paediatric Association*. 2020;17(3):230-233. doi: 10.15690/pf.v17i3.2127.

19. Usami M, Iwadare Y, Kodaira M, et al. Sleep duration among children 8 months after the 2011 Japan earthquake and tsunami. *PloS One*. 2013;8(5):e65398. doi: 10.1371/journal.pone.0065398.

20. Lee S, Ward K. Mental health, relationships, and coping during the coronavirus pandemic. *Parenting in Context Research Lab*. 2020.

21. Bowers ME, Yehuda R. Intergenerational transmission of stress in humans. *Neuropsychopharmacology*. 2016;41(1):232-244. doi: 10.1038/npp.2015.247.

22. Lee S, Ward K. Stress and parenting during the coronavirus pandemic. *Parenting in Context Research Lab*. 2020.

23. Curtis T, Miller BC, Berry EH. Changes in reports and incidence of child abuse following natural disasters. *Child Abuse & Neglect*. 2000;24(9):1151-1162. doi: 10.1016/S0145-2134(00)00176-9.

24. Vogel JM, Vernberg EM. Part 1: Children's psychological responses to disasters. *Journal of Clinical Child Psychology*. 1993;22(4):464-484. doi: 10.1207/s15374424jccp2204_7.

25. Hobfoll SE. The influence of culture, community, and the Nested-Self in the stress process: Advancing conservation of resources theory. *Applied Psychology*. 2001;50(3):337-421. doi: 10.1111/1464-0597.00062.

26. Frasquilho D, Matos MG, Salonna F, et al. Mental health outcomes in times of economic recession: A systematic literature review. *BMC Public Health*. 2016;16(1):115. doi: 10.1186/s12889-016-2720-y.

27. Hobfoll S, Freedy J, Lane C, Geller P. Conservation of social resources: Social support resource theory. *Journal of Social and Personal Relationships*. 1990;7:465-478.

28. Koyama Y, Fujiwara T, Isumi A, Doi S. Association of parental social network diversity with behaviour problems and resilience of offspring in a large population-based study of Japanese children. *BMJ Open*. 2020;10(e035100). doi: 10.1136/ bmjopen-2019-035100.

29. Sprang G, Silman M. Posttraumatic stress disorder in parents and youth after health-related disasters. *Disaster Medicine and Public Health Preparedness*. 2013;7(1):105-110. doi: 10.1017/dmp.2013.22.

30. Pew Research Center. Most Americans say coronavirus outbreak has impacted their lives. 2020.

31. Sprague C, Sprague C, Kia-Keating M, et al. Youth psychosocial adjustment following wildfire: The role of family resilience, emotional support, and concrete support. *Child Youth Care Forum*. 2015;44(3):433-450. doi: 10.1007/s10566-014-9285-7.

32. World Health Organization. WHO director-general's opening remarks at the media briefing on COVID-19 - 11 March 2020. https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020. Updated 2020. Accessed August 24, 2020.

33. Whitehouse.gov. 15 days to slow the spread. https://www.whitehouse.gov/articles/15-days-slow-spread/. Updated 2020. Accessed August 24, 2020.

34. Schuchat A, CDC COVID-19 Response Team. Public health response to the initiation and spread of pandemic COVID-19 in the United States, February 24-April 21, 2020. *Morbidity and Mortality Weekly Report*. 2020;69(18):551-556. doi: 10.15585/mmwr.mm6918e2.

35. Moreland A, Herlihy C, Tynan MA, et al. Timing of state and territorial COVID-19 stay-at-home orders and changes in population movement — United States, March 1–May 31, 2020. *Morbidity and Mortality Weekly Report*. 2020;69(35):1198-1203. doi: 10.15585/mmwr.mm6935a2.

36. Berinsky AJ, Huber GA, Lenz GS. Evaluating online labor markets for experimental research: Amazon.com's mechanical turk. *Political Analysis*. 2012;20(3):351-368. doi: 10.1093/pan/mpr057.

37. Paolacci G, Chandler J. Inside the turk: Understanding mechanical turk as a participant pool. *Current Directions in Psychological Science*. 2014;23(3):184-188. doi: 10.1177/0963721414531598.

38. Follmer D, Sperling R, Suen H. The role of MTurk in education research: Advantages, issues, and future directions. *Educational Researcher*. 2017;46(6):329-334. doi: 10.3102/0013189X17725519.

39. Huff C, Tingley D. "Who are these people?" evaluating the demographic characteristics and political preferences of MTurk survey respondents. *Research & Politics*. 2015;2(3):205316801560464. doi: 10.1177/2053168015604648.

40. Chandler J, Shapiro D. Conducting clinical research using crowdsourced convenience samples. *Annual Review of Clinical Psychology*. 2016;12(1):53-81. doi: 10.1146/annurev-clinpsy-021815-093623.

41. Young J, Young K. Don't get lost in the crowd: Best practices for using amazon's mechanical turk in behavioral research. *Journal of the Midwest Association for Information Systems*. 2019(2):7-34. doi: 10.17705/3jmwa.000050.

42. Rouse S. A reliability analysis of mechanical turk data. *Computers in Human Behavior*. 2015;43:304-307. doi: 10.1016/j.chb.2014.11.004.

43. U.S. Department of Health and Human Services. National survey of children's health. 2019.

44. Abramson D, Stehling-Ariza T, Garfield R, Redlener I. Prevalence and predictors of mental health distress post-katrina: Findings from the gulf coast child and family health study. *Disaster Medicine and Public Health Preparedness*. 2008;2(2):77-86. doi: 10.1097/DMP.0b013e318173a8e7.

45. Stoddard J, Kaufman J. Coronavirus impact scale. *Johns Hopkins University*. 2020.

46. Zhang W, O'Brien N, Forrest JI, et al. Validating a shortened depression scale (10 item CES-D) among HIV-positive people in british columbia, canada. *PloS One*. 2012;7(7):e40793. doi: 10.1371/journal.pone.0040793.

47. Khadjesari Z, White IR, McCambridge J, et al. Validation of the AUDIT-C in adults seeking help with their drinking online. *Addiction Science & Clinical Practice*. 2017;12(1):2. doi: 10.17863/CAM.6949.

48. Frank D, DeBenedetti AF, Volk RJ, Williams EC, Kivlahan DR, Bradley KA. Effectiveness of the AUDIT-C as a screening test for alcohol misuse in three race/ethnic groups. *Journal of General Internal Medicine*. 2008;23(6):781-787. doi: 10.1007/s11606-008-0594-0.

49. Harvard Global Health Institute and Harvard's Edmond J. Safra Center for Ethics. Key metrics for COVID suppression. 2020.

50. USAFacts. US coronavirus cases and deaths track COVID-19 data daily by state and county. https://usafacts.org/visualizations/coronavirus-covid-19-spread-map/. Updated 2020. Accessed Sept 6, 2020.

51. Barrera M, Sandler IN, Ramsay TB. Preliminary development of a scale of social support: Studies on college students. *American Journal of Community Psychology*. 1981;9(4):435-447. doi: 10.1007/bf00918174.

52. Bursac Z, Gauss CH, Williams DK, Hosmer DW. Purposeful selection of variables in logistic regression. *Source Code for Biology and Medicine*. 2008;3(1):17. doi: 10.1186/1751-0473-3-17.

53. StataCorp. Stata statistical software: Release 14. 2015.

54. Duan L, Shao X, Wang Y, et al. An investigation of mental health status of children and adolescents in china during the outbreak of COVID-19. *Journal of Affective Disorders*. 2020;275:112-118. doi: 10.1016/j.jad.2020.06.029.

55. Dopheide J. Recognizing and treating depression in children and adolescents. *American Journal of Health-System Pharmacy*. 2006;63(3):233-243. doi: 10.2146/ajhp050264.

56. Armstrong K, Quinn R, Dadds M. The sleep patterns of normal children. *Med J Aust*. 1994;161(3):202-206.

57. Ohayon A, Roberts R, Zulley J, Smirne S, Priest R. Prevalence and patterns of problematic sleep among older adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry*. 2000;39(12):1549-1556. doi: 10.1097/00004583-200012000-00019.

58. Logan D, King C. Parental identification of depression and mental health service use among depressed adolescents. *J. Am. Acad. Child Adolesc. Psychiatry*. 2002;41(3):296-303.

59. Juth V, Silver RC, Seyle DC, Widyatmoko CS, Tan ET. Post-disaster mental health among Parent–Child dyads after a major earthquake in indonesia. *J Abnorm Child Psychol*. 2015;43(7):1309-1318. doi: 10.1007/s10802-015-0009-8.

60. Owens P, Hoagwood K, Horwitz S, et al. Barriers to children's mental health services . *J. Am. Acad. Child Adolesc. Psychiatry*. 2002;41(6):731-738.

61. Logan D, King C. Parent facilitation of adolescent mental health service utilization: A conceptual and empirical review. *Clinical Psychology: Science and Practice*. 2001;8(3).

62. Maybery D, Reupert A. Parental mental illness: A review of barriers and issues for working with families and children. *Journal of Psychiatric and Mental Health Nursing*. 2009;16(9):784-791. doi: 10.1111/j.1365-2850.2009.01456.x.

63. Bashshur RL, Shannon GW, Bashshur N, Yellowlees PM. The empirical evidence for telemedicine interventions in mental disorders. *Telemedicine Journal and e-Health*. 2016;22(2):87-113. doi: 10.1089/tmj.2015.0206.

64. Golberstein E, Wen H, Miller BF. Coronavirus disease 2019 (COVID-19) and mental health for children and adolescents. *JAMA Pediatrics*. 2020;174(9):819-820. doi: 10.1001/jamapediatrics.2020.1456.

65. Zins JE, Elias MJ. Social and emotional learning: Promoting the development of all students. *Journal of Educational and Psychological Consultation*. 2007;17(2-3):233-255. doi: 10.1080/10474410701413152.

66. American Psychological Association. Stress in the time of COVID-19, volume one. 2020.

67. Fallon B, Lefebvre R, Collin-Vézina D, et al. Screening for economic hardship for child welfare-involved families during the COVID-19 pandemic: A rapid partnership response. *Child Abuse & Neglect*. in press:104706. doi: 10.1016/j.chiabu.2020.104706.

68. Alon T, Doepke M, Olmstead-Rumsey J, Tertilt M. The impact of covid-19 on gender equality. *National Bureau of Economic Research*. 2020.

69. Isaacs J, Healy O, Peters H. Paid family leave in the united states: Time for a new national policy. *Urban Institute*. 2017:1-12.

70. Addati L, Cassirer N, Gilchrist K. Maternity and paternity at work: Law and practice across the world. *International Labour Organization*. 2014.

71. Achenbach TM, McConaughy SH, Howell CT. Child/adolescent behavioral and emotional problems. *Psychological Bulletin*. 1987;101(2):213-232. doi: 10.1037/0033-2909.101.2.213.

72. De Los Reyes A, Kazdin AE. Measuring informant discrepancies in clinical child research. *Psychological Assessment*. 2004;16(3):330-334. doi: 10.1037/1040-3590.16.3.330.

Chapter 5. Aim 3: "His best friend is Alexa right now": How parents describe the impact of COVID-19 on their children's well-being

5.1 Abstract

Background: Children have faced unprecedented changes during the COVID-19 pandemic. Yet, research on children during the pandemic has primarily focused on their clinical features rather than on their socioemotional well-being.

Methods: This study examined the responses of 234 parents who described how COVID-19 has affected their children's (<18years) well-being. In a May 2020 survey, parents who were recruited online were asked to respond to open-ended questions about the negative and positive impacts of the pandemic on their children. To assess the differential impact of COVID-19, the answers of parents with children in three age groups were compared: families with all young children (<5 years; n=41), families of all school-aged children (5-17 years; n=154), and families with children of mixed ages (n=39). The parents' responses were analyzed using thematic analysis.

Results: Analyses identified four domains of child well-being impacted by COVID-19: physical health, social connections, education, and mental/behavioral health. Findings indicated that COVID-19 has had both negative and positive impacts on these domains which differ by children's age. Parents of older parents expressed that their children were showing signs of psychological distress, a sentiment which was less often expressed among parents of young children. Fear of infection impacted children's health by influencing parents' willingness to let their young children go outside and older

children's anxiety about being outdoors. Disruption in relationships with peers and extended family was a key concern for child development, especially for older children. For some families, having more time together brought closeness and more engagement in their child's life.

Conclusions: The impact of COVID-19 on children has been varied with both positive and negative impacts identified. Programs which disseminate trusted information about COVID-19, promote the formation of Pods, and integrate socio-emotional learning into schools may help support children during the COVID-19 pandemic. Multi-dimensional and multi-level interventions are needed which target child, family, and systems.

5.2 Introduction

COVID-19 caused unprecedented changes in the lives of children. Much of the current research has focused on how children are less severely impacted by COVID-19 infection than adults.[1] However, the COVID-19 pandemic has likely profoundly impacted children through school closures and social distancing mandates. Of the estimated 73.7 million children in the United States in 2020, COVID-19-related school closures affected an estimated 55.1 million children, and over 275 thousand children had confirmed cases of COVID-19 in 2020.[2,3]. Additionally, Stay at Home Orders, implemented as a COVID-19 prevention measure, limited children's interpersonal interactions and led to high rates of household financial strain. These interconnected impacts of COVID-19 likely have had a multifaceted effect on children's well-being. The goal of the present study is to assess how parents describe COVID-19 impacting their children in order to identify domains of well-being which can be a target for interventions to address deficits and promote resilience.

Children's physical health during COVID-19 has been a primary research focus and remains poorly understood. Since the beginning of the COVID-19 pandemic, evidence of COVID-19 transmission among children was slow to emerge and has been marked by unclear messaging about transmission and prevention.[4] Initial studies identified that infection risk was more pronounced for adults than children.[1] However, later studies identified that children are just as likely to be infected but less likely to be symptomatic or develop severe symptoms.[5] The role children play as vectors of transmission to more vulnerable populations remains uncertain.[1] In the face of this uncertainty, many parents have feared that their children would become infected with COVID-19 and possibly infect others. A potential site of transmission is schools, and a large proportion of US parents are worried that their children will be infected with COVID-19 at school.[6]

School and daycare closures during COVID-19 also severely interrupted children's educational schedules. Another domain that has impact children during COVID-19 is the closure of schools and daycare facilities. In the first months of the pandemic, the closure of these facilities was implemented as a mitigation strategy to reduce the spread of COVID-19. These closings resulted in an abrupt transition to online learning and changes to children's routines. Parents have had mixed reactions to how school closings have affected their children's educational outcomes. A survey conducted in September 2020 by the National Parents Union reported that 38% of parents of school-aged children thought that their children were learning less, and 17% of parents reported that their children were learning more than they normally would when attending school in person.[7]

Social distancing measures, which are a primary prevention strategy for COVID-19

prevention, may also impact children's well-being. Many children and families have not

had the same level of engagement with friends and extended families, limiting their

access to social supports. These measures have caused many parents to be concerned

about their children's social connections and loneliness. The American Psychological

Association found that 71% of parents were worried about the impact the pandemic has

had on their children's social development.[8]

COVID-19's impact on other domains of children's lives is less well understood. For

example, household stress may have escalated during the COVID-19 pandemic due to

unemployment and financial strain. In the early months of the pandemic, unemployment

soared from 4.4% in March 2020 to 14.7% in April 2020.[9] Job loss during COVID-19 has

also been found to significantly increase the risk of child maltreatment.[10] Furthermore,

family conflict likely increased as members struggled with differing views on COVID-19

prevention and families have had to adjust to children's online learning and parents

working from home.

With the confluence of changes brought on by the COVID-19 pandemic, studies have

identified a negative impact on child mental health. A review study by Loades and

colleagues found that children and adolescents experiencing loneliness are at increased

risk of developing depression and anxiety.[11] Another study conducted among primary

school students in the Hubei province of China, where the pandemic originated found that

about a month into lockdown mandates, 22.6% of children reported depressive symptoms and 18.9% reported symptoms of anxiety; these proportions indicated a higher prevalence of symptoms than pre-pandemic studies of school-aged children in China.[12]

Research on the conceptualization of child well-being suggests that many models follow a pathogenesis model focusing on the negative manifestations of well-being.[13] The study of child well-being during COVID-19 has also largely focused on the negative impacts of the pandemic. This is not surprising as there is mounting evidence of the potential negative impact of COVID-19 on children, and that these negative impacts of the COVID-19 pandemic on child well-being are likely multifaceted. In contrast, another conceptualization of child well-being focuses on factors that contribute to positive development.[13] There is scant research on any potential positive aspects of the COVID-19 pandemic. The few reports that consider these positive impacts speculate that the pandemic may promote greater independence among children and closer relationships to family.[14,15]

This current study identifies the key domains used by parents to describe the impact of COVID-19 on their children's well-being. In addition, this research assesses how COVID-19 may differentially impact children based on age as younger children may experience less disruption in their daily routines at home compared to school-aged children who are affected by school closures. Disruptions in social connections with peers may differentially impact children by age as younger children are more attached to their parents while adolescents also often have strong attachments with peers.[16,17] To

address age-related differences, the present research examines how parents of school-aged children describe their children's adaption to COVID-19 compared to parents of young children (ages 0-4 years) and families with children of mixed ages. This study is guided by a phenomenologist perspective and aims to both describe "what" parents experience and "how" they experienced it,[18] with the goal of understanding common or shared experiences and perceptions of child well-being during COVID-19. Understanding these common experiences may facilitate the development of research measures as well as practices and policies to address the impact of the COVID-19 pandemic on child well-being.

5.3 Methods

Study Population

Study participants were drawn from the longitudinal COVID-19 and Well-Being Study. Participants completed a baseline survey conducted between March 24th and 27th, 2020 and a follow-up survey between May 5th to May 14th, 2020. Study participants were recruited through an online platform, Amazon Mechanical Turk (MTurk). Study populations recruited through MTurk are not nationally representative but are often more representative than convenience- sampling.[19,20] In comparison to national samples, MTurk participants tend to be younger, more educated, and underemployed.[21] Additionally, MTurk participants from the United States have been found to overrepresent Asians and underrepresent Black and Hispanics relative to the US population.[21] Eligibility for the baseline study included: aged 18 years or above, United States residence, English speaking and reading, and had heard of the coronavirus. MTurk best practices were used to design study protocols,[22,23] and eligible participants had to

pass attention and validity checks embedded into the survey.[24] This study was approved by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board.

The current study examines participants who reported having a child under the age of 18 years in their household and who participated in the Child Well-Being Supplement. The Child Well-Being Supplement, which contained the questions that are the focus of this study, was completed during the follow-up survey and included participants who reported having a child under the age of 18 in their household who agreed to participate. This second wave of data collection in early May 2020, occurred when a few states were beginning to reopen and/or lift restrictions on certain business types for the first time, but 31 states and the District of Columbia had mandatory Stay at Home Orders and 48 states and the District of Columbia, had recently ordered that schools would be closed for the rest of academic year.[3,25] Participation in the Child Well-Being supplement was high, with 93% of participants with children consenting to participate. The main surveys took approximately 15 minutes and the supplement took approximately 6 minutes to complete. Participants were paid $2.50 for the baseline, $3 for the follow-up survey, and an extra dollar for completing the supplement amounting to approximately $11 per hour. Retention of participants who reported a child at baseline was 83%. Parents who participated in the follow-up did not differ from parents who did not participate with respect to gender, race, receipt of government assistance, and number of children in the household; however, non-respondents were significantly younger than respondents. In total, 253 people qualified for the follow-up that reported having a child, 18 people (7.11%) declined participation, and one participant was excluded due to poor quality of

qualitative responses. Few demographic differences were identified between individuals

who elected to participate in the supplement, compared to those who did not, with

supplement participants more likely to report that their children qualified for free or

reduced lunch.

Analysis

All participants in the Child Well-Being Supplement (N=234) were asked the question:

"Please describe what concerns you have about the impact of COVID-19 on your

child(ren)? Parents who responded that the coronavirus had led to "some" or "only to a

few" positive changes in their children's health were asked: "What are these positive

changes?" (N=68). Data were analyzed using a thematic analytic approach which is a

process by which patterns or themes are identified across people.[26] After reading a subset

of the responses, members of the study team developed a codebook which reflected a

consensus on the codes that had emerged during the initial review. Two analysts

independently coded the transcripts, and discrepancies in coding were resolved through

consensus. The two coders and another member of the study team identified child well-

being domains by examining commonalities or clusters among the codes. The frequencies

of codes within the domains are shown in Supplemental Tables 14 and 15. To assess how

frequently domains were expressed, codes for each domain were collapsed (Figures 7 &

8). To augment the credibility of findings journaling was used to helped to ensure that

interpretations of the researchers reflected the perspectives of participants.[27] Our findings

are presented in relation to the identified general well-being domains and in relation to

the children's age, comparing families will all young children (<5 years; n=41) to

families of all school-aged children (5-17 years; n=154), and families with children of mixed ages (n=39).

5.4 Results

Demographics

Most families reported having 1 or 2 children. On average, parents reported 1.7 children under the age of 18 years living in their household (range: 1-8; Table 13). Parents in this sample mostly had all school-aged children (65.8%), with 17.5% having only young children and 16.7% having both young children and school-aged children. Participants' mean age was 38.6 (range: 19-63), and the majority were female (63.7%) and White (78.2%), with 7.7% reporting their race as non-Hispanic Black and 9.0% as Asian. Half (56.0%) of parents reported a household income of $60K or more, and 27.8% of parents reported their children qualified for free/reduced lunch at school. The majority of participants were the children's primary caregiver (94.4%).

Domains of child well-being during COVID-19

The analysis of the negative impact of COVID-19 on child well-being revealed four primary domains: physical health, social connections, school, and mental/behavioral health (Figure 1). A few additional responses fell into a small "other" category, and 12 parents reported no concerns. Interestingly, among parents who reported some or a few positive changes in their children's health, the same four primary domains of impact were identified (Figure 2). In the following sections, we explore the positive and negative impacts on each of these domains as well as age-related differences within each domain.

Children's physical health

COVID-19 was identified as having both direct and indirect impacts on children's physical health. Parents of children of all ages expressed concern that their child would become infected or be a vector of transmission. These fears are represented by a father of a school-aged child:

> Although I know that children of a certain age aren't likely to get a severe case or symptoms of COVID-19 if infected, I still worry that my daughter could get infected and be one of the few who have serious negative side effects, I also worry both her being a potential carrier and infecting her mother or myself. (Father of one child aged 11 years)

This sentiment was expressed often, and there were no clear age-related differences. Parents of younger and older children expressed worries about their children's potential to be infected or infect others.

COVID-19 also impacted the dynamics of children developing unhealthy routines. Reduced time outside and lack of exercise were the most often cited reasons for this reduction, but they differed by child age. Some parents with younger children felt that they were not allowed or deemed it unsafe to take their children outside while Stay at Home orders were enacted or were fearful of taking their children outside. A parent of a one-year-old stated: "I cannot take my child to go out to have some fresh air or to get some sunlight because we have to stay at home (Father of one child age 1 year)." Parents of young children also expressed fear of taking their children outside because they did

not feel that their children understood how to protect themselves and follow prevention guidelines. A mother of a young child stated:

> He's only 5, so I've had a time trying to explain that he can't hug or go near other people. After hearing about the deaths of several children in New York due to complications from Covid-19, I've become a lot more anxious and would just rather not take him with me if I can help it. He's upset that I don't always take him with me like I used to, as well as not being able to visit the playground near our house. (Mother of one child age 5 years)

For older children, parents expressed that limiting time outside was often motivated by the child. Some adolescents felt anxious about contracting the virus and did not want to leave the house. A mother of an adolescent said that her daughter would not even walk outside as she was afraid of getting the virus (Mother of one child aged 13 years). Other school-aged children showed a preference for electronics rather than spending time outside, with one mother stating, "I am worried that his best friend is Alexa right now. He isn't as active as he used to be. It's hard to get him to go out and do things. (Mother of one child age 7 years)." Similarly, another mother stated:

> My main concern is that my child likes to stay indoors a lot more. He doesn't go outside to just play in the front yard or anything. His screen time with playing video games or his mobile phone has increased significantly. I want to change his habit, but with an ongoing pandemic I don't really know what to do since he doesn't have much to do after his schoolwork. (Mother of one child age 10 years)

In contrast, other parents identified that COVID-19 helped their children develop healthier routines. For younger children, developing healthier routines was often attributed to families spending more time together. A father of two young children described how his family had developed routines that promoted exercising as a family and eating healthier.

> We have had more time as a family. This leads to more time having fun, exercising and playing, and working out emotions. With all the time together and love, it has given us a lot of motivation to keep up on things, make sure the boys are taking their meds and eating right. I know the world is suffering, but this time with my family and the chance to reshape our lifestyle feels like a blessing to me. (Father of two children ages 4 and 6 years)

Some older children also developed healthier routines during the pandemic; however, these healthy routines seemed less dependent on parental involvement as compared to younger children with parents commenting on their children's independent physical activities. A father of school-aged children stated that his kids "spend more time playing outside with physical activity than they had in the weeks prior to the pandemic (Father of two children ages 7 and 11 years)."

The first identified domain was physical health as concern over infection was a primary concern among parents of children of all ages. Fear of infection also indirectly impacted physical health by influencing parents' willingness to let their younger children go outside and their older children's anxiety about being outdoors. Families who reported that their children were developing healthier routines during COVID-19 did not report

that fear of infection had reduced their time outside; rather, they reported spending more time exercising and being outside. For families with young children, this often meant more family time outside compared to older children who were more apt to be spending time outside independent of their parents. This finding is supported by a study of school-aged Canadian youth, which identified that children were less active and played outside less compared to prior to COVID-19 restriction.[28] The study by Moore and colleagues also identified a relationship between social media and family physical activity on sedentary behaviors.[28] The current study adds an additional element to Moore's study, suggesting that fear of infection may be a predictor of reduced engagement in children's time spent outdoors.

Children's social connections

Disruption in relationships with peers and extended family was identified as a key concern for child development. For both younger and older children, parents reported concern about the impact of disrupted social connections. The mother of a young child expressed:

> He is a toddler and needs social development. However, he cannot go on playdates or go to the park and run around with other kids his age. I worry that this will have a negative impact on him in the future. (Mother of one child age 1 year)

A mother of a teenager stated a similar sentiment:

I am concerned she is learning to be isolated more. I want her to value having

relationships with people. [COVID-19] places emphasis on being alone." (Mother

of one child age 15 years).

One approach families have used to manage social isolation is engaging with peers

through video platforms. However, many parents did not feel that this was a sufficient

source of connection for both older and younger children. A mother of a 9-year-old

stated: "My child misses her friends, and although they video chat a few times a week, it

is obviously not the same." (Mother of one child age 9 years). A mother of a 7-year-old

expressed a similar sentiment and expressed that her child had stopped engaging in

virtual connections. She noted, "he misses his grandparents and won't video chat with

them anymore because it's not the same (Mother of one child age 7 years)."

When comparing younger children to older children, older children seemed to be

especially impacted by their limited social interactions. One mother said, "They are

having to stay away from friends, and my oldest especially is feeling a bit depressed

about it." (Mother of five children ages 0, 3, 5, 11, and 11 years). Some parents attributed

this age-related difference in impact to social development; that is, to a lack of

understanding among younger children. A mother explained, "My oldest is sad about not

going to school or seeing his friends. My youngest doesn't really understand yet."

(Mother of two children ages 2 and 6 years)

While disconnection with peers and extended family was commonly expressed as a

negative impact of the virus, parents with both young and older children observed some

positive impacts as well. Specifically, they felt that their own relationships with their children had improved. One parent stated, "[My child] has been able to spend more time with his father. We are doing a lot of activities together." (Mother of one child age 3 years). Another parent of several older children stated, "My husband and I now have time to point out things that ought to be corrected that were once overlooked when school was in [session] and we were always in a hurry." (Mother of four children ages 3, 10, 13, and 14 years). These quotes illustrated that, for some families, having more time together brought closeness and more engagement in their child's life.

This second identified domain of children's social connections was primarily discussed in relation to disruptions in children's relationships with their peers and extended family. Parental concerns about social isolation, or the objective state of reduced frequency of social interaction, were particularly prevalent among older children. This finding aligns with developmental literature that finds that school-aged children, particularly adolescents, become more focused on relationships with peers.[16,17] While relationships with peers suffered during COVID-19, many parents reported strengthening relationships with their children during this time. Parents increased engagement in their children's lives is not only important for filling the void of social interaction with peers but also may be a critical protective factor when parents facilitate children's ability to cope with the impact of the COVID-19 pandemic.

Children's education

The closure of school and daycare centers impacted children's access to educational resources and quality of instruction. Educational concerns were less prevalent for the parents of younger children. However, the parents of younger children were concerned that with the closing of daycare facilities they were not able to provide sufficient developmentally appropriate activities. A father wrote:

> He's not yet pre k age, he starts that this fall, but he still went to a daycare once a week and was learning to do different things…The only thing I'm worried about is that he should be doing more organized activities, and I'm not the best at that. I usually just come up with some shit for us to do, and while usually fun, I'm not sure it's helping him in any sort of developmental way. (Father of one child age 4 years)

Reduced access to quality instruction was a particularly prevalent concern for school-aged children, with one mother expressing:

> I feel the covid 19 has had a terrible impact on my child's education. They are doing online learning and it's optional as not all students have access to internet. They all have laptops as the school provides them. Supposedly they all cannot access it so it is optional…My daughter is getting like 1hr of work total for all classes. this semester is a waste. (Mother of one child age 15)

Notably, the degree of impact on school-aged children differed by child and likely also by school resources and policies. Children with special needs were particularly affected by COVID-19 as access to school resources were reduced during the pandemic. "my son is special needs, and he needs more than his mom trying to do the best she can." (Mother of two children ages 11 and 13 years)

For a small subset of children, a transition to learning at home was seen as a benefit. For parents of young children, some felt that their children were benefiting from more time with the family. One parent said, "He has had much more time with myself and my wife, which I think is a great thing. We have been working with him to make up for lack of pre-school and he has been doing extremely well." (Father of one child age 4 years) For school-aged children, the benefit of online learning was largely seen for children who struggled with in-person learning. One parent expressed that her children had behavioral problems in school, and these had been reduced since transitioning to home learning (Mother of three children ages 3, 6, and 8 years). For another child, the home environment was a benefit, with the parent stating, "The child is not as anxious about school because all of the school's resources are now online." (Mother of one child age 13 years)

Education was the third identified domain of child well-being impacted by the COVID-19 pandemic. Parents of school-aged children reported wide variability in the quality of instruction, with some parents reporting concerns that their children did not have access to sufficient educational materials and were falling behind. These reports align with a report which identified learning loss among all students.[29] Parents of younger children also expressed concerned about educational development when daycare facilities were closed. For the subset of students who struggle with social anxiety or behavioral issues at school, a transition to online learning may have improved their educational outcomes. Notably, parents' comfort compensating for lack of in-person educational experiences

varied, with some parents of young children feeling that they were able to fill in any gaps that resulted from the closing of daycares while others felt uncertainty over appropriate developmental activates.

Children's mental and behavioral health

Emotional and behavioral health was a salient concern for parents due to the impact of social isolation and pandemic-related stressors. For younger children, concerns related to children's mental and behavioral health were mentioned less often. However, some parents of younger children expressed concern about their children's frustration due to a lack of understanding. One mother stated:

> I worry about how my child feels, he doesn't really understand what is going on and it is probably extremely confusing and frustrating to him that he can't see his friends or family, especially with school being out. (Mother of one child aged 5 years)

Another parent expressed how this lack of understanding was causing her young child to act out:

> She has been having (more) severe temper tantrums than before. she never had them and now they are happening a few times a week for extended periods of time. She doesn't understand why we can't go into nana's house when we visit or get close to her last time we went to see my mom we had to leave because she kept trying to get inside her house and was very upset (Mother of one child aged 2 years)

Parental concerns about the mental health of their school-aged children were more prevalent than for younger children. Multiple impacts of COVID-19 on child mental health were discussed for school-aged children, including loneliness, depression, and anxiety. Loneliness and social isolation were most often cited with one parent stating: "The social isolation is really taking its toll. She wants to see her friends but isn't able to due to the restrictions put in place (Father of one child aged 10 years)." For school-aged children, some parents also expressed concern about depression related to isolation and lack of purpose. One father said:

> They are getting depressed and isolated. With no school they don't have a sense of purpose and they don't get the social interaction that they usually would. It's not like summer vacation because the kids around here are under quarantine and they don't play together. (Father of two children aged 11 and 9 years)

Other parents expressed that their school-aged children were anxious about contracting COVID-19 or having a family member infected. For instance, a mother wrote:

> She is too young to be worrying about death. She talks about it a lot. She is having a hard time sleeping she paces the floors. Her over all mental well-being is what concerns me. She does not need to be worrying about me getting sick and dying. (Mother of one child aged 12 years)

Positive mental and behavioral health outcomes were also discussed among some parents. Some parents with both young and school-aged children felt that their children were happier because they were able to spend more time with them. A parent of four stated: "They are happy because mum and dad now spend more time with them than before

(Mother, 4 children ages 14, 13, 10 and 3 years)." For children of all ages, parents highlighted the development of positive behavioral characteristics. For example, a mother expressed, "I think there's been an increase in life skills like learning house chores and cooking and laundry. They've been pretty good at establishing a routine (Mother of two children ages 7 and 4 years)."

The fourth and final domain identified in this study was children's mental and behavioral health. Parents of older children were more likely than parents of young children to express concern that their children were developing mental health issues such as anxiety and depression. Parents often associated these outcomes with loneliness, lack of structure, and worrying about COVID-19 infection. For a subset of school-aged children, COVID-19 brought about positive behavioral change and increased independence and life skills. Parents of younger children were less likely to identify adverse mental and behavioral health outcomes and instead reported that their children did not understand what was happening. This lack of understanding among young children sometimes manifested in behavioral issues. Some parents of young children also reported that their children were happier due to more time spent as a family.

5.5 Discussion

This analysis of open-ended survey responses provides insight into the nature of the impact of COVID-19 on children as viewed by their parents. The vast majority of parents reported that COVID-19 had a negative impact on multiple aspects of their children's well-being, including physical health, social connections, education, as well as mental and behavioral health. While parents identified COVID-19 as having many adverse

effects on their children, families also adapted with new routines and ways of interacting. With the rollout of COVID-19 vaccines, the COVID-19 pandemic will transition to widespread re-opening and children returning to in-person learning and socializing. Highlighting strategies for positive family adaptions and elevating family assets may help promote child and family resilience as children transition back to pre-pandemic routines. Below, we discuss key findings and intervention implications to address the intertwined domains of children well-being during COVID-19. Some of the strategies proposed can be implemented virtually, while other strategies can be employed when in-person instruction resumes.

Parents in this study identified physical health as a key domain of child well-being impacted by COVID-19. Parents expressed concern of children becoming infected with COVID-19, and, for some parents, this concern led to not wanting their children to spend time outside. These concerns may be associated with mixed messaging about how children are affected by COVID-19 and may, or may not, serve as disease vectors. It is critical to address parents' concerns about their children recreating outside, as exercise is an important tool to mitigate distress among children and there is a consistent association between sedentary screen time (primarily TV watching) and poorer mental health.[30] These findings have intervention implications as clear and consistent messaging may help alleviate some concerns about how children are impacted by COVID-19 infection as well as promoting children's engagement in outside activities. Messaging to encourage children's physical health could include information on how COVID-19 impacts children's health, what is safe and unsafe to do outdoors, and examples of strategies to

improve family health such as eating regular family meals together.[31] Additionally, indoor recreation options can be encouraged such as engagement in play-based games on gaming systems as well as low-cost options such as use of child-centered workout videos offered for no charge on online platforms such as YouTube. These messages can be relayed through trusted information sources, communication campaigns, and social network diffusion.

Another key finding was that the most prevalent well-being domain impacted by COVID-19 was children's connections with their social networks. Study findings and developmental studies suggest that school-aged children may be particularly affected by disrupted connections with peers compared to younger children whose primary relationships are with their parents.[16,17] These findings suggest that it is important to find ways for school-aged children to interact safely with their friends. One way of promoting safe in-person interactions during COVID-19 is the formation of pods, which are partnerships between groups of families to provide childcare, improve socialization, and support educational assistance. To reduce the risk of COVID-19, socialization is often limited to the families within the pods.[32] A September 2020 study conducted by the National Parents Union found that only 14% of parents reported being in a pod, but 89% of the families in pods found it helpful for their children's education.[33] Importantly, this study identified that many parents felt that their own relationship with their children had strengthened during COVID-19. These findings are consistent with a qualitative study of Australian parents, which found that some family relationships had been strengthened during COVID-19.[34] To promote the strengthening of family connections, it may be

helpful to provide parents with age-appropriate strategies and activities that they can do with their children while also working from home.

The impacts of COVID-19 on children's education are likely to be varied. Study findings suggest that school-aged children were often impacted negatively while young children experienced benefits from closures. Future research should assess factors impacting school-aged children's education during COVID-19, such as differences across classrooms and school districts due to the quality and access to online instruction. Additionally, child-related factors may impact educational outcomes as some children seem to prefer the online format for instruction. Age may also play a role as older children may be more comfortable accessing online learning compared to younger children with shorter attention spans.[35] In contrast, educational content may be more challenging for older children, and parents may feel less comfortable providing support. Household factors such as access to the internet and a computer as well as adult supervision may also play a role in how COVID-19 has impacted child educational outcomes. This study also found that children with special needs may be particularly impacted by COVID-19 as access to required support services was often reported to be limited or nonexistent. The profound impact of COVID-19 on school-aged children's education identified in this study has intervention implications. Assessments can be used to identify gaps in learning, and remediation strategies can be implemented, such as team tutoring, structured after school programs, and summer learning opportunities.[36] Additionally, school systems can improve the quality of online instruction and provide remediation strategies for children who are struggling through the sharing of best

practices and provision of professional development.[29] For example, an analysis of schools serving low-income students of color which had high engagement in online instruction during COVID-19 found that these schools eliminated all technology barriers, connected individually with families, integrated learning and assessment, and promoted accountability as well as celebrated successes.[37] Community-based organizations can also help address the learning gap created by COVID-19 such as the YMCA which has created Academic Support Centers where children ages can receive online learning support and enrichment from trained associates.

This study corroborated previous research and found that school-aged children's socio-emotional health has been particularly affected by COVID-19 with children experiencing anxiety, and depression.[12] It is unknown if the effect of the COVID-19 pandemic on child emotional health will be transient or ongoing. In this study, parents perceived young children as being less affected as they felt that their young children did not understand what was going on. Schools can be an important source of socio-emotional support and information. For example, schools can disseminate information about student's mental health and emotional well-being. Currently, 37% of parents say that their children's school does a fair/poor job of providing this information.[33] School systems can also work to integrate social and emotional learning (SEL) for all students and increased supports for high-risk students and students with problems to ensure children are socioemotionally supported.[38] Effective SEL instruction involves teaching social and emotional skills for daily life and the formation of school-family-community partnerships.[38] Some children

and families may require additional support, and it is imperative that these families are identified and able to easily access affordable tele-mental health services.

This study allowed for the elevation of parents' voices on how COVID-19 has impacted their children's well-being. The qualitative analysis identified four domains of child well-being impacted by COVID-19, suggesting that future studies should employ a multi-dimensional approach to assessing well-being during COVID-19. The overall domains identified in this study align with other studies of child well-being with a few exceptions.[39-41] First, other measures of the educational well-being domain primarily focused on academic achievement.[39,41] In the present study, the school domain is more expansive and includes daily structure and quality of instruction.[39] Second, other assessments of child well-being have included a measure of materials resources or an economic domain.[39,41] Despite the economic hardship of the COVID-19 pandemic, material deprivation did not emerge as a commonly cited child well-being concern among parents in the present study. This may reflect that this is not a primary avenue parents perceive as impacting children during COVID-19. Alternatively, this may indicate an under representation of families who have been disproportionally affected by COVID-19, such as those who are have lost their jobs or underemployed.[21] Future research must include these populations in order to understand if there are unique ways that COVID-19 has affected children.

Another potential limitation of this study is the use of parent-reported outcomes as parental reports do not always accurately reflect children's experiences.[13] Parent

identification of problems that their children are experiencing is likely influenced by the nature of the problem, its commonality, parent's familiarity with it, and their willingness to accept a diagnosis.[42,43] Additionally, parents of young children may have a particularly challenging time recognizing a mental health problem.[44] However, parental detection of mental health challenges may be more accurate during the COVID-19 pandemic as parents are often spending more time with their children. Additionally, this paper assesses child well-being at one point in time. Child well-being is likely a process; therefore, longitudinal studies should be employed to assess how well-being changes over the course of the pandemic and beyond.[13]

COVID-19 has had, and will likely continue to have, a dramatic effect on children's well-being affecting children's physical health, mental/behavioral health, social, and academic outcomes. Support of children in response to COVID-19 must be multi-dimensional and multi-level, which includes intervention at the child, family, and system levels.

5.6 Tables for Chapter 6

Table 13.   **Demographics of study population (N=234)**

	n (%)
Parent Age	38.62 (8.06)
Parent Race (White)	183 (78.21)
Black	18 (7.69)
Asian	21 (8.97)
Other	12 (5.13)
Household Income ($60K and over)	131 (55.98)
Average number of children	1.72 (0.99)
Primary caregiver	221 (94.44)
Children qualify for free or reduced lunch	65 (27.78)
Children's age	
All young children	41 (17.52)
All school aged children	154 (65.81)
Children of mixed ages	39 (16.67)

5.7 Figures for Chapter 6

Figure 7.   **Frequency of negative impact of COVID-19 domains by families with young compared to school-aged children (N=234)**

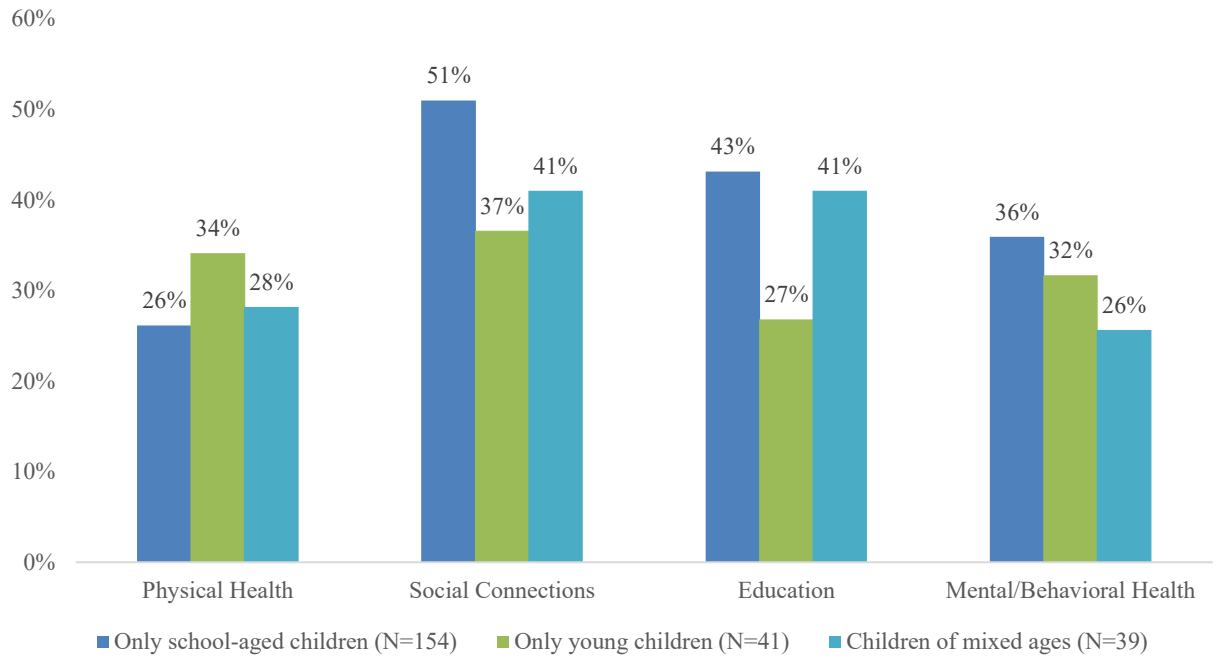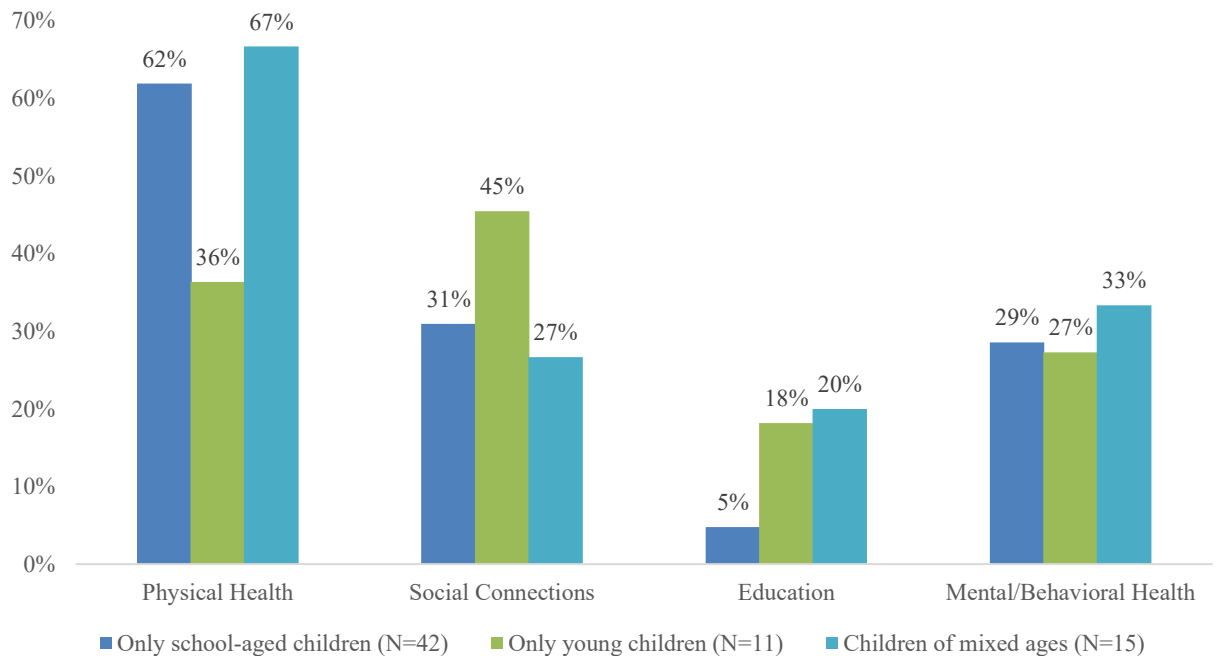Legend: Only school-aged children (N=154) | Only young children (N=41) | Children of mixed ages (N=39)

Figure 8.   **Frequency of positive impact of COVID-19 domains by families with young compared to school-aged children (N=69)**

Legend: Only school-aged children (N=42) | Only young children (N=11) | Children of mixed ages (N=15)

5.8 Supplements for Chapter 6

Table 14. **[Supplement] Frequency of codes on negative impact of COVID-19 by families with young compared to school-aged children**

	Only school-aged children (N=154)	Only young children (N=41)	Children of mixed ages (N=39)
Physical Health			
Child contracting the virus/dying from COVID-19	25	11	7
Child eating unhealthy	1	0	0
Child not getting enough exercise/time outside	16	4	4
Social Connections			
Disrupted social connections between child and extended family	9	3	2
Disrupted social connections between child and peers	76	13	15
Education			
Child getting behind in school/quality of online classes	43	4	12
Concern for what will happen next year/when school resumes for child	14	3	4
No set schedule for child or loss of routine	11	2	3
Child does not have access to same services provided in school	9	3	0
Mental/Behavioral Health			
Child feels anxious/scared	22	1	1
Child having behavioral issues	1	1	0
Child feels bored	5	0	4
Child feels unhappy/depressed	15	3	3
Child feels lonely	16	1	0
General concern about mental health	2	1	1
Child is having trouble sleeping	4	0	0
Child does not understand what is going on	3	9	2
Other			
Insufficient/changed caregiving	3	1	1
Concerned about how financial impact of COVID-19 will affect kids	2	0	0
Child has too much screen time	8	0	1
Other	7	3	0
No concerns	9	3	0

Table 15. **[Supplement] Frequency of codes on positive impact of COVID-19 by families with young compared to school-aged children**

	Only school-aged children (N=42)	Only young children (N=11)	Children of mixed ages (N=15)
Physical Health			
Less allergies	1	0	1
Not getting colds from other kids	0	1	2
Child eating healthier	11	2	4
Child getting more exercise	22	1	4
Child spending more time outside	11	2	3
Less exposure to pollution	0	0	1
Child gaining/losing weight	1	0	1
Social Connections			
Child communicating more with parents	4	0	1
Child spending more time connecting with extended family	1	0	0
Child has more time with family in household (parent or siblings)	11	5	4
People in the community coming together	1	0	0
Education			
Child is less anxious about school	2	0	1
Child has fewer behavioral problems because not at school	0	0	1
Parent knows what their child is learning	0	2	1
Mental/Behavioral Health			
Child feels happier	2	0	3
Child is more independent or responsible	3	3	2
Child developed new skill	2	1	0
Child has more sleep	6	0	1
Other			
Healthcare more accessible to child	0	1	0
Other	1	0	1

5.9 References

1. Zimmermann P, Curtis N. Coronavirus infections in children including COVID-19. *The Pediatric Infectious Disease Journal*. 2020;39(5):355-368. doi: 10.1097/INF.0000000000002660.

2. Leeb RT, Price ;S, Sliwa S, et al. Morbidity and mortality weekly report. *Wilderness & Environmental Medicine*. 2012;23(1):89-90. doi: 10.1016/j.wem.2011.11.005.

3. Education Week. Map: Coronavirus and school closures in 2019-2020. https://www.edweek.org/ew/section/multimedia/map-coronavirus-and-school-closures.html. Updated 2020. Accessed September 22, 2020.

4. Sinha IP, Harwood R, Semple MG, et al. COVID-19 infection in children. *The Lancet*. 2020;8:446–447. doi: 10.1016/S2213-2600(20)30152-1.

5. Bi Q, Wu Y, Mei S, et al. Epidemiology and transmission of COVID-19 in 391 cases and 1286 of their close contacts in Shenzhen, China: A retrospective cohort study. *The Lancet Infectious Diseases*. 2020;20(8):911-919. doi: 10.1016/S1473-3099(20)30287-5.

6. Marken S, Harlan J. 45% of parents very worried kids will get COVID-19 at school. https://news.gallup.com/poll/321512/parents-worried-kids-covid-school.aspx#:~:text=WASHINGTON%2C%20D.C.%20%2D%2D%20Almost%20half,%22not%20at%20all%20worried.%22. Updated 2020. Accessed December 8, 2020.

7. National Parents Union. New poll: Parents warn of pandemic's lasting effect on children's education. https://nationalparentsunion.org/npu-polling/. Updated 2020. Accessed December 23, 2020.

8. American Psychological Association. Stress in the time of COVID-19: Volume two. 2020.

9. National Conference of State Legislatures. National employment monthly update. https://www.ncsl.org/research/labor-and-employment/national-employment-monthly-update.aspx. Updated 2020. Accessed October 6, 2020.

10. Lawson M, Piel MH, Simon M. Child maltreatment during the COVID-19 pandemic: Consequences of parental job loss on psychological and physical abuse towards children. *Child Abuse & Neglect*. 2020;110(Pt. 2)(104709). doi: 10.1016/j.chiabu.2020.104709.

11. Loades ME, Chatburn E, Higson-Sweeney N, et al. Rapid systematic review: The impact of social isolation and loneliness on the mental health of children and adolescents in the context of COVID-19. *Journal of the American Academy of Child and Adolescent Psychiatry*. 2020;59(11):1218-1239.e3. doi: 10.1016/j.jaac.2020.05.009.

12. Xie X, Xue Q, Zhou Y, et al. Mental health status among children in home confinement during the coronavirus disease 2019 outbreak in Hubei Province, China. *JAMA Pediatrics*. 2020;174(9):898-900. doi: 10.1001/jamapediatrics.2020.1619.

13. Amerijckx G, Humblet PC. Child Well-Being: What does it mean? *Children & Society*. 2014;28(5):404-415. doi: 10.1111/chso.12003.

14. Dvorsky MR, Breaux R, Becker SP. Finding ordinary magic in extraordinary times: Child and adolescent resilience during the COVID-19 pandemic. *European Child & Adolescent Psychiatry*. 2020:1-3. doi: 10.1007/s00787-020-01583-8.

15. Gupta S, Jawanda MK. The impacts of COVID-19 on children. *Acta Paediatrica*. 2020;109(11):2181-2183. doi: 10.1111/apa.15484.

16. Greenberg M, Siegel JM, Leitch CJ. The nature and importance of attachment relationships to parents and peers during adolescence. *Journal of Youth and Adolescence*. 1983;12(5):373-386. doi: 10.1007/BF02088721.

17. Coleman PK. Perceptions of parent-child attachment, social self-efficacy, and peer relationships in middle childhood. *Infant and Child Development*. 2003;12(4):351-368. doi: 10.1002/icd.316.

18. Creswell JW. *Qualitative inquiry & research design: Choosing among five approaches.* Thousand Oaks, CA: Sage Publications; 2007.

19. Berinsky AJ, Huber GA, Lenz GS. Evaluating online labor markets for experimental research: Amazon.com's mechanical turk. *Political Analysis*. 2012;20(3):351-368. doi: 10.1093/pan/mpr057.

20. Huff C, Tingley D. "Who are these people?" evaluating the demographic characteristics and political preferences of MTurk survey respondents. *Research & Politics*. 2015;2(3):205316801560464. doi: 10.1177/2053168015604648.

21. Paolacci G, Chandler J. Inside the turk: Understanding mechanical turk as a participant pool. *Current Directions in Psychological Science*. 2014;23(3):184-188. doi: 10.1177/0963721414531598.

22. Chandler J, Shapiro D. Conducting clinical research using crowdsourced convenience samples. *Annual Review of Clinical Psychology*. 2016;12(1):53-81. doi: 10.1146/annurev-clinpsy-021815-093623.

23. Young J, Young K. Don't get lost in the crowd: Best practices for using amazon's mechanical turk in behavioral research. *Journal of the Midwest Association for Information Systems*. 2019(2):7-34. doi: 10.17705/3jmwa.000050.

24. Rouse S. A reliability analysis of mechanical turk data. *Computers in Human Behavior*. 2015;43:304-307. doi: 10.1016/j.chb.2014.11.004.

25. Moreland A, Herlihy C, Tynan MA, et al. Timing of state and territorial COVID-19 stay-at-home orders and changes in population movement — United States, March 1– May 31, 2020. *Morbidity and Mortality Weekly Report*. 2020;69(35):1198-1203. doi: 10.15585/mmwr.mm6935a2.

26. Braun V, Clarke V. Using thematic analysis in psychology. *Qualitative Research in Psychology*. 2006;3(2):77-101. doi: 10.1191/1478088706qp063oa.

27. Watt D. On becoming a qualitative researcher: The value of reflexivity. *Qualitative Report*. 2007;12(1):82.

28. Moore SA, Faulkner G, Rhodes RE, et al. Impact of the COVID-19 virus outbreak on movement and play behaviours of canadian children and youth: A national survey. *Int J Behav Nutr Phys Act*. 2020;17(1). doi: 10.1186/s12966-020-00987-8.

29. Dorn E, Hancock B, Sarakatsannis J, Viruleg E. COVID-19 and learning loss— disparities grow and students need help. https://www.mckinsey.com/industries/public-and-social-sector/our-insights/covid-19-and-learning-loss-disparities-grow-and-students-need-help#. Updated 2020. Accessed December 11, 2020.

30. Biddle SJH, Asare M. Physical activity and mental health in children and adolescents: A review of reviews. *British Journal of Sports Medicine*. 2011;45(11):886-895. doi: 10.1136/bjsports-2011-090185.

31. Skeer MR, Ballard EL. Are family meals as good for youth as we think they are? A review of the literature on family meals as they pertain to adolescent risk prevention. *J Youth Adolescence*. 2013;42(7):943. doi: 10.1007/s10964-013-9963-z.

32. Johns Hopkins School of Public Health. Pod agreement: Guiding principles. https://www.jhsph.edu/covid-19/_documents/pod-agreement-example-FINAL-10-15.pdf. Updated 2020. Accessed December 23, 2020.

33. National Parents Union. National parents union- coronavirus impact survey, sept. 21-29, 2020. https://mercuryllc.app.box.com/s/53n19nhwnq6ekpxoagkoag1vf21tv49y. Updated 2020. Accessed December 23, 2020.

34. Evans S, Mikocka-Walus A, Klas A, et al. From it has stopped our lives to spending more time together has strengthened bonds: The varied experiences of Australian families during COVID-19. *Frontiers in psychology*. 2020;11:588667. doi: 10.3389/fpsyg.2020.588667.

35. Gómez-Pérez E, Ostrosky-Solís F. Attention and memory evaluation across the life span: Heterogeneous effects of age and education. *Journal of clinical and experimental neuropsychology*. 2006;28(4):477-494. doi: 10.1080/13803390590949296.

36. Darling-Hammond L, Schachner A, Edgerton A, et al. Restarting and reinventing school: Learning in the time of COVID and beyond. 2020.

37. Curriculum Associates. Overcoming the digital divide: Distance-learning successes during the pandemic. 2020.

38. Zins JE, Elias MJ. Social and emotional learning: Promoting the development of all students. *Journal of educational and psychological consultation*. 2007;17(2-3):233-255. doi: 10.1080/10474410701413152.

39. Pollard E, Lee P. Child well-being: A systematic review of the literature. *Social Indicators Research*. 2003;61(1):59-78. doi: 10.1023/A:1021284215801.

40. Lippman L, Moore K, McIntosh H. Positive indicators of child well-being: A conceptual framework, measures, and methodological issues. *Applied Research Quality Life*. 2011;6(4):425-449. doi: 10.1007/s11482-011-9138-6.

41. Bradshaw J, Richardson D. An index of child well-being in Europe. *Child Indicators Research*. 2009;2(3):319-351. doi: 10.1007/s12187-009-9037-7.

42. Logan DE, King CA. Parental identification of depression and mental health service use among depressed adolescents. *J. Am. Acad. Child Adolesc. Psychiatry*. 2002;41(3):296-304.

43. Teagle S. Parental problem recognition and child mental health service use. *Ment Health Serv Res*. 2002;4(4):257-266. doi: 10.1023/A:1020981019342.

44. Pavuluri MN, Luk SL, McGee R. Help-seeking for behavior problems by parents of preschool children: A community study. *Journal of the American Academy of Child and Adolescent Psychiatry*. 1996;35(2):215-222. doi: 10.1097/00004583-199602000-00015.

Chapter 6.   Conclusions

Taken together, the three research papers in this dissertation have focused on an examination of change in parent and child well-being during the early months of the COVID-19 pandemic in the United States. Study findings provide insight into how families have been affected by COVID-19 and identify intervention targets to reduce distress within families.

6.1   Applying theory to understand findings

This study applied Norris and colleagues' Risk Factors for Poor Mental Health Framework to identify characteristics that may affect family well-being during COVID-19.[1] This framework includes four levels of influence: personal characteristics, trauma & stress, family, and resource context that Norris and colleagues found to affect families after a disaster.[1] The four-levels served as the organizing framework for this study and three of the levels (personal, family, and resource context) were found to associated with many of the parent and child well-being outcomes. Using this framework, this study was able to pinpoint potential risk and protective factors across levels of influence to identify intervention targets. The specific factors identified in this dissertation work (e.g., child age, parental depression, and loss of social network support) are discussed in detail in the next section, "Key findings with intervention implications."

The fourth level of impact, trauma & stress/severity of exposure, was not found to be strongly associated with family well-being during COVID-19. This finding deviates from Norris's and colleague's framework and findings from previous disasters.[2-5] This

inconsistency may be explained by the measures used. For example, a measure of severity of COVID-19 exposure used in this study was living in a state with a high prevalence of COVID-19 infection. However, this measure was also not found to be associated with parent or child well-being. The lack of relationship between severity of COVID-19 exposure and family well-being may be a product of the proximity of measurement. More proximal measures of severity of exposure than the state-level risk variable used in this study (e.g., zip code) may have a stronger effect.

Another theory which informed our variable selection and helped situate study findings is Hobfoll's Conservation of Resource Theory (COR).[6] Norris and colleagues used COR Theory to inform their risk factors framework as COR emphasizes the importance of assessing resource context. COR also states that the family context may be particularly important for children as they are dependent on their families and communities for their resource pools.[7] The emphasis on the importance of family context for child well-being was consistent with our findings as we found that parental depression was a strong and consistent predictor of child well-being across outcome measures.

COR Theory can also help explain study findings that Black participants, compared to White participants, reported higher depressive symptoms in May 2020 when controlling for covariates, including depression symptomology in March 2020. This finding is consistent with other recent research, which has identified that COVID-19 is exacerbating existing inequalities.[8,9] One of the corollaries of COR theory is the concept of resource caravans.[10] Resource caravans are the environmental conditions that support and protect

or detract from resources of individuals and families.[10] This corollary may help us understand the racial disparities in depression identified in this study. The elevated depression among Black Americans identified in this study may be influenced by the long history of systemic racism which has limited resources within minority communities.[11] For example, disparities in access to quality education and discrimination have resulted in racial minority groups holding lower pay or less stable jobs.[12] This dynamic of lower education quality which can lead to job instability illustrates how resources can be tied together and compound stress. Future empirical research can provide additional insights into the causes of mental health racial disparities in response to the COVID-19 pandemic and inform the development of tailored interventions that address both depressive symptoms and the structural conditions that may contribute to distress.

In this study, we also identified that receiving government assistance was associated with higher parental depressive symptoms. This finding may be understood by another corollary of COR theory that states that those who lack resources are more vulnerable to resource loss and that initial losses beget future loss.[13] It may be that families who have limited financial resources are more likely to lose other resources during the COVID-19 pandemic. For example, families who are unable to pay their rent may have to move and lose access to their social support networks much can mitigate depression. Examination of loss cycles during COVID-19 and interventions to mitigate them warrants further investigation.

Principles of Attachment Theory can also help us understand study findings. Attachment Theory suggests that parental availability and sensitivity play critical roles in child well-being.[14] One of the key findings of this study was the importance of family context. Qualitative analysis found that parents felt that their children were benefiting from the increased time that their family was spending together as they were more aware of their children's needs and able to engage with their children through schoolwork and developing healthier routines together. This finding that increased parental availability and responsiveness was associated with improved child well-being aligns with the tenants of Attachment Theory. Attachment Theory also helps explain the relationship between parental depression and child distress identified in this study, a relationship that is consistent with previous research.[15] Attachment Theory posits that parental depression may impact child well-being as depressed parents are more likely to have reduced affective relationships and are more likely to have insecure attachment styles with their children compared to parents without depression.[15] Therefore, study findings and Attachment Theory principles, emphasize the importance of addressing parent health in order to also support children.

Attachment Theory also can help understand age-related differences in how disrupted social connections impact child distress. Through qualitative analysis, we found that many parents were concerned about the loss of their children's friendships, with parents of older children being particularly concerned that this loss contributed to their children's sadness and depression. These findings align with studies of Attachment Theory which suggests that for older children, parents remain as attachment figures but they move down

in the attachment hierarchy with children's friends becoming more salient attachment figures.[16] Our results are also consistent with research findings that the disruption of attachment relationships causes feelings of agitation, anxiety, and depression.[17] Further, Attachment Theory has informed our understanding of intervention implications as it highlights the importance of minimizing relationship disruption within families and support networks.

6.2   Key findings with intervention implications

The identification of cross-level predictors of family distress during the COVID-19 pandemic aligns with Norris and colleague's notion that disaster response interventions must have an ecological approach with both a need for societal and community-level interventions for the population at large as well as targeted interventions for the most at need.[1] This section outlines key findings from this dissertation analysis which have intervention implications.

Implication 1: Parent and child mental health has been impacted by the COVID-19 pandemic and both must be addressed

Using quantitative as well as qualitative data, this dissertation research identified that COVID-19 has taken a toll on the mental health of families. Analysis of changes in parental mental health found that on the one hand there was an overall significant decrease in parental worry and depressive symptoms and no change in alcohol use between March and May 2020; however, on the other hand, some parents experienced an increase in mental distress and alcohol use in the early months of the pandemic. For their

children, parents reported increased mental health problems and sleep disturbances. Findings indicate that age was a significant predictor of the development of mental health distress but not sleep disturbances, with a higher proportion of older children developing anxiety and depressive symptoms than young children. Adding a more nuanced understanding to child mental health, qualitative findings identified that, for some children, COVID-19 may have improved mental health due to more time spent together as a family, less school-related anxiety, and an increase in life skills. Findings also suggest that to address child well-being, it is important to address parental mental health as parental depression was identified as a strong and consistent predictor of children becoming distressed during COVID-19.

Taken together, findings from this dissertation suggest that mental health interventions must be wide reaching and target both children and parents. Due to elevated mental distress in communities, universal mental health interventions are needed in order to prevent distress and mitigate low levels of distress. An advantage of universal interventions is that they reach individuals who might not seek treatment or disclose symptoms.[18] While there are numerous types of universal mental health interventions, many are based on cognitive behavioral therapy (CBT) approaches which involve efforts to change thinking patterns and gain confidence in coping.[19] For parents, the workplace may provide a good site to provide universal prevention programs. Examples of workplace mental health programs include CBT-based interventions, mental health literacy, and exercise-based interventions.[18] A meta-analysis of workplace interventions found that a range of different depression prevention interventions produce small but

overall positive effects.[18] While people are working from home, internet-based CBT

programs should be considered as they have also been found to be effective in improving

depression and anxiety in the general population.[20] Among children, this study identified

that school-aged children were at heightened risk of developing distress during COVID-

19 compared to young children suggesting that school may be a good site to deliver

universal mental health strategies.[19] Many parents are not satisfied with the mental health

support received by their children's schools, as indicated by a September 2020 poll which

found that 37% of parents say that their children's schools do a fair/poor job of providing

information on mental health and emotional well-being.[21] One strategy to promote mental

well-being in schools is for school systems to integrate social and emotional learning

(SEL) for all students to provide universal socioemotional support.[22] SEL draws on

principles of CBT to teach coping strategies. SEL programs promote the recognition and

management of emotions as well as the ability to solve problems effectively and establish

positive relationships with others.[22] SEL instruction involves teaching children social and

emotional skills for daily life and involves the establishment of school-family-community

partnerships.[22]

While all families may benefit from universal mental health programs, some families

require specialized attention. Children and parents with clinically significant distress

must be identified and have access to affordable mental health specialists. Workplace and

school-based programs as well as primary care settings can serve as screening locations

and can connect families to mental health specialists. Previous research has identified that

there is limited access to and underutilization of mental health services among children

and families.[23-25] To address this gap, access to affordable and convenient mental health services must be expanded for families. During the COVID-19 pandemic, when access to in-person services is limited, expansion of tele-mental health services for children and parents can help reduce psychological stress as telemedicine has been found to be as effective as in-person services.[26,27] Provision of mental health services must be undergirded by a trauma-informed perspective which recognizes adversity faced by individuals and communities and addresses determinants of mental distress through integrated care.[28,29]

Implication 2: Accurate and trusted information about COVID-19 is needed in order to address parental fears of their children becoming infected

Many parents expressed fear about their children becoming infected with COVID-19 in both qualitative and quantitative findings. While this worry can motivate positive health behaviors for some parents, this concern led to parents not wanting their children to spend time outside. It is critical to address parents' concerns about their children recreating outside, as exercise is an important tool to mitigate distress among children [30] and there is a consistent association between sedentary screen time (primarily TV watching) and poorer mental health.[30]

Parental concerns about what is and is not safe for children may be associated with mixed messaging about how children are infected by COVID-19 and their role as potential disease vectors. Parental fears may be mitigated by providing clear and consistent messaging about how children are impacted by COVID-19 infection as well as messages

about what is safe and unsafe to do outdoors. These messages can be relayed through

trusted information sources, communication campaigns, and social network diffusion.

Additionally, indoor recreation options can be encouraged, such as engagement with

play-based games on gaming systems as well as low-cost options such as the use of child-

centered workout videos offered for no charge on online platforms such as YouTube.

Implication 3: Age-appropriate communication strategies can help children comprehend the COVID-19 pandemic and mitigate distress

Findings from the qualitative research suggest that parents' concern for their child's well-

being was related to their child's understanding of the pandemic. Parents expressed that

their young children (<5 years) did not understand what was happening while their older

children sometimes were overwhelmed with anxiety as they worried about becoming

infected and death.

The COVID-19 pandemic is an unprecedented experience for families and

communicating about COVID-19 is uncharted territory. The National Academy of

School Psychologists (NASP) provides age-appropriate recommendations for

communicating with children, which vary in detail depending on the child's age.[31] For

example, for early elementary school children, it is suggested that parents provide simple

information, such as that washing hands prevents germs, and to balance COVID-19 facts

with reassurances. For upper middle and high school students, NASP recommends

discussing issues more in-depth and referring them to accurate COVID-19 information

sources. Multiple sources also recommend limiting children's media exposure and

dispelling rumors and inaccurate information. To reduce the impact of the news

information on children, it is recommended that regular routines are established and

maintained, parents speak honestly with their children, and coping techniques are

modeled (e.g., deep breathing).[1,31]

Implication 4: Household discord must be identified and addressed

We found that reporting household discord was associated with both parents' increased

worry about children and parents' depressive symptoms. For children, household discord

increased the development of sleep issues in bivariate models. COVID-19, as with other

disasters that elevate stress and isolation, has been found to elevate family discord and

violence[32] which previous research has also found to be linked to mental health

functioning.[33] However, not all families experienced discord during the pandemic, and

qualitative findings from this study suggested that for some families, dynamics might

have improved during COVID-19. Specifically, parents' comments pointed to their

spending more time together as a family which, in turn, led to improved family

communication and the development of healthier routines.

When considering the implications for interventions, families experiencing mild forms of

conflict could benefit from trainings on interpersonal skills, that can be offered virtually.

For example, programs like the Triple P-Positive Parent Program, that has been adapted

for online delivery, works to equip parents with skills to manage family issues. For the

subset of families who experience severe discord and violence, it is important to have

access to professional services and shelters. For families needing safe spaces, shelters

must be open, accessible, and have sufficient spaces which adhere to social-distancing guidelines. Identification of household discord and violence is more challenging during the COVID-19 pandemic as families are staying at home and isolated from friends, health professionals, and other services, which can help identify families experiencing discord who are in need of additional support.[34,35] Innovative social media or text-based programs may help identify hard-to-reach families who are experiencing discord or violence. Additionally, strengthened partnerships with schools and public safety may help identify families experiencing violence and severe discord and connect them to services. Finally, families where household discord has already been identified, should be assessed for well-being and provided with programs to reduce conflict as stressors related to COVID-19 may amplify existing household discord.

Implication 5: Policies should address income loss and caregiving strain during COVID-19 in order to reduce distress

For parents, income loss due to COVID-19 was associated with higher mental distress – especially distress related to worrying about their children. For children, household income loss was associated with developing sleep disturbances. Additionally, about a quarter of families in this study were concerned about caregiving because of COVID-19. In these families, children were more likely to develop anxiety compared to families who were not concerned about caregiving.

Socioeconomic safety nets and caregiving supports should be strengthened to address these stressors which have been heightened during COVID-19. To help families cope

with the economic fallout of the coronavirus pandemic, the Coronavirus Aid, Relief, and Economic Security (CARES) Act provides most families up to $1,200 per adult and $500 per child in relief payments; however, this relief package may not be sufficient to address ongoing income loss.[36] Families also need to be financially supported with emergency paid sick leave, unemployment insurance, housing assistance, as well as access to quality food assistance programs.[37] To support caregiving, policies such as paid parental leave and practices for parents that allow for flexible work arrangements are needed as is access to low-cost childcare.[38-40]

Implication 6: Interventions which strengthen family's social networks are important to mitigate distress

For both parents and families, social connections were found to impact well-being. For parents, the loss of social support resources was associated with greater symptoms of depression and alcohol use. For children, not being able to spend time around others was associated with developing sadness and depression. Qualitative findings suggested that parents of older children, compared to young children, were particularly concerned about the effect that disrupted social resources would have on their children. Notably, in households where a parent had received weekly emotional support, parents were less likely to report that their children had developed mental health and sleep disturbances during the early months of the COVID-19 pandemic.

These findings suggest that it is important to identify ways for both parents and children, especially older children, to interact safely with their friends. One way of promoting safe

in-person interactions during COVID-19 is the formation of Pods. Pods ("Parent Organized Discovery Sites" or "quaranteams") are partnerships between groups of families and serve to provide childcare, socialization, and educational assistance. To reduce the risk of COVID-19, socialization is often limited to the families within the Pods.[41] In September 2020, the National Parents Union conducted a study that found that only 14% of parents reported being in a Pod. Pods can be a safe space for both parents and children to interact with peers. Internet-based support groups for parents can also be an effective strategy to mobilize social support and cohesion.[42] Communication campaigns that activate natural support networks by encouraging families and peers to connect via social media, phone, or through socially distanced interactions could also promote child and parent well-being.

Implication 7: COVID-19 has likely caused educational gaps which must be identified and addressed

Qualitative findings identified that in addition to parents' concerns over their children's social and mental health, their children's educational deficits caused by COVID-19 was also a key concern. Parents expressed worry over the quality of online instruction in schools and access to resources. Findings also suggested that parents with children with special needs may be particularly impacted by COVID-19 as access to required support services was often reported to be limited or not accessible.

The impacts of COVID-19 on children's education are likely to be varied. Assessments can be used to identify gaps in learning, and remediation strategies can be implemented,

such as team tutoring, structured after school programs, and summer learning opportunities.[43] Additionally, school systems can improve the quality of online instruction. For example, an analysis of schools serving low-income students of color which had high engagement in online instruction during COVID-19 found that these schools eliminated all technology barriers, connected individually with families, integrated learning and assessment, and promoted accountability as well as celebrated successes.[44] Formation of educational pods can also support children's academic progress. A September 2020 poll found that among parents in a Pod, 89% reported that they were helpful for their children's education.[21] Community-based organizations can also help address learning gaps. For example, the YMCA created Academic Support Centers where children ages 5-12 years can receive online learning support and enrichment from trained associates.

6.3   Strengths and limitations

This study adds to the limited body of research on family well-being during the COVID-19 pandemic and identifies risk and protective factors. The use of an online recruitment strategy for participation in the study survey allowed for the examination of real-time dynamics. Additionally, the use of qualitative methods allowed for the elevation of parents' voices on how COVID-19 has impacted their children's well-being. Another strength of this study is that it assessed indicators across multiple mental health outcomes for both parents and children and multiple levels of influence in order to identify intervention targets.

It is important to also acknowledge the limitations of this research. Participants in this study were recruited through an online platform, which requires internet and access to a computer. Therefore, this sample may not be representative of populations who do not have access to electronic resources. Further, this study, like other studies conducted with MTurk, underrepresents United States residents who are Black and Hispanic.[45] It is unclear why these populations are less often represented on the MTurk platform, but possible factors include a lack of awareness of the platform, less access to reliable internet, or mistrust.[46] Additionally, this study uses parental reports to assess child outcomes. Parental reports only have moderate concordance with child-reported mental health outcomes.[47,48] Parental identification of problems that their children are experiencing is likely influenced by the nature of the problem, its commonality, parent's familiarity with it, and their willingness to accept a diagnosis.[49,50] However, parental detection of mental health challenges may be more accurate during the COVID-19 pandemic as they are often spending more time with their children. Social desirability may also affect this study as parents may not feel comfortable disclosing their distress or that of their children.

6.4 Recommendations for future research

To better understand and promote family well-being, there are a number of areas of research that warrant further study. First, as the focus of the current study was on the first few months of the COVID-19 pandemic in the United States, it is necessary to understand how trajectories of parent and child health have continued to change as the pandemic continued. Some families have experienced more long-term income loss while other families have grappled with school re-opening strategies. The recent rollout of

COVID-19 vaccines may also have brought hope to families as businesses are beginning to reopen. Second, future studies should use measures of child well-being with clinical significance in order to identify children most in need of clinical services. Third, as schools and businesses re-open, studies should evaluate the impact of work and school-based interventions, such as SEL, on reducing family distress. In addition, future studies should work with schools to educate families about the importance of including the perspective of children in order to collect information from both parents and children. Fourth, in order to increase the representativeness of study findings, future studies should work to incorporate more Black and Hispanic samples as well as populations which do not have access to the internet. Finally, in order to promote child health and the re-opening of businesses and schools, the uptake of COVID-19 vaccines must be examined, and barriers to parental and child vaccination should be addressed.

6.5 Conclusion

In sum, this study is one of the first to look at family well-being during the early months of the COVID-19 pandemic. By assessing indicators across multiple mental health outcomes and multiple levels of influence, this study identified several intervention targets. The ongoing trajectory of the COVID-19 pandemic is unclear, and families may continue to experience household stress, the loss of socioeconomic resources, and the fear of becoming infected or losing a loved one. On the basis of these results, we advocate for policies that provide a financial safety net to families as well as for interventions that provide clear and trusted information about COVID-19, address household discord, and strengthen social support networks for both parents and children. To address elevated distress among families, more comprehensive systems of care are needed that integrate

primary care, psychiatric care, schools, and socioeconomic support resources in order to identify and address the needs of children and their families. In the face of the ongoing pandemic and social distancing guidelines, online comprehensive family mental health services must be developed and expanded. To address families impacted by COVID-19, interventions must be multi-dimensional and multi-level, including interventions at the child, family, and systems levels.

6.6 References

1. Norris FH, Friedman MJ, Watson PJ, Byrne CM, Diaz E, Kaniasty K. 60,000 disaster victims speak: Part I. an empirical review of the empirical literature, 1981-2001. *Psychiatry*. 2002;65(3):207-239. doi: 10.1521/psyc.65.3.207.20173.

2. Furr JM, Comer J, Edmunds JM, Kendall PC. Disasters and youth: A meta-analytic examination of posttraumatic stress. *Journal of Consulting and Clinical Psychology*. 2010;78(6):765-780. doi: 10.1037/a0021482.

3. Tang B, Liu X, Liu Y, Xue C, Zhang L. A meta-analysis of risk factors for depression in adults and children after natural disasters. *BMC Public Health*. 2014;14(1):623. doi: 10.1186/1471-2458-14-623.

4. Peek L. Children and disasters: Understanding vulnerability, developing capacities, and promoting resilience — an introduction. *Children, Youth and Environments*. 2008;18(1):1-29.

5. Norris FH, Friedman MJ, Watson PJ. 60,000 disaster victims speak: Part II. summary and implications of the disaster mental health research. *Psychiatry*. 2002;65(3):240-260. doi: 10.1521/psyc.65.3.240.20169.

6. Hobfoll S, Freedy J, Lane C, Geller P. Conservation of social resources: Social support resource theory. *Journal of Social and Personal Relationships*. 1990;7:465-478.

7. Hobfoll SE, Spielberger CD. Family stress: Integrating theory and measurement. *Journal of Family Psychology*. 1992;6(2):99-112. doi: 10.1037/0893-3200.6.2.99.

8. Webb Hooper M, Nápoles AM, Pérez-Stable EJ. COVID-19 and racial/ethnic disparities. *JAMA*. 2020;323(24):2466-2467. doi: 10.1001/jama.2020.8598.

9. Novacek D, Hampton-Anderson J, Ebor M, Loeb T, Wyatt G. Mental health ramifications of the COVID-19 pandemic for black Americans: Clinical and research recommendation. *Psychological Trauma: Theory, Research, Practice, and Policy*. 2020;12(5):449-451. doi: 10.1037/tra0000796.

10. Hobfoll SE. Conservation of resource caravans and engaged settings. *Journal of Occupational and Organizational Psychology*. 2011;84(1):116-122. doi: 10.1111/j.2044-8325.2010.02016.x.

11. Lavalley R, Johnson RK. Occupation, injustice, and anti-black racism in the United States of America. *Journal of Occupational Science*. 2020.

12. Centers for Disease Control and Prevention. Health equity considerations and racial and ethnic minority groups. https://www.cdc.gov/coronavirus/2019-ncov/community/health-equity/race-ethnicity.html#fn12. Updated 2020. Accessed August 24, 2020.

13. Hobfoll SE. The influence of culture, community, and the Nested-Self in the stress process: Advancing conservation of resources theory. *Applied Psychology*. 2001;50(3):337-421. doi: 10.1111/1464-0597.00062.

14. Bretherton I. The origins of attachment theory: John Bowbly and Mary Ainsworth. *Developmental Psychology*. 1992;28(5):759-775. doi: 10.1037/0012-1649.28.5.759.

15. Radke-Yarrow M, Cummings EM, Kuczynski L, Chapman M. Patterns of attachment in two- and three-year-olds in normal families and families with parental depression. *Child Development*. 1985;56(4):884-893. doi: 10.1111/j.1467-8624.1985.tb00161.x.

16. Nickerson AB, Nagle RJ. Parent and peer attachment in late childhood and early adolescence. *The Journal of Early Adolescence*. 2005;25(2):223-249. doi: 10.1177/0272431604274174.

17. Hazan C, Shaver PR. Attachment as an organizational framework for research on close relationships. *Psychological Inquiry*. 1994;5(1):1-22. doi: 10.1207/s15327965pli0501_1.

18. Tan L, Wang M, Modini M, et al. Preventing the development of depression at work: A systematic review and meta-analysis of universal interventions in the workplace. *BMC Medicine*. 2014;12(1):74. doi: 10.1186/1741-7015-12-74.

19. Fazel M, Hoagwood K, Stephan S, Ford T. Mental health interventions in schools 1: Mental health interventions in schools in high-income countries. *Lancet Psychiatry*. 2014;1(5):377-387. doi: 10.1016/S2215-0366(14)70312-8.

20. Powell J, Hamborg T, Stallard N, et al. Effectiveness of a web-based cognitive-behavioral tool to improve mental well-being in the general population: Randomized controlled trial. *Journal of Medical Internet Research*. 2012;15(1):e2. doi: 10.2196/jmir.2240.

21. National Parents Union. National parents union- coronavirus impact survey, sept. 21-29, 2020. https://mercuryllc.app.box.com/s/53n19nhwnq6ekpxoagkoag1vf21tv49y. Updated 2020. Accessed December 23, 2020.

22. Zins JE, Elias MJ. Social and emotional learning: Promoting the development of all students. *Journal of Educational and Psychological Consultation*. 2007;17(2-3):233-255. doi: 10.1080/10474410701413152.

23. Owens P, Hoagwood K, Horwitz S, et al. Barriers to children's mental health services . *J. Am. Acad. Child Adolesc. Psychiatry*. 2002;41(6):731-738.

24. Logan D, King C. Parent facilitation of adolescent mental health service utilization: A conceptual and empirical review. *Clinical Psychology: Science and Practice*. 2001;8(3).

25. Maybery D, Reupert A. Parental mental illness: A review of barriers and issues for working with families and children. *Journal of Psychiatric and Mental Health Nursing*. 2009;16(9):784-791. doi: 10.1111/j.1365-2850.2009.01456.x.

26. Juth V, Silver RC, Seyle DC, Widyatmoko CS, Tan ET. Post-disaster mental health among Parent–Child dyads after a major earthquake in indonesia. *J Abnorm Child Psychol*. 2015;43(7):1309-1318. doi: 10.1007/s10802-015-0009-8.

27. Bashshur RL, Shannon GW, Bashshur N, Yellowlees PM. The empirical evidence for telemedicine interventions in mental disorders. *Telemedicine Journal and e-Health*. 2016;22(2):87-113. doi: 10.1089/tmj.2015.0206.

28. Oral R, Ramirez M, Coohey C, et al. Adverse childhood experiences and trauma informed care: The future of health care. *Pediatric Research*. 2016;79(1-2):227-233. doi: 10.1038/pr.2015.197.

29. Dayton L, MSPH, Agosti J, MPP, Bernard-Pearl D, MD, et al. Integrating mental and physical health services using a socio-emotional trauma lens. *Current Problems in Pediatric and Adolescent Health Care*. 2016;46(12):391-401. doi: 10.1016/j.cppeds.2016.11.004.

30. Biddle SJH, Asare M. Physical activity and mental health in children and adolescents: A review of reviews. *British Journal of Sports Medicine*. 2011;45(11):886-895. doi: 10.1136/bjsports-2011-090185.

31. National Association of School Psychologists, National Association of School Nurses. Talking to children about COVID-19 (coronavirus): A parent resource. 2020.

32. Bradbury-Jones C, Isham L. The pandemic paradox: The consequences of COVID-19 on domestic violence. *Journal of Clinical Nursing*. 2020;29(13-14):2047-2049. doi: 10.1111/jocn.15296.

33. Hedtke KA, Ruggiero KJ, Fitzgerald MM, et al. A longitudinal investigation of interpersonal violence in relation to mental health and substance use. *Journal of Consulting and Clinical Psychology*. 2008;76(4):633-647. doi: 10.1037/0022-006X.76.4.633.

34. Kenny MC. Child abuse reporting: Teachers' perceived deterrents. *Child Abuse & Neglect*. 2001;25(1):81-92. doi: 10.1016/s0145-2134(00)00218-0.

35. Ragavan MI, Culyba AJ, Muhammad FL, Miller E. Supporting adolescents and young adults exposed to or experiencing violence during the COVID-19 pandemic. *Journal of Adolescent Health*. 2020;67(1):18-20. doi: 10.1016/j.jadohealth.2020.04.011.

36. Quakenbush C, McKernan S. What amount of cash can help buffer families against COVID-19's economic impacts? *Urban Institute*. 2020.

37. Moore Q, Beebe J, Bakhiet Z. Hidden figures: The economic impact of covid-19 on low-income women and their children. 2020.

38. Isaacs J, Healy O, Peters H. Paid family leave in the united states: Time for a new national policy. *Urban Institute*. 2017:1-12.

39. Addati L, Cassirer N, Gilchrist K. Maternity and paternity at work: Law and practice across the world. *International Labour Organization*. 2014.

40. Alon T, Doepke M, Olmstead-Rumsey J, Tertilt M. The impact of covid-19 on gender equality. *National Bureau of Economic Research*. 2020.

41. Johns Hopkins School of Public Health. Pod agreement: Guiding principles. https://www.jhsph.edu/covid-19/_documents/pod-agreement-example-FINAL-10-15.pdf. Updated 2020. Accessed December 23, 2020.

42. Scharer K. Internet social support for parents: The state of science. *Journal of Child and Adolescent Psychiatric Nursing*. 2005;18(1):26-35. doi: 10.1111/j.1744-6171.2005.00007.x.

43. Darling-Hammond L, Schachner A, Edgerton A, et al. Restarting and reinventing school: Learning in the time of COVID and beyond. 2020.

44. Curriculum Associates. Overcoming the digital divide: Distance-learning successes during the pandemic.2020.

45. Hitlin P. Research in the crowdsourcing age, a case study. *Pew Research Center*. 2016.

46. Watson B, Robinson DHZ, Harker L, Arriola KRJ. The inclusion of African-American study participants in web-based research studies: Viewpoint. *Journal of Medical Internet Research*. 2016;18(6):e168. doi: 10.2196/jmir.5486.

47. Achenbach TM, McConaughy SH, Howell CT. Child/adolescent behavioral and emotional problems. *Psychological Bulletin*. 1987;101(2):213-232. doi: 10.1037/0033-2909.101.2.213.

48. De Los Reyes A, Kazdin AE. Measuring informant discrepancies in clinical child research. *Psychological Assessment*. 2004;16(3):330-334. doi: 10.1037/1040-3590.16.3.330.

49. Logan DE, King CA. Parental identification of depression and mental health service use among depressed adolescents. *J. Am. Acad. Child Adolesc. Psychiatry*. 2002;41(3):296-304.

50. Teagle S. Parental problem recognition and child mental health service use. *Ment Health Serv Res*. 2002;4(4):257-266. doi: 10.1023/A:1020981019342.

Curriculum Vitae

PROFESSIONAL DATA
615 N. Wolfe St., Baltimore, MD
ldayton2@jhu.edu

EDUCATION AND TRAINING

Degree/Year	*Institution and Field*
PhD/2021 (expected)	Johns Hopkins University, Baltimore, MD Bloomberg School of Public Health Department of Health, Behavior and Society
MSPH/2015	Johns Hopkins University, Baltimore, MD Bloomberg School of Public Health Department of Health, Behavior and Society
BS/2009	University of Michigan, Ann Arbor, MI Major: Neuroscience, Honors

PROFESSIONAL EXPERIENCE

Johns Hopkins University

Research Assistant at the Lighthouse Studies at Peer Point, Health, Behavior and Society, Johns Hopkins Bloomberg School of Public Health, 2017 – Present

COVID-19 and Health of Incarcerated People Working Group Member, Department of Epidemiology, Johns Hopkins Bloomberg School of Public Health, 2020 – Present

Program Faculty, Pediatric Integrate Care Collaborative – Indian Health Services (PICC-IHS), Health, Behavior & Society, Johns Hopkins Bloomberg School of Public Health, 2015 – 2020

Global Health Fellow for Health Communication Capacity Collaborative (HC3-Nepal), Health, Behavior and Society, Johns Hopkins Bloomberg School of Public Health, 2014 – 2015
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Other Non-JHU Professional Experience

Technical Consultant, National Alliance on Mental Illness (NAMI), Maryland, 2016
NAMI is an organization dedicated to improving the lives of Americans affected by mental illness. Led the evaluation for a NAMI training curriculum designed to increase family engagement by behavioral health staff.

Program Director, Visions Service Adventures, Ghana, Nicaragua, and British Virgin Islands, 2011 – 2013

Visions is a volunteer organization that collaborates with local nonprofits. Collaborated with local community-service agencies to lead construction, environmental, and social service projects in Ghana, Nicaragua, and the British Virgin Islands.

Detention Center GED Coordinator, Gallatin Valley Detention Center, Montana, 2012-2013
Taught GED courses to incarcerated people as well as recruited and trained community members to become volunteer GED tutors.

Middle School Special Education Teacher, Pueblo Pintado Community School/Teach for America, New Mexico, 2009 – 2011
Taught middle school students with learning, mental, emotional, or physical disabilities in a rural Bureau of Indian Education school.

Research Assistant, Translational and Developmental Neuroscience Lab, University of Michigan, 2006 – 2009
The Translational and Developmental Neuroscience Lab examines affective-cognitive processing during adolescent development using behavioral and neuroimaging methods. Conducted literature reviews and developed computer programs to test emotional processing.

PROFESSIONAL ACTIVITIES
Society Membership and Leadership
Society for Prevention Research - member

EDITORIAL AND OTHER PEER REVIEW ACTIVITIES
Journal Peer Review Activities
Substance Use and Misuse reviewer, 2020 – present
Journal or Other Editorial Board Membership
Journal of Community Psychology student editor, 2020 – present

HONORS AND AWARDS [list the honor/award and date received, with the most recent first]
Honors
Desmond Tutu Fellow, Johns Hopkins University, 2020
University Honors, University of Michigan, 2005 – 2009
Awards
American Psychopathological Association Scholarship Award, 2021
Dean's PhD Tuition Scholarship, Johns Hopkins University, 2020
Doctoral Distinguished Research Award, Johns Hopkins University, 2019
Doctoral Special Funding Award, Johns Hopkins University, 2018
Global Health Established Field Placement, Johns Hopkins University, 2014
Transition to Teaching Grant, 2010

Minority Health and Health Disparities International Training Fellowship, University of Michigan, 2008
Ginsberg Fellowship, University of Michigan, 2006

PUBLICATIONS
Journal Articles

Dayton L., Schneider KE., Strickland J., & Latkin C. (In Press). Determinants of worry using the SARS-CoV-19 Worry (CoV-Wo) scale among United States residents. *Journal of Community Psychology.*

Dayton L., Mazhnaia A., Xiangrong K., Winiker A., Schneider K., Davey-Rothwell M., Tobin K., and Latkin C. (In Press). Trends in overdose experience and prevention behaviors in Baltimore, MD, 2017-2019. *Drug and Alcohol Dependence.*

Strickland S., Reed D., Hursh S., Schwartz L., Foster R., Gelino B., LeComte R., Oda F., Salzer A., Schneider T., **Dayton L.,** Latkin C., Johnson M. (In Press). Integrating Operant and Cognitive Behavioral Economics to Inform Infectious Disease Response: COVID-19 Prevention, Testing, and Vaccination. *PLOS ONE.*

Tilchin C., **Dayton L.,** & Laktin C. (In Press). Socioeconomic factors associated with the COVID-19 transmission risk behavior of intending to work while sick from COVID-19. *Journal of Occupational and Environmental Medicine*

Latkin C., **Dayton L.,** Yi G.., Konstantopoulos A., & Boodram B. (In Press) Trust in a COVID-19 vaccine in the U.S.: A social-ecological perspective. *Social Science & Medicine.*

Latkin C., **Dayton L.,** Yi G.., Konstantopoulos A., Maulsby C., Kong X. (In Press). COVID-19 vaccine intentions in the United States, a social-ecological framework. *Vaccine.*

Latkin C., **Dayton L**., Strickland J., Colon B., Rimal R., & Boodram B. (In Press). An assessment of the rapid decline of trust in US sources of public information about COVID-19. *Journal of Health Communication.*

Latkin C., **Dayton L**., Moran M., Strickland J., & Collins K. (In Press). Behavioral and psychosocial factors associated with COVID-19 skepticism in the United States. *Current Psychology.*

Schneider K., **Dayton L**., Winiker A., Tobin K., & Latkin C. (In Press). The role of overdose reversal training in knowing where to get naloxone: Implications for improving naloxone access among people who use drugs. *Substance Use and Abuse.*

Latkin C., **Dayton L.**, Yi G., & Kong X. (2021). Mask usage, social distancing, racial, and gender correlates of COVID-19 vaccine intentions among adults in the US. *PLOS ONE* 16(2): e0246970

Dayton L., Tobin K., Falade-Nwulia O., Davey-Rothwell M., Al-Tayyib A., Saleem H., & Latkin C. (2020). Racial disparities in overdose prevention among people who inject drugs. *J Urban Health* 97(6): 823-830.

Dayton L., Tobin K., & Latkin C. (2020). Understanding HIV/AIDS prevention and care in the context of competing health and well-being priorities among black men who have sex with men in Baltimore, MD. *AIDS Care.*

Dayton L., Gicquelais R., Tobin K., Davey-Rothwell M., Falade-Nwulia S., Xiangrong K., Fingerhood, M., Jones A., & Latkin C. (2019). More than just availability: Who has access and who administers take-home naloxone in Baltimore, MD. *PLoS ONE* 14(11): e0224686.

Latkin C., Gicquelais R., Clyde C., **Dayton L**., Davey-Rothwell M., German D., Falade-Nwulia S., Saleen H., Fingerhood M., & Tobin K. (2019). Stigma and drug use settings as correlates of self-reported, non-fatal overdose among people who use drugs in Baltimore, Maryland. *International Journal of Drug Policy*, 68: 86-92.

Latkin C., **Dayton L**., Davey-Rothwell M., Tobin K. (2019). Fentanyl and drug overdose: Perceptions of fentanyl risk, overdose risk behaviors, and opportunities for intervention among people who use opioids in Baltimore, USA. *Substance Use and Misuse*, (54)6: 998-1006.

Underwood C.R., **Dayton L.,** & Hendrickson Z.M. (2019). Concordance, communication, and shared decision-making about family planning among couples in Nepal: A qualitative and quantitative investigation. *Journal of Social and Personal Relationships,* 37(2): 357-376.

Dayton L., Agosti J., Bernard-Pearl D., Earls M., Farinholt K., Groves B., Rains M., Sarvet B., Wilcox H., & Wissow L**.** (2016). Integrating mental and physical health services using a socio-emotional trauma lens. *Curr Probl Pediatr Adolesc Health Care*, 46(12): 391-401.

Dayton L., Buttress A., Agosti J., Aceves J., Kieschnick M., Popejoy A., Robbins R., & Farinholt K. (2016). Practical steps to integrate family voice in organization, policy, planning, and decision-making for socio-emotional trauma-informed integrated pediatric care. *Curr Probl Pediatr Adolesc Health Care*, 46(12): 402-410.

Submitted Journal Articles
Dayton L., Schneider KE., Strickland J., & Latkin C. (Under Review). Determinants of worry using the SARS-CoV-19 Worry (CoV-Wo) scale among United States residents.

Latkin C., **Dayton L.**, Yi, G., Jaleel A., Nwosu, C., Limaye R. (Under Review). COVID-19 vaccine delay: An examination of United States residents' intention to delay vaccine uptake.

Strodel R., **Dayton L.,** Garrison-Desany H., Eber G., Beyrer C., Arscott J., Rubenstein L., & Sufrin C. (Under Review). COVID-19 vaccine prioritization of incarcerated people relative to other vulnerable groups: An analysis of state plans**.**

Latkin C., **Dayton L**., Kauffman M., Schneider K., Strickland J., & Konstantopoulos A. (Under Review). Social norms and SARS-CoV-2 prevention behaviors in the United States.

Yi G., **Dayton L.,** Kong X., Hall B., Kaufman M., Colon B., & Latkin C. (Under Review). Investigating COVID-19 risk perception and preventive behaviors: A gender analysis from a Protection Motivation Theory perspective.

Schneider K., **Dayton L**., Wilson D., Nestadt P., & Latkin C. (Under Review). Distress in the time of COVID-19: Understanding the distinction between COVID-19 specific mental distress and depression among United States adults

Schneider K., **Dayton L**., Goodell E., & Latkin C. (Under Review). COVID-19 belief profiles and association with prevention behaviors: A latent class analysis.

Schneider K., Wilson D., **Dayton L.**, Goodell E., & Latkin, C. (Under Review). Political partisanship and stigma against people who use drugs in opinions about allocating COVID-19 prevention resources to vulnerable populations.

Winiker A., Schneider K., **Dayton L**., Latkin C., & Tobin K. (Under Review). Examining associations between depression and identity-specific social support among Black gay, bisexual, and other men who have sex with men (BMSM) in Baltimore City, Maryland.

PRACTICE ACTIVITIES
Practice-Related Reports
Watson C., Warmbrod K., Vahey R., Cicero T., Inglesby T., Beyer C., Rubenstein L., Eber G., Sufrin C., Garrison-Desany H., **Dayton L**., & Strodel R. (2020). COVID-19 and the U.S. Criminal Justice System: Evidence for Public Health Measures to Reduce Risk. Baltimore, MD: Johns Hopkins Center for Health Security.

Agosti J. & **Dayton L**. (2020). The Pediatric Integrated Care Collaborative Indian Health Service (PICC-IHS) Toolkit. Johns Hopkins Bloomberg School of Public Health.

Pediatric Integrated Care Collaborative (PICC) faculty. (2018). Improving the Capacity of Primary Care to Serve Children and Families Experiencing Trauma and Chronic Stress Toolkit.

Underwood C.R., Hendrickson Z.M., **Dayton L**., Lohani J.R., Upreti K., and Hess R. (2016). Formative Research for the HC3 Nepal Project: Findings from Qualitative Interviews. Johns Hopkins Center for Communication Programs Working Paper. Baltimore, Maryland.

Presentations to Policymakers, Communities, and Other Stakeholders

Dayton L. & Garrison-Desany, H. COVID-19 and the US Criminal Justice System: Responding to the surge of COVID-19 cases, Part 2. Federal Death Penalty Resource Council; 10 December 2020; Virtual.

Dayton L., Family Well-Being and COVID-19. Center for Adolescent Health; 01 July 2020; Virtual.

Consultations or Collaborations with Policymakers, Community Groups, and Other Stakeholders

COVID-19 liaison with Baltimore City Health Department, 2020– present
COVID-19 liaison with Meals on Wheels, 2020– present
COVID-19 liaison with State Attorney's Office, 2020– present
Meals on Wheels Volunteer, 2015 – present
Baltimore Animal Rescue & Care Shelter Volunteer, 2019 – present
HIV/AIDS Tester and Counselor, SOURCE, 2016 – 2018

Other Practice Activities

Collaborated in writing 10 declarations/affirmations to support release of incarcerated people during COVID-19, 2020

PART II

TEACHING

Capstone Advisees

    Marlesha Whittington, MPH, 2019 – 2020

Classroom Instruction

    Psychosocial Factors in Health and Illness, Guest Lecturer, Johns Hopkins Bloomberg School of Public Health, 2021

    MSPH Field Placement Preparation, Guest Lecturer, Johns Hopkins Bloomberg School of Public Health, 2021

    Psychosocial Factors in Health and Illness, Guest Lecturer, Johns Hopkins Bloomberg School of Public Health, 2020

    HBS Research and Proposal Writing Process for Doctoral Students, Guest Lecturer, Johns Hopkins Bloomberg School of Public Health, 2019

    Global Health Principles and Practice, Guest Lecturer, Johns Hopkins University, 2019

    Graduate Seminar in Social and Behavioral Sciences, Guest Lecturer, Johns Hopkins Bloomberg School of Public Health, 2018

    Epidemiologic Inference in Public Health II, Lead Teaching Assistant, Johns Hopkins Bloomberg School of Public Health, 2018

    Observational Epidemiology, Teaching Assistant, Johns Hopkins Bloomberg School of Public Health, 2014

    Detention Center GED Instructor, Gallatin Valley Detention Center, 2012 – 2014

    Middle School Special Education Teacher, Pueblo Pintado Community School, 2009 – 2011

RESEARCH GRANT PARTICIPATON

A geospatial analysis of hotspots and targeted injection settings pilot intervention for HIV prevention among people who inject drugs in Baltimore, Maryland (1R01DA050470-01A1), 07/01/20 – 06/30/25, NIDA
Principal Investigator: Carl Latkin
This study uses innovative approaches to identify "hotspots," defined as geographic areas in which high rates of HIV or HCV infection, high HIV viral loads, or drug-resistant HIV strains are found.
Role: Study Director

An evaluation of a social network intervention for primary and secondary prevention of opioid overdoses (1R01CE003021-03), 09/30/18 – 09/29/21, CDC
Principal Investigator: Carl Latkin
The study is based on our previous research, pilot studies, and the research of other investigators who have demonstrated that social networks can be capitalized on to develop robust and sustainable interventions for behavior change among opiate users.
Role: Study Manager

Supplement to R01DA040488, RCT of a social-network oriented mhealth based intervention to increase access and adherence to HCV (R01DA040488-05S2), 03/01/20 – 02/28/2, NIDA
Principal Investigators: Carl Latkin & Karin Tobin
The study is a supplement to an RCT to improve health outcomes and reduce risk behaviors among HIV/HCV co-infected PWID and their social network members.
Role: Research Assistant

RCT of a social-network oriented mhealth based intervention to increase access and adherence to HCV (1R01DA040488-05), 08/01/15 – 02/28/21, NIDA
Principal Investigators: Carl Latkin & Karin Tobin
The study is an RCT to improve health outcomes and reduce risk behaviors among HIV/HCV co-infected PWID and their social network members.
Role: Research Assistant

Trauma Informed Care Project (HHSI236201600011C), 09/30/16 – 09/28/20, Indian Health Service
Principal Investigators: Larry Wissow & Janice Bowie
This project aims to integrate trauma-informed care at IHS and tribal facilities. The project uses a learning collaborative method in which newly learned processes are implemented and subsequently evaluated to identify what works well, what does not work well, and what changes might be needed.
Role: Project Faculty

Pediatric Integrated Care Collaborative (U79SM061259), 09/30/14 – 09/29/17, SAMSHA
Principal Investigator: Larry Wissow
The Pediatric Integrated Care Collaborative (PICC) strives to improve access to trauma prevention and treatment services for families with young children by identifying and developing the best practices for trauma-informed integrated care. PICC brings together
teams of health care providers, mental and behavioral health professionals, families, and community agencies. Using a learning collaborative method, teams learn about new processes and work in parallel, sharing the challenges and solutions they encounter as they implement these processes and sustain them in their everyday practice.

Role: Project Manager

PRESENTATIONS *both in-person and virtual

Scientific Meetings

Dayton L., Scheider K., Strickland J., & Latkin C. Determinants of Worry Using the SARS-CoV-19 Worry (CoV-Wo) Scale Among United States Residents. American Psychopathological Association Conference: 4 March 2021; Virtual.

Scheider K., **Dayton L**., Nestadt P., & Latkin C. The Distinction Between COVID-19 Related Mental Distress and Depression in United States Adults. American Psychopathological Association Conference: 5 March 2021; Virtual.

Dayton L. & Latkin C. Parental mental health and alcohol use during the early months of the COVID-19 pandemic in the United States. International AIDS Society COVID-19 Conference: Prevention, 2 February 2021; Virtual.

Dayton L., Kong X., & Latkin C. Child mental health and sleep during the early months of the COVID-19 pandemic in the United States. International AIDS Society COVID-19 Conference: Prevention, 2 February 2021; Virtual.

Latkin C., **Dayton L.,** Yi G., & Kong K. Mask usage, social distancing, racial, and gender correlates of COVID-19 vaccine intentions among adults in the US. International AIDS Society COVID-19 Conference: Prevention, 2 February 2021; Virtual.

Latkin C., **Dayton L.,** & Yi G. Trust in a COVID-19 vaccine in the US: a social ecological perspective. International AIDS Society COVID-19 Conference: Prevention, 2 February 2021; Virtual.

Dayton L., Powell T., Whittington M., Davey-Rothwell M., Tobin K., & Latkin C. Where are the kids of mothers who use opioids?: Social network factors associated with retaining care of children. Society for Prevention Research, 21 July 2020; Virtual.

Dayton L., Strickland J., & Latkin C. Personal and structural factors associated with engagement in SARS-CoV-2 (COVID-19) prevention behaviors in the United States. COVID-19 Conference hosted by International AIDS Society, 10 July 2020; Virtual.

Latkin C., **Dayton L**., & Strickland J. Behavioral and psychosocial factors associated with COVID-19 skepticism in the United States. COVID-19 Conference hosted by International AIDS Society, 10 July 2020; Virtual.

Yi, G., Xiangrong K., **Dayton L**., & Latkin, C. A gender analysis of risk perception and precautionary behavior in response to COVID-19. COVID-19 Conference hosted by International AIDS Society, 10 July 2020; Virtual.

Dayton L., Tobin K., & Latkin C. Understanding HIV/AIDS prevention and care in the context of competing health and well-being priorities among black men who have sex with men in Baltimore, MD. Society for Prevention Research; 29 May 2019; San Francisco, CA.

Tormohlen K., **Dayton L.,** Tobin K., & Latkin C. Engagement in opioid agonist therapy and drug use among network members. The College on Problems of Drug Dependence, 15 June 2019; San Antonio, TX.

Underwood C., **Dayton L.,** & Hendrickson Z. Communication, gender equity beliefs and family planning use: Does couple concordance make a difference?. Oral presentation at the 2018 International Social and Behavior Change Communication Summit; 17 April 2018; Nusa Dua, Indonesia.

Hendrickson Z., **Dayton L.,** Hess R., & Underwood C. "They tell me they will use pills when their husband will come back": Complexities of timing of contraceptive use in Nepal. Poster presentation presented at the American Public Health Association 2016 Annual Meeting; 31 October 2016; Denver, Colorado.

Underwood C., Hendrickson Z., Lohani J., **Dayton L**., & Hess R. Gender, power and communicative action: Qualitative findings from selected Nepali communities. Oral presentation at the International SBCC Summit 2016: Elevating the Art & Science of SBCC; 08 February 2016; Addis Ababa, Ethiopia.

Dayton L., Hendrickson Z., Hess R., & Underwood C. Family planning use and decision-making among high unmet need groups in Nepal. Poster presented at the Johns Hopkins Bloomberg School of Public Health Center for Global Health's Global Health Day; 02 April 2015; Feinstone Hall, Baltimore, MD.

Invited Seminars

Bowie J. & **Dayton L.,** Roadmap for addressing the social determinants of health through trauma-informed clinic-community partnership. Two Series ECHO presentation for the Pediatric Integrated Care Collaborative in partnership with Indian Health Service; 20 June 2018 and 27 June 2018; Virtual.

Bowie J. & **Dayton L.,** Family Involvement in Pediatric Primary Care. Two Series ECHO presentation for the Pediatric Integrated Care Collaborative in partnership with Indian Health Service; 6 June 2018 and 13 June 2018; Virtual.

ADDITIONAL INFORMATION

Personal statement that synthesizes your research, policy, and practice goals, objectives and impact

My research addresses the development, evaluation, and dissemination of trauma and harm prevention strategies to enhance well-being among underserved populations, with a focus on youth and families. Community-based practice and social network interventions are central to my work. Current projects focus on the overdose and SARS-CoV-2 epidemics.

Keywords

Trauma prevention, harm reduction, COVID-19, children and families, people who use drugs, incarcerated individuals, social network interventions