 Persistent symptoms and conditions among children and adolescents hospitalised with COVID-19 illness: a qualitative study

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ABSTRACT

Objectives There is limited in-depth research exploring persistent symptoms and conditions among children and adolescents who contracted COVID-19 illness that required hospitalisation. The main objective of this study was to conduct qualitative interviews among families who had a child hospitalised with COVID-19 illness to elucidate their child's physical, mental and social health outcomes months after initial acute infection.

Design, setting and participants A qualitative study that composed of in-depth interviews among families with a child hospitalised with COVID-19 illness in one large urban US paediatric healthcare system. Parents (N=25) were recruited from an ongoing quantitative study to estimate the prevalence of long COVID in children hospitalised with COVID-19 illness. During in-depth interviews, parents were invited to describe their child’s post-COVID-19 symptoms and experiences. Interviews were audiotaped, transcribed and coded in NVivo.

Results Seven themes were identified concerning the child’s prolonged COVID-19 experiences: (1) post-traumatic stress disorder, (2) social anxiety, (3) severe symptoms on reinfection, (4) worsened pre-existing conditions, (5) lack of insurance coverage for costly treatments, (6) access and utilisation of support systems and (7) overall resilience and recovery. Four parent-specific themes were identified: (1) fear of COVID-19 unknowns, (2) mixed messaging from health information sources, (3) schools being both a support system and a hindrance and (4) desire for and access to support systems.

Conclusions A subset of children who were hospitalised with COVID-19 illness are experiencing a range of serious mental health impacts related to persistent COVID-19 symptoms. Clinical and public health support strategies should be developed to support these children and their families as they reintegrate in school, social and community activities.

INTRODUCTION

As of 15 September 2022, there have been almost 14.7 million documented COVID-19 cases in the US paediatric population. Data show that the majority of COVID-19 cases in children and adolescents are asymptomatic and do not typically require hospitalisation. However, the Centers for Disease Control and Prevention (CDC) reports that over 1200 children and adolescents through age 18 years have died from COVID-19 illness. A small proportion of children with COVID-19 illness are at risk for developing a novel Kawasaki-like disease called multisystem inflammatory syndrome in children (MIS-C). As of 25 September 2022, there have been 8862 MIS-C cases reported in children, most with a positive SARS-CoV-2 test result.

Irrespective of hospitalisation status, some children infected with SARS-CoV-2 can develop symptoms or complications that last for several months, but are typically less severe than those in adults. Symptoms that persist after acute COVID-19 illness are called various names; long COVID, postacute sequelae of SARS-CoV-2, post-COVID-19 syndrome, long-haul COVID and chronic COVID-19 syndrome. To date, long COVID has been shown to consist of over 200 symptoms, including fatigue, sleep disturbance, concentration difficulties, loss of appetite, muscle or joint pain, pulmonary...
fibrosis, myocardial dysfunction and mental health conditions.5–7–9

At this time, there is no standardised definition of long COVID-19 in adults, and the quality of evidence is still developing.10 11 In children, there is a general lack of data regarding long COVID, especially among those diagnosed with MIS-C versus those not diagnosed with MIS-C, and in children less than 11 years old.10 12 13 It is important to assess the incidence and prevalence of long COVID in children as it may impact their social, emotional, mental and physical health, as well as academic performance, all of which have the potential to impact a child’s quality of life even beyond the paediatric years.14 Yet, there are very few studies that have qualitatively, or assessed in-depth the social and mental impacts of COVID-19 illness in children.8–10 This is especially true for those children most severely impacted by COVID-19 illness coming from diverse backgrounds. Therefore, the aim of this study was to conduct qualitative interviews among families who had a child who was hospitalised with COVID-19 illness among a sample of ethnically and socioeconomically diverse children. It was hypothesised that parents would identify new symptoms and experiences from the standard CDC list currently available.

METHODS
We report here results from an exploratory qualitative study using semistructured in-depth interviews. The study is reported following the Standards for Reporting Qualitative Research framework.15

Participants
Using convenience and volunteer sampling, a total of 25 parents were recruited between March 2021 and April 2022. Participants were eligible if they had previously reported in an ongoing quantitative study conducted during the same time period that their child was experiencing long COVID or post-COVID-19 conditions and had consented to participate in an in-depth interview at a later date.

Study recruitment
As part of a larger quantitative study among a large sample of children hospitalised for COVID-19 illness, parents were asked if they would be interested in also participating in an in-depth interview at a later time. Among those parents who expressed interest in participation, research team members called a maximum of three times to schedule an interview. Participants provided informed and written consent prior to taking part in the interview. All qualitative interviews that are reported here took place between January and April 2022.

Data collection
Interviews were conducted by five graduate-level qualitative research-trained team members (SS, JF, WH, AL and AV), with AL conducting all Spanish interviews. A semistructured interview guide was developed, informed by our quantitative study findings, the literature, study aims and the research team’s expertise (see table 1). The guide was iteratively reviewed throughout the study. Interviews were conducted on the telephone, audio recorded and later transcribed by an external provider. Interviews lasted between 10 and 32 min (mean average=21 min). Data collection was terminated once no further categories were identified. All participants received a US$25 gift card as compensation for their time and participation.

Data analysis
Data were analysed using an inductive coding approach. Initially, the first authors (JF and SM) read and reread all transcripts while taking reflective notes. Line-by-line coding of the first five transcripts was conducted to create an initial list of codes, which were reviewed and refined with the research team through critical dialogue. All transcripts were imported to NVivo Pro V.12 and codes were created to systemically capture interesting aspects of the data across the entire dataset. The initial list of codes was further extended and refined throughout the entire coding process. To promote study rigour and maintain a connection to the project, 25 transcripts were second coded by the 5 coauthors (JF, SW, DP, NA and AL). Themes were identified based on the existing coding and organised into themes. The final set of themes was refined through discussions with the research team.

Patient and public involvement
Patients and the public were not involved in this research’s design, conduct, reporting or dissemination plans.

RESULTS
Of the 25 paediatric patients, 13 (52%) were female, 15 were white/Caucasian, 6 were black/African American and 4 were another race. Furthermore, 14 were Hispanic and 11 were non-Hispanic. Paediatric patients ranged in age from 4 months old to 18 years old at age of initial COVID-19 diagnosis. The parents/caregivers of the 25 paediatric patients were interviewed by phone, of which 2 were conducted in Spanish. After conducting our interviews and performing the subsequent analysis, we derived the results shown below in tables 1 and 2. The themes identified fall into two broad categories; themes that relate to the paediatric patient who experienced the COVID-19 illness (table 1), and themes that relate to the parents of patients, and their experiences caring for a child with long COVID (table 2). All themes derived from both parent and paediatric patient experiences are visually presented in figure 1.

Themes derived from patients with long COVID
Table 1 reports the seven themes that were identified that relate to long COVID patients: (1) social anxiety and depression, (2) post-traumatic stress disorder (PTSD)-like symptoms, (3) severe symptoms upon reinfection,
### Table 1  Themes relating to patients with long COVID

<table>
<thead>
<tr>
<th>Theme name</th>
<th>Theme description</th>
<th>Supporting quote(s)</th>
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| **Social anxiety and depression**              | COVID-19 infection was related to mental health issues in children such as anxiety, depression and hallucinations, but not all were affected. Recovery is common, though some still experience persistent symptoms. | ‘In school, if someone is talking loudly or making more noise, she gets anxiety.’  
‘She is afraid of separation from me (the mother).’  
‘Doesn’t want to go out, cries and says just get something for me. I don’t want to go out.’  
‘He just has anxiety, like right after having covid but now he’s doing well’ |
| **PTSD-like symptoms**                         | All patients reported fully recovering from any behavioral changes; changes included tiring easily, hearing and seeing things that weren’t there, loss of appetite, speech delay, some children still fear going out in public. | ‘Mom! Why are you crying?’ Probably like 20 times a day...And I was like ‘I’m not crying’. That night she was hysterical, and she was brushing stuff off her...She’s like ‘there’s spiders crawling all over me’. The next day she was still hearing crying...she kept hearing a noise and she said she heard a monster and was so terrified. I’ve never seen her so horried and just hearing and seeing things. She was like ‘I was frozen, I couldn’t move because there was a monster.’ You know she never had a fever...I knew that she was probably having hallucinations...I’ve never seen her like that before and it was terrifying.’  
‘It’s kind of difficult because at the beginning he didn’t want to go outside because he heard the news and everybody’s saying if you contact people and they have the covid, they will get it again  
‘She’s more afraid to go out in public. She doesn’t really want to go out anymore because of(having COVID), since she had COVID two years ago.’  
‘She didn’t fully get back to herself probably until like maybe that last week of December...Because you know at first I would have to wake her up to eat but once she started staying up, and she was more alert, and then she would come to me to let me know that she was hungry.’  
‘It’s not really social anxiety(for her), it’s only if(someone)cough(s)or sneezes(s), that’s it.’ |
| **Severe symptoms upon reinfection**           | The severity of COVID-19 symptoms increases with recurrent infection. Reinfection with more severe symptoms may occur despite complete COVID-19 vaccination. | ‘She was fully vaccinated...she got it again in January, she got really bad high fever and all symptoms, everything came back, and she still has the taste and smell.’  
‘She got COVID again January 8th, it affects more her asthma, made her asthma worse, and she had more joint pain and constant headache.’  
‘I got COVID again and it was really strange and they give me the same treatment again.’  
‘The day after Thanksgiving, I got COVID again. A week after that visit, my fever got very bad...After evaluation, they told me to stay in the hospital, and I stayed there for a week. Then I went home shortly, and then I came back.’ |
| **Worsened pre-existing conditions**           | Many participants have a history of other medical conditions. Some parents are confused about whether some symptoms result from COVID-19 or pre-existing medical conditions. COVID-19 increases the pre-existing medical conditions’ symptoms severity. | ‘She got COVID again in January 8th, it affects more her asthma, made her asthma worse’  
‘I was sick with COVID for four months initially, I had a mild headache, and then I had a hard time to breathe; I have previously had cancer and I received B cell treatment...so I have no antibodies to fight; I cannot create any antibodies’  
‘The doctor wants him to get MRI for hydrocephalus, his head is above 100 percentile’ |
| **Lack of insurance coverage and costly treatments** | Health insurance does not cover many peoples COVID-19 infections. Medications prescribed for COVID-19 were not covered, and most parents could not afford them. | ‘Each time we take the child to the hospital, the doctor prescribes antibiotics.’  
‘The medication was about $800. It was a lot of amounts, and we couldn’t afford it.’ |
| **Support systems used**                      | Parents mentioned that support groups for parents of children with COVID-19 would have been helpful during their child’s infection and the pandemic. Forms of support used included friends/family, school/teachers, athletics and technology. Though some said nothing would have made it their experience easier. | ‘...a support group, other parents that were actually going through the same thing that my daughter and I were going through...’  
‘...a lot of support from my family and the friends I have...’  
‘He gets a lot of help at school from his teachers. He got a lot of support with mental health...that positively affected him...helped him get caught up on grades.’  
‘I resorted to video game and internet, being connected to my friends there, so I didn’t feel too isolated.’  
‘Soccer has been helping him a lot.’ |
| **Recovery and resilience**                   | Wearing a mask everywhere, taking precautions even after having recovered from COVID-19 and continuing to isolate, adjusting well, feeling good. | ‘It’s good, she’s okay. she’s just careful, trying to be careful’  
‘Yes, in person, she’s just wearing the mask every day’  
‘We continue to wear a mask everywhere; they go to school, and she does play basketball without a mask, but we don’t eat inside restaurants or go anywhere without a mask. the cases are going down, so I don’t know when to put down your guard.’  
‘It’s just that, I wouldn’t go out as much, I just stayed indoors, like school, I had the option to go to class but I chose to stay home. Yeah, just isolating more, that’s about it.’ |

PTSD, post-traumatic stress disorder.
### Table 2  Themes relating to parents of children with long COVID

<table>
<thead>
<tr>
<th>Theme name</th>
<th>Theme description</th>
<th>Supporting quote(s)</th>
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<tbody>
<tr>
<td>Fear of COVID-19 unknowns</td>
<td>Many parents described a sense of fear and apprehension due to COVID-19 being a new disease with many unknowns.</td>
<td>‘Because I felt like with the outbreak at the school, I wanted to see more in terms of what they were doing to prevent another outbreak at the school. So, I changed her to a different school.’</td>
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<tr>
<td>Support systems used/needed</td>
<td>Parents discussed support systems that were used and ones they wish would have existed to help manage/deal with their children’s COVID-19 infections.</td>
<td>‘...a lot of support from my family and the friends I have...' ‘Soccer has been helping him a lot.’ ‘He gets a lot of help at school from his teachers. He got a lot of support with that (mental health)...that positively affected him...helped him get caught up on grades.’ ‘...a support group, other parents that were actually going through the same thing that my daughter and I were going through.’</td>
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<td>Mixed messaging from health information sources</td>
<td>Over the course of the COVID-19 pandemic, as the situation evolved, sources sometimes released recommendations that were different or contradicted each other. This caused confusion amongst some of the parents interviewed.</td>
<td>‘At school a lot of the kids were sick and she was afraid because they just keep them (at home in isolation) for 5 days and then they have to go back (to school) and she’s like, ‘Well sometimes they come back and they’re still coughing and have fever. And I’m like “Well that’s what they are saying now that they only have to stay for 5 days”.’</td>
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<td>School systems both helping and hurting</td>
<td>For some parents and their children suffering from COVID-19, their schools were helpful in aiding recovery. However, many parents expressed concerns that their children’s schools were not doing enough to prevent COVID-19 outbreaks and did not treat COVID-19 as a serious concern.</td>
<td>‘Yeah, we are working on (his academic performance) now. There’s a psychologist who just came in (to the school)...so they are working on him to see all about that, so we have not had the results yet.’ ‘He gets a lot of help at school from his teachers. He got a lot of support with that (mental health)...that positively affected him...helped him get caught up on grades.’ ‘At school a lot of the kids were sick and she was afraid because they just keep them (at home in isolation) for 5 days and then they have to go back (to school) and she’s like, ‘Well sometimes they come back and they’re still coughing and have fever. She’s afraid...She said “my teacher was coughing one time” and she was so scared...Right now, if she could be in online school it would be better.’ ‘Because I felt like with the outbreak at the school, I wanted to see more in terms of what they were doing to prevent another outbreak at the school. So, I changed her to a different school.’</td>
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(4) worsened pre-existing conditions, (5) lack of insurance coverage and costly treatments, (6) support systems used and (7) recovery and resilience.

**Child theme 1: social anxiety and depression**
Starting with the theme of social anxiety and depression, we found that many participants reported mental health challenges such as anxiety, depression, irritability and even hallucinations, but these symptoms were not ubiquitous, and a majority of these patients recovered with time. One specific example involved a girl who had been hospitalised for COVID-19 illness for less than 1 day. She shared the following experience as her daughter was recovering at home:

‘Mom! Why are you crying?’ Probably like 20 times a day she would say that. And I was like ‘I’m not crying’. That night she came up and she was hysterical and she was brushing stuff off of her and I was like ‘What are you doing?’ She’s like ‘there’s ants or spiders crawling all over me.’—Mother of a 11-year-old girl who had been hospitalized with COVID-19 illness

**Child theme 2: PTSD-like symptoms**
Some participants had more severe or long-lasting mental health symptoms that were similar to the symptoms of PTSD. This included severe anxiety or panic attacks triggered by hearing coughing, seeing people not wearing a mask, getting within 6 ft of strangers and having a prolonged fear of reinfection. One mother described her daughter’s social anxiety as a result of her COVID-19 hospitalisation and illness experience as follows:

She’s more afraid to go out in public. She doesn’t really want to go out anymore because of [having COVID], since she had COVID two years ago.—Mother of a 9-year-old girl who had been hospitalized with COVID-19 illness

**Child theme 3: severe symptoms on reinfection**
We also found that many of our participants had worsened symptoms on COVID-19 reinfection. After their primary infection, they often stated that the symptoms lasted longer and were more severe upon secondary or even tertiary infections; participants also reported to be fully vaccinated before being re-infected.

**Child theme 4: worsened pre-existing conditions**
Other participants with pre-existing conditions, such as asthma, reported that their conditions worsened during or after their COVID-19 infection.

**Child theme 5: lack of insurance coverage and costly treatments**
Additionally, some participants reported having trouble securing health insurance to pay for medications prescribed to help treat COVID-19 or its long-term effects, and the out-of-pocket costs were often unaffordable.
Child theme 6: support system utilisation

However, despite these hardships, we found a strong theme of resilience from both the parents of patients and the patients themselves to COVID-19 infection and the pandemic in general. Many patients relied on support systems such as family, friends, sports/athletics, video games/electronics and other sources to help them manage their COVID-19 symptoms and life during the pandemic.

Child theme 7: recovery and resiliency

Overall, this combination of resilience and support system utilisation led to better recovery results, and many of our participants reported being fully recovered at the time of the interview. One mother of a 12-year-old boy recovering from long COVID said:

He just has anxiety, like right after having covid but now he’s doing well

Themes derived from parents of children with long COVID

Table 2 reports our findings that relate to the parents of children suffering from long COVID symptoms. Like tables 1 and 2 consists of three sections: theme name, theme description and supporting quotes.

Four themes were identified that relate to parents of long COVID patients: (1) fear of COVID-19 unknowns, (2) mixed messaging from health information sources, (3) support systems used and needed and (4) school systems both helping and hurting during the COVID-19 pandemic.

Parent theme 1: fear of COVID-19 unknowns/parent theme 2: mixed messaging from health information sources

For the first theme, fear of COVID-19 unknowns, we found that many of the parents interviewed had a general fear regarding COVID-19, mainly revolving around its relative newness and the lack of concrete information that comes with a new infectious disease. This fear was often not eased by major sources of health information (eg, the CDC, NIH, WHO) as the information and recommendations being released by these different organisations were not always in agreement, causing further confusion and fear for parents. One mother stated:
Because I felt like with the outbreak at the school, I wanted to see more in terms of what they were doing to prevent another outbreak at the school. So, I changed her to a different school.

At school a lot of the kids were sick and she was afraid because they just keep [at home in isolation] for 5 days and then they have to go back [to school] and she’s like, ‘well sometimes they come back and they’re still coughing and have fever. And I’m like “well that’s what they are saying now that they only have to stay for 5 days.”

Parent theme 3: support systems used and needed/parent theme 4: school systems both helping and hurting during the pandemic

Parents also felt as though school administrators were not doing enough to prevent outbreaks, and that they were not treating COVID-19 with the appropriate level of concern or seriousness. On the other hand, parents also expressed gratitude towards school teachers for being considerate and helpful throughout the pandemic, providing support to students who missed school due to COVID-19 infection. One consistent need expressed by the parents which would have been beneficial for them and their families was a parental support group in which they could discuss their issues and concerns with other parents of children with long COVID. Specifically, parents stated:

He gets a lot of help at school from his teachers. He got a lot of support with his mental health. That positively affected him and helped him get caught up on grades.

…a support group, other parents that were actually going through the same thing that my daughter and I were going through.

DISCUSSION

The purpose of this qualitative study was to better understand and explore child/adolescent and parent/caregiver experiences with persistent COVID-19 symptoms after serious illness that required hospitalisation. Persistent COVID-19 symptoms are still not well understood, especially in the paediatric population as children have been shown to have less severe illness requiring hospitalisation versus adults. Seven themes that underscore the importance of mental health and well-being in COVID-19 illness recovery were revealed: (1) social anxiety and depression, (2) PTSD-like symptoms, as well as (3) severe symptoms on reinfecion, (4) worsening pre-existing conditions, (5) costly treatments and lack of insurance coverage, (6) support systems used and (7) overall resilience and recovery were identified among patients. Four themes were identified relating specifically to the parents of long COVID patients, including (1) fear of COVID-19 unknowns, (2) mixed messaging from health information sources, (3) schools being both a support system and a hindrance and (4) specific support systems used and needed. These findings have important implications for children and families as we plan for postpandemic recovery efforts.

Throughout our interviews, parents of children with long COVID expressed an underlying sense of fear stemming from the fact that COVID-19 was a newly emerging disease; at the start of the pandemic, little was known about how it would affect adults or children in the short term or long term. Parents did not know what to expect in the days, weeks, months or years after their child’s initial COVID-19 infection. Compounding this fear was that parents often felt dissatisfied with COVID-19 guidance given by local, state and federal health agencies. Indeed, an internal review, ordered by previous CDC director Dr. Rochelle Walensky in April 2022 and released in September 2022, determined that the CDC was slow to release guidance and that it was often found to be confusing or overwhelming.16 This bared out in our findings here, and underscores that the CDC may not have done enough to assuage parental fears or provide adequate and timely information. However, in response to these shortcomings, the CDC has initiated an overhaul to its processes to be better prepared for future crises.16 Some of the changes made included streamlining the process for publication of data/findings, and the re-establishment of the Advisory Committee to the Director.16 Regardless, as children continue to become infected with SARS-CoV-2, it will be important to connect those families who experience persistent symptoms with physical and mental health recovery resources, both in medical and community environments.

A second major underlying cause of increased anxiety and stress among the parents interviewed was that insurance did not always cover COVID-19/long COVID/MIS-C treatments. One mother described how her insurance company would not cover a medication prescribed for her daughter who was experiencing recurrent infections post-COVID-19. The out-of-pocket cost for this medication was approximately US$800, a price the mother stated she could not afford. News media have reported patients having trouble getting their insurance companies to recognise long COVID as a covered illness or to pay for treatments related to their long symptoms.17 Future policy work could place pressure on insurance companies to recognise long COVID as a covered illness. The federal government has already taken steps towards this by listing long COVID as a disability under the Americans with Disabilities Act.18 However, this has not ensured that insurance companies must pay for long COVID treatments, so further legislation is needed.

Parents were not the only ones that experienced stress, fear and anxiety related to COVID-19. Many parents described emotional and behavioural symptoms similar to PTSD in their children such as avoidance, negative thinking/mood and changes in their physical/emotional reactions in when in or around certain situations/environments/triggers.19 For example, one mother of a 9-year-old patient stated that, at the time of the interview, her daughter continues to have a fear response triggered...
by seeing or hearing people cough or sneeze, and that she continues to avoid being around people while in public. Evidence of PTSD-like symptoms is concerning as they could lead to future adverse outcomes in adulthood if not adequately treated by a professional. In response to this, the CDC and other paediatric organisations should consider COVID-19 infection as a potential adverse childhood event (ACE). An ACE is a ‘traumatic event that occurs before a child reaches the age of 18’ and, according to the CDC, if a child experiences an ACE, it can have a tremendous lifelong negative impact on their health and increases their risk for violence, victimisation and perpetration. Recognising COVID-19 as an ACE can guide preventive and protective strategies that can be implemented to reduce the mental health impacts of COVID-19.

The classroom is one system through which policymakers and community stakeholders can have a direct and immediate impact on child health. Many parents we spoke with praised their children’s schools for offering aid and resources to help their children recover post-COVID-19. This included teachers and other school staff offering additional time and attention to children who missed school due to their infection or the pandemic. Many parents reported initially that their children were doing worse in school at the start of the pandemic or right after their initial infection, but with time they were able to bring their grades back up. Some schools also offered resources to help deal with mental health issues, including hiring psychologists and additional counsellors so that children would have more opportunities to speak with a professional about mental health. However, parents also expressed disappointment in their school administrations. Some parents described school systems as not providing enough measures to protect their children from COVID-19 infection. Others expressed that the school administration did not treat COVID-19 with the seriousness they felt it deserved. At the start of the pandemic, many parents were satisfied with what schools were doing to prevent COVID-19 spread, including masking and social distancing. According to a Pew Research Center report, 45% of parents surveyed said they were very satisfied with the steps their children’s school was taking to prevent the spread of the COVID-19. However, over the course of the pandemic, some states began to regulate the steps schools could take to limit COVID-19 spread/exposure. One teacher said, ‘The precautions we put in place at the beginning of last year, things that were to help, to help reassure parents that we’re doing everything we possibly can to keep our kids safe—we’re not seeing that this year’. These changes left some parents feeling worried about their children’s safety. One mother, interviewed by The Texas Tribune, said ‘I am absolutely scared to death. I feel like a trapped animal that can’t do anything to protect her babies. I would really prefer for [the school district] to offer virtual learning again’. These findings and remarks suggest that continued funding and resources can, and should support programs and interventions aimed at preventing COVID-19 among school-aged children and to help students struggling with long COVID symptoms.

Overall, most parents described the physical and mental state of their children as recovering either from the start of the pandemic or start of COVID-19 infection. For instance, parents described grades, athletic ability, depression, anxiety and social/behavioural issues as suffering initially but improving or easing over time. This pattern demonstrates resilience in the face of socioenvironmental stressors such as a global pandemic, but it has also been observed within other contexts such as war or natural disasters, especially when intervention programmes are used to help children manage their thoughts, feelings and reactions after a traumatic event. For example, a study involving students exposed to violence showed that those who underwent a cognitive–behavioural therapy (CBT) intervention programme had significantly reduced symptoms of PTSD compared with the control. With effort and time, most of our patients interviewed made full recoveries. However, some continued to experience PTSD-like symptoms long after the initial infection. This process of recovery could have been hastened through CBT intervention programme implementation. It is imperative that public health systems continue to care for children experiencing long COVID and long-term solutions and interventions be sought out and deployed.

Study limitations and strengths
There are study limitations that should be mentioned. As participants for this qualitative component were recruited from our main study, selection or participation bias may have occurred. There may also be limits to generalisability given we only sampled from one large paediatric healthcare system in one large urban area of the USA. It is imperative that future research consider the cultural context of long COVID in other geographical regions of the world. Strengths of this study include a unique contribution to the literature, as there are few qualitative reports from around the world focused on the sustained impact of the COVID-19 pandemic among children and families. These studies are important as they can help inform the resources that will be necessary for health and community systems to support these children in their recovery.

CONCLUSIONS
A subset of children who were hospitalised with COVID-19 illness are experiencing a range of serious mental health impacts related to persistent COVID-19 symptoms, namely PTSD and social anxiety. Parents are also experiencing related stressors as a result of seeking medical care and resources to support their child’s recovery. Clinical and public health support strategies should be developed to support these
children and their families as they reintegrate in school, social and community activities.

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Contributors SEM and JF conceptualised and designed the study, drafted the initial manuscript and carried out the initial analyses. JK and LX provided clinical guidance, critically reviewed the manuscript for important intellectual content and revised the manuscript. SEM, MSM and JF coordinated and supervised data acquisition, and reviewed and revised the manuscript. SS, JF, WH, AL and AV conducted all qualitative interviews. JF, SW, DF, NA and AL conducted the qualitative thematic analysis. SEM supervised data analyses, interpretation of results, reviewed and revised the manuscript. All authors read and approved the final version. SEM is the guarantor.

The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Consent obtained directly from patient(s).

Ethics approval This study involves human participants and the UTHealth Committee for the Protection of Human Subjects approved all aspects of the current study (study number HSC-SPH-20-1133). Participants gave informed consent to participate in the study before taking part.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available on reasonable request. The data and codes generated during and/or analysed during the current study are available from the first author(s) on reasonable request.

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