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RESEARCH

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Impacts of the COVID-19 pandemic on the daily lives of children with type 1 diabetes mellitus

Repercussões da pandemia de COVID-19 no cotidiano de crianças com diabetes tipo 1

Repercusiones de la pandemia de COVID-19 en la vida cotidiana de niños con diabetes tipo 1

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Abstract

Objective: to analyze the impact of the COVID-19 pandemic on the daily lives of children with type 1 diabetes mellitus (T1D). **Method**: this qualitative exploratory study was conducted through semi-structured interviews using puppets. Data were collected from children with T1DM at a pediatric hospital in the interior of São Paulo, Brazil, as well as remotely via video calls. The data underwent inductive thematic analysis. **Results**: a total of 14 children aged 7 to 11 years were interviewed. The analytical process yielded two main categories: (1) Psychosocial repercussions: the consequences of the COVID-19 pandemic and (2) Support networks and coping strategies: the role of social relationships and strategies to manage the challenges of the COVID-19 pandemic, each with its respective subcategories. **Final considerations and implications for practice**: this study highlights the significant repercussions of the COVID-19 pandemic on the daily lives of children with T1DM, emphasizing changes in their daily routines and treatment management. It also underscores the importance of continuous support for this vulnerable population during crises. This study reinforces the importance of personalized approaches to T1DM management during crises, focusing on mental health support and addressing the psychosocial needs of children.

Keywords: Child; COVID-19; Diabetes Mellitus, Type 1; Pandemics; Qualitative Research.

Resumo

Objetivo: Analisar as repercussões da pandemia de COVID-19 no cotidiano de crianças com diabetes *mellitus* tipo 1. **Método**: Estudo qualitativo e exploratório, desenvolvido com base em entrevistas semiestruturadas utilizando fantoches. Foram submetidos à análise temática indutiva os dados de crianças com diabetes *mellitus* tipo 1 coletados presencialmente em um hospital pediátrico do interior paulista e remotamente mediante videochamadas. **Resultados**: Foram entrevistadas 14 crianças entre 7 e 11 anos. Do processo analítico, emergiram duas categorias: 1) Repercussões psicossociais: as consequências da pandemia de COVID-19 e 2) Autocuidado e redes de apoio no enfrentamento da COVID-19: percepções infantis e estratégias de adaptação. Cada qual traz suas respectivas subcategorias. **Considerações finais e implicações para a prática:** Este estudo abordou importantes consequências da pandemia de COVID-19 no cotidiano de crianças com diabetes *mellitus* tipo 1, sobretudo mudanças na rotina diária e no tratamento, além de ter reforçado a necessidade de apoio contínuo para essa população vulnerável em contextos de crise. Abordagens personalizadas mostram-se essenciais na gestão do diabetes *mellitus* tipo 1 durante crises, com foco no suporte à saúde mental e aos aspectos psicossociais das crianças.

Palavras-chave: COVID-19; Criança; Diabetes *Mellitus* tipo 1; Pandemias; Pesquisa Qualitativa.

Resumen

Objetivo: analizar las repercusiones de la pandemia de COVID-19 en la vida cotidiana de niños con diabetes mellitus tipo 1 (DM1). **Método**: estudio cualitativo exploratorio desarrollado mediante entrevistas semiestructuradas, utilizando marionetas como herramienta de interacción. Se recopilaron datos de niños con DM1 en un hospital pediátrico del interior del estado de São Paulo, así como de forma remota a través de videollamadas. Los datos fueron sometidos a un análisis temático inductivo. **Resultados**: se entrevistó a 14 niños con edades entre siete y 11 años. A partir del análisis, se identificaron dos categorías principales: (1) Repercusiones psicosociales: las consecuencias de la pandemia de COVID-19 y (2) Redes de apoyo y estrategias de afrontamiento: la aplicabilidad de las relaciones sociales y las estrategias utilizadas para enfrentar la pandemia de COVID-19, con sus respectivas subcategorías. **Consideraciones finales e implicaciones para la práctica**: Este estudio destacó las importantes repercusiones de la pandemia de COVID-19 en la vida cotidiana de niños con DM1, subrayando cambios en sus rutinas diarias y en el manejo de su tratamiento. Asimismo, refuerza la necesidad de brindar apoyo continuo a esta población vulnerable en contextos de crisis. Este trabajo resalta la importancia de enfoques personalizados para la gestión de la DM1 durante períodos de crisis, con un énfasis especial en el apoyo a la salud mental y los aspectos psicosociales de los niños.

Palabras clave: COVID-19; Diabetes Mellitus tipo 1; Investigación Cualitativa; Niño; Pandemias.

INTRODUCTION

Type 1 diabetes mellitus (T1DM) is a chronic autoimmune disease characterized by destruction of pancreatic β-cells, leading to absolute insulin deficiency and lifelong dependence on exogenous insulin.[1] This type of diabetes can occur at any age, but incidence is higher in the pediatric population, requiring tight glycemic control to prevent acute complications such as diabetic ketoacidosis, as well as chronic complications resulting from poor glycemic control.[2]

Managing T1DM in children involves a complex daily routine that includes insulin administration, frequent capillary blood glucose testing, healthy eating habits, and regular physical activity.[3] Because these tasks require ongoing supervision, they are typically shared among the child, family, and healthcare team, making care a dynamic process shaped by the family context.[3]

During the COVID-19 pandemic, this routine became even more challenging. Social distancing measures and the suspension of in-person care, especially in services considered nonurgent, directly affected follow-up care for children with chronic conditions, including those with T1DM.[4,5] Disruptions in access to specialized care, coupled with increased responsibilities at home, may have worsened glycemic control and increased family stress.[6,7]

However, much of the research on T1DM management during the pandemic focused on clinical outcomes and young people's mental well-being, revealing a gap in understanding how daily life and family dynamics were affected.[8-10] This gap highlights the need to broaden the focus beyond the biomedical dimension, considering children's own experiences and perceptions of this period.[10-15]

Given this context, this study aimed to analyze the impacts of the COVID-19 pandemic on the daily lives of children with T1DM, from the children's own perspective.

METHOD

This exploratory study used a qualitative approach.[16] To ensure transparency and methodological consistency, the study was described in detail in accordance with the Consolidated Criteria for Reporting Qualitative Research (COREQ) checklist.[17] COREQ is widely used to standardize reporting in qualitative research, supporting a critical and robust appraisal of data collection, analysis, and interpretation. Applying COREQ ensured essential elements—such as the study setting, participant characteristics, data collection procedures, and analytic strategies—were reported clearly and systematically, strengthening the credibility and methodological rigor of the findings.

The study settings were the pediatric inpatient wards and the pediatric diabetes outpatient clinic of a university hospital in São Paulo State, Brazil (outside the state capital), as well as a virtual setting via Google Meet and Zoom.

Children aged 7 to 11 years who had been diagnosed with T1DM by March 31, 2021, were invited to participate. This cutoff date was selected because it corresponded to the period of highest risk of COVID-19 infection and mortality. The age range was chosen because it spans Piaget's concrete operational stage, when children can already understand cause-and-effect relationships, express opinions, and describe their experiences in a more structured way.[18] In addition, this range covers late childhood, prior to the more intense emotional and social transitions of early adolescence, which favors more spontaneous narratives that reflect everyday life with the condition. Children who could not actively participate in the interviews because of limitations in verbal expression or comprehension were excluded, since the study focused on children's own narratives.

The final number of participants was determined based on data saturation, assessed during data collection and preliminary interview analysis. After each new set of interviews, the researchers reviewed emerging codes and themes; recruitment ended when information became repetitive and no longer added elements relevant to understanding the phenomenon. This process was discussed in research team meetings, ensuring consensus on when saturation had been reached.[19]

Data were collected from March to October 2023, both remotely and in person. For remote recruitment, a WhatsApp chat with ten mothers of children with T1DM was used; it had been created by healthcare professionals involved in these children's care. The researchers were later added to it to explain the study objectives and invite eligible families who met the inclusion criteria. Of the ten families, only two met the eligibility criteria. Both agreed to participate and referred other eligible families, in line with the snowball sampling technique.[20] There were no records of refusals or nonresponse to the invitation.

After parents or legal guardians expressed interest, they were contacted by phone to explain the study objectives, ethical considerations, and interview format, and to schedule the video interview. At that time, legal guardians received and signed the Informed Consent Form (ICF), and the children provided formal assent to participate. The video interviews, which lasted an average of 20 minutes, were conducted with the children via Google Meet or Zoom, with parents or legal guardians present if desired. In some cases, parents or legal guardians observed the interview but did not participate or influence the child's responses, helping preserve spontaneity. All interviews were conducted by a fourth-year nursing student who had received prior theoretical and practical training, including directed study, simulations, and case analysis. The study supervisor, a faculty member with established experience in qualitative research in pediatrics and chronic conditions, oversaw the entire training process and provided feedback by critically reviewing interview audio recordings. During the initial interactions, the student was accompanied by a doctoral student or the team's postdoctoral researcher, both with prior experience in the field and involvement in some interviews, helping ensure the data collection process was conducted ethically and appropriately.

For in-person recruitment, parents or legal guardians were approached by the researchers in the waiting room while awaiting

the outpatient appointment, or in the inpatient wards. At that time, the study objectives and ethical aspects were explained, and informed consent from parents or caregivers was requested, along with children's assent. Only one interview was conducted with each participant.

As a data collection strategy in both remote and in-person modalities, puppets were used to encourage imagination and facilitate communication and expression of feelings—an approach previously tested and refined by the research group in earlier studies.[21]

In the in-person modality, children were invited to create their own puppets using craft sticks, googly eyes, cut felt clothing and hair, and all-purpose glue. This personalized creation strengthened bonding with the characters and supported more spontaneous narratives, facilitated by the interviewer, who wore a laminated felt apron with detachable figures selected by the participants. All materials were disposable or waterproof, disinfected with 70% alcohol after use, and the puppets were given to the children at the end of the interview.

In the remote modality, the interviewer used pre-made puppets presented on camera, using the apron as a visual aid. Children chose the puppet that would serve as the main character and could name it, while the researcher used a puppet representing her own characteristics. Although children could not create their own characters, the puppet-based interaction and playful format were maintained, ensuring the production of meaningful narratives.

In both modalities, after selecting the puppets, the interviewer opened the interaction with questions about the character chosen by the child, such as "Who is this character?" and "What name would you like to give the character?" Additional guiding prompts then explored the child's routines and experiences: "What was your routine like before the diagnosis?", "What changed after you found out you had diabetes?", "What was your care routine like during the pandemic?", "Were you afraid of the coronavirus?", "Did anyone in your household get COVID-19?", "What were your appointments and diabetes follow-up like during that period?", "How did you feel when school returned to in-person classes?", and "Did your classmates follow the same precautions as you?" The interview format was developed to allow children to move beyond these questions and spontaneously share other experiences and feelings they considered relevant. This flexibility was intended to preserve narrative authenticity and maintain the interview as a space for free expression.

All interviews, both in person and remote, were audio-recorded and transcribed verbatim. Data were analyzed and interpreted using inductive content analysis in three phases: preparation, organization, and reporting of results.[22,23] During preparation, transcripts were organized and read carefully to obtain an overall understanding of the data. The second phase involved coding, categorization, and abstraction. As transcripts were reviewed, meaning units and information relevant to describing the analyzed content were identified. Meaning units were then grouped by similarity to deepen understanding of the topic. In the final step, categories were named according to their characteristics and presented in detail.[22,23]

Initial coding was carried out independently by two researchers and subsequently discussed in meetings with the full research team, which also took part in discussing and validating the final categories, ensuring consensus and analytic rigor. The team comprised a fourth-year undergraduate nursing student, two doctoral students (third year), one postdoctoral researcher, and two faculty members. All had prior experience in qualitative analysis and research related to chronic conditions.

The ethical principles set forth in resolutions of the Brazilian National Health Council (Conselho Nacional de Saúde, CNS)—especially Resolutions No. 466/2012 and No. 510/2016, as well as guidance from Circular Letter No. 1/2021 issued by the National Research Ethics Commission (Comissão Nacional de Ética em Pesquisa, CONEP) on remote data collection — were carefully followed. Remote interviews were conducted on encrypted platforms to protect participants' privacy. Data were stored securely under the researchers' sole responsibility. All information was de-identified to preserve confidentiality. Participants received prior guidance on the security measures adopted and provided free and informed consent to the use of digital tools for data collection. The research protocol was approved by the Human Research Ethics Committee of the proposing institution and the co-participating institution (CAAE: 58869622.9.0000.5393). To ensure participants' anonymity, excerpts were labeled CHILD1, CHILD2, ...CHILD14, corresponding to the interview order.

RESULTS

Fourteen children participated in the study, aged 7 to 11 years (mean 10 years); eight were girls, and six were boys. The mean time since T1DM diagnosis was 3.25 years. The children lived in 11 municipalities across four Brazilian states, resulting in a geographically diverse sample. Of the 14 interviews, 5 were conducted remotely and 9 in person.

Puppets played an important mediating role in the interviews. This playful resource was essential for building rapport between the children and the interviewers, easing initial tension, and encouraging the spontaneous expression of feelings and perceptions about the pandemic and diabetes. Although the puppets facilitated interaction, narratives were voiced mainly in the first person, with children describing their own experiences and emotions rather than speaking as the characters. Thus, the puppets primarily functioned as a catalyst for creating an atmosphere of trust and engagement, without symbolic mediation replacing the children's direct voices.

Two thematic categories were developed, each with its subcategories: 1) Psychosocial impacts of the COVID-19 pandemic and 2) Self-care and support networks in coping with COVID-19: children's perceptions and adaptation strategies. Chart 1 presents examples of the analytic path from meaning units to subcategories and thematic categories based on the children's narratives.

Chart 1. Categories, subcategories, and selected meaning units.

Categories	Subcategories	Meaning units
Psychosocial impacts of the COVID-19 pandemic	Challenges of social distancing for children during the pandemic	But during the pandemic, because we had to stay in quarantine, I couldn't go out, because it was dangerous, and I didn't get to see my friends very often. (CHILD1)
		I thought it was boring; I couldn't see my friends, and I missed them. (CHILD14)
	Emotions elicited by the pandemic	I was afraid of dying because it was a serious disease. It would be dangerous if I caught it, since I already had diabetes. (CHILD9)
		I felt sad when my mom got COVID. (CHILD13)
Self-care and support networks in coping with COVID-19: children's perceptions and adaptation strategies	Perceptions of the importance of self-care	Before diabetes, I didn't exercise much, but after I found out I had diabetes, I had to exercise more. (CHILD3)
	Coping and adaptation strategies in response to challenges posed by COVID-19	I wore a mask, stayed away from people, and used hand sanitizer. (CHILD2)
		When we went to the supermarket or anywhere else, we had to wear a mask. (CHILD6)
	Support networks and valuing family time	My grandpa came to our house every day to check my blood sugar and take care of me. (CHILD2)
		I played, watched TV, and played with my brother; it was fun. (CHILD11)

Psychosocial impacts of the COVID-19 pandemic

This category describes the main difficulties children reported during the pandemic. They had to cope with school closures, which affected their learning and social development. A new reality emerged, in which they had to adapt to online classes, face challenges related to technology and concentration, and deal with being separated from their peers. They also experienced feelings of fear, loneliness, anxiety, and sadness, as well as fear of the unknown, with direct consequences for their emotional well-being. Difficulties related to treatment, particularly the lack of regular medical follow-up, became a major concern for children and their families. Access to food and medications also emerged as an additional challenge because of mobility restrictions and resource shortages during the pandemic.

Challenges of social distancing for children during the pandemic

This category shows how social distancing affected children's routines and disease management, since health services were focused on COVID-19 cases, which led to delays in diagnosing and treating T1DM:

> *All the clinics closed; even my pediatrician's office took a long time to reopen, and when my test results came back high […] we had to wait for the office to reopen to take them there.* (CHILD4)

Other key pillars of T1DM management—such as physical activity, insulin therapy, and a balanced diet—were also compromised. Difficulty accessing medications and specific foods increased insecurity for some families:

> *So, at home, there was no way to exercise?* CHILD8: *No. Yes, I ate a lot of chips and chocolate […]. I just kept eating.* (CHILD14)

> *We were very worried, because we had to go get the insulin in N. [the child's hometown]. It was kind of hard because I couldn't eat much carbohydrate or sugar. It was tough, you know, because the supermarket had closed and the coronavirus was getting closer to us.* (CHILD1)

With school closures and the start of remote learning, children also reported difficulties with online classes:

> *I never liked online classes. For me, it is not the same as learning in person, when we can see better what the teacher is explaining.* (CHILD1)

> *It's bad! The internet doesn't work, you can't see the lesson or pay attention.* (CHILD3)

> *I didn't like it; I prefer in-person classes. It feels like we can't really participate, the teachers don't listen to us, and we can't communicate properly.* (CHILD13)

Another concern was the distance from peers and the difficulty of keeping in touch:

> *But during the pandemic, because we had to stay in quarantine, I couldn't go out, because it was dangerous, and I didn't get to see my friends very often.* (CHILD1)

> *I thought it was boring; I couldn't see my friends, and I missed them.* (CHILD14)

One child, however, identified a benefit of online activities in bringing classmates closer to their day-to-day life:

> *I joined the online class and showed my house to my friends.* (CHILD2)

Emotions elicited by the pandemic

Children reported that the pandemic had a substantial impact on their mental health, mainly because of the wide range of intense feelings and emotions triggered by uncertainty, fear, and insecurity. Media coverage played an important role in further amplifying these feelings:

> *I saw a lot of news on TV; I saw people who were dying from it, being hospitalized because of it, being intubated because of it.* (CHILD6)

Children whose relatives were infected with COVID-19 expressed greater fear and sadness:

> *I felt sad when my mom got COVID.* (CHILD13)

> *COVID was bad for us; a lot of people died, and they died because they didn't know what it was. My dad almost died from COVID […] COVID was killing a lot of people, and it wouldn't let us leave the house.* (CHILD2)

As the pandemic worsened, anxiety and sadness increased, since early studies at the time suggested that having a chronic condition was a risk factor for developing more severe COVID-19:

> *I was afraid of dying because it was a serious illness. And it would be dangerous if I got it, because I already had diabetes.* (CHILD9)

> *I had to be careful. Since I had diabetes, getting sick is hard to control.* (CHILD2)

> *I got COVID-19 twice and I was really scared.* (CHILD13)

> *Yeah, I had to take better care of myself and protect myself, because if I got COVID-19 with diabetes, things could go really wrong.* (CHILD14)

In this context, some children reported being more concerned about managing T1DM than about the pandemic itself:

> *I was more worried about diabetes, you know?* (CHILD13)

There were also reports that stress caused by the pandemic contributed to poorer control of the chronic condition:

> *I think the pandemic period was really sad; after my grandmother caught the virus, we had to be twice as careful. Because I was worried and feeling emotional and nervous, my blood sugar went up a lot.* (CHILD1)

By contrast, some children reported that they were not afraid of COVID-19:

> *Were you afraid of COVID?* CHILD2: *No, COVID was going to go away at some point; we just had to wait, and the doctors take care of that.*

> *Were you afraid of COVID-19?* CHILD4: *Not much, but my mom was terrified.*

For these children, following public health measures made fear seem unnecessary:

> *I wasn't afraid, because I always went out wearing a mask and always put hand sanitizer on my hands.* (CHILD5)

Children who had COVID-19 more than once reported feeling less afraid during the second infection:

> *I was less afraid, because I already knew what it was like. I think it was milder because I had fewer symptoms.* (CHILD13)

They also linked their lack of fear of COVID-19 to their age and to a limited understanding of how severe the disease was:

> *I didn't feel anything. I think I was younger and just didn't really care about things.* (CHILD4)

> *For me, not much changed. My mom was the one who was really worried. Because I was younger, it felt as if there wasn't really a pandemic.* (CHILD13)

Children also described feeling bored with a repetitive daily routine and with having few activities to do at home, often referring to social distancing as boring:

> Every day felt the same; it was really boring having the same day over and over. (CHILD2)

> *I felt bored, really bored […] It was really boring; I couldn't play.* (CHILD7)

> *It was kind of boring too; there was nothing for me to do at home.* (CHILD12)

Many children said they were really bothered by having to follow preventive measures:

> *During the pandemic, I couldn't eat sweets, I couldn't play in the street, I had to wear that awful mask […]. I had to stay one meter away from people, I couldn't take my mask off at all, I couldn't go to the bathroom at the same time as everyone else, and there was one desk at each spot. It was really boring!* (CHILD7)

> *I had to go out wearing that mask that was so annoying it almost made me feel suffocated.* (CHILD2)

> *I didn't like wearing a mask; it was really boring.* (CHILD11)

> *I always wore a mask. Sometimes it gets tiring to wear a mask, but my mom told me not to keep taking it off, and the teachers really insisted that we not leave our noses out, wash our hands, and use hand sanitizer.* (CHILD13)

Some children initially felt happy about not going to school, but over time they began to miss in-person classes and their friends:

> *I just played with my sister and was happy because I didn't have to go to school […]. I missed my friends! Then, when school started again, it was fun.* (CHILD8)

> *I thought it was nice. It's just that I don't really like going to school; I'm lazy.* (CHILD10)

> *I missed regular classes; I missed being able to go out like before.* (CHILD13)

In addition to missing their friends, children reported missing family members during the period of social distancing and feeling anxious because they could not leave the house:

> *I thought it was strange not being able to see them; I missed them.* (CHILD14)

> *I was really anxious, and we couldn't go out because it was dangerous, you know?* (CHILD1)

Self-care and support networks in coping with COVID-19: children's perceptions and adaptation strategies

This category explores how children perceived the importance of self-care and which measures they considered most important to prevent COVID-19 infection. It also describes strategies they used to adapt their medical follow-up, with a focus on T1DM management, and the role of support networks during the period of social distancing.

Perceptions of the importance of self-care

During the period of social distancing, children recognized the importance of self-care to stay healthy while managing their chronic condition, because they were afraid their T1DM might get out of control:

> *Yeah, it was hard, you know? I had to be careful not to get sick and have my blood sugar go out of control.* (CHILD2)

As part of self-care, they also started exercising more:

> *Before I had diabetes, I didn't exercise much, but after I found out I had diabetes, I had to exercise more.* (CHILD3)

Physical activity became part of their daily routine, as CHILD1 explained:

> *I spent a lot of energy; I ran, I got up really early. I woke up at six in the morning, had my breakfast, went down to the corral to milk the cows, then went back up, got my horse, and rode all day.* (CHILD1)

They also showed that they had developed solid T1DM self-care skills:

> *I checked my blood sugar to see what it was. If it was 200, I had to take 1 unit. If I wasn't going to eat, then I didn't take anything just to correct it. When I didn't have the rapid one [insulin], I had to jump rope or do physical exercise.*

Because their primary caregiver was not always available to help them manage T1DM during social distancing, children reported needing to develop self-care skills focused on managing the chronic condition, such as insulin administration and capillary blood glucose monitoring:

> *I had to manage on my own because my grandmother has a hard time learning how to do things, so I had to do it myself. Now I do everything by myself; I don't depend on anyone.* (CHILD4)

Although children recognized the importance of keeping their distance from classmates and relatives, not being able to go to places they enjoyed also interfered with their blood sugar control:

> *We had to stay isolated; we weren't supposed to stay too close to people, right? Because it was dangerous […]. I really missed going to the farm […]. When I stay at home for a long time, my blood sugar gets a little out of control. When I go to the farm, I don't even take insulin, and my blood sugar still stays good!* (CHILD1)

Coping and adaptation strategies in response to challenges posed by COVID-19

Social distancing changed children's daily routines, and they began to adopt different strategies to prevent COVID-19 infection. They needed to step up their T1DM-related care and adapt it so they could continue monitoring their condition through online appointments with professionals from different disciplines, although this experience was not the same for all children:

> *I had to take even more care of myself, you know?* (CHILD1)

> *Do you think you missed or had any appointments delayed because of the pandemic?* CHILD3: *No, because the doctor saw me online.*

> *You said you had an online appointment; which professional was it with?* CHILD1: *It was with the nutritionist and my endocrinologist […]. I actually thought it was fun, but online appointments are not the same as in-person ones.*

Because appointments were held online and given the broader pandemic context, some children were unable to complete their routine monitoring tests during this period. To avoid losing control of T1DM, they tried to stay vigilant and maintain good habits:

> *I didn't have any tests done […]. Before the pandemic, we had already gone to the doctor, I had already had the tests done, and they had turned out well. So we just kept things the same until we could go back for another appointment.* (CHILD1)

During the pandemic, families also needed to adapt and receive support to cope. Adopting coping strategies to prevent the spread of the virus and avoid worsening of the chronic condition was essential. One such strategy was allowing caregivers to work remotely:

> *Was she (your mother) able to stay home?* CHILD2: *Yes, she's working from home.*

> *During the pandemic, they found out about my diabetes and let my mom stay home with me for a while and help me with that.* (CHILD1)

When children needed to leave home during this period and when they returned to in-person classes, they recognized the importance of following prevention measures, such as wearing masks and using hand sanitizer:

> *If we went to the grocery store or anywhere else, we had to wear a mask.* (CHILD6)

> *I wore a mask, stayed away from people, and used hand sanitizer.* (CHILD2)

> *We had to wear a mask and put on hand sanitizer before going in to see the doctor.* (CHILD6)

They also reported not sharing personal items, such as water bottles:

> *During the pandemic, we couldn't share snacks. We had to sit one desk behind our classmates, and we couldn't borrow anything without first putting hand sanitizer on it. We also couldn't share water bottles or anything.* (CHILD6)

They further stated that they respected social distancing and, consequently, had to stay away from their social circle:

> *Before the pandemic, I used to play outside in the street a lot, you know? But during the pandemic, since we had to stay in quarantine, we couldn't go out because it was dangerous; I didn't see my friends out on the street very much.* (CHILD1)

> *We couldn't leave the house. I had to stay away from the people I liked.* (CHILD11)

Later, as the pandemic progressed and COVID-19 vaccines became available, they emphasized the importance of getting vaccinated:

> *My mom took my little sister and me to get vaccinated, and everyone got the COVID-19 vaccine.* (CHILD6)

> *Only when COVID-19 was over did I get the vaccine […]. It helps protect you.* (CHILD14)

> *At home, everyone got vaccinated.* (CHILD11)

> *Did you get the vaccine?* CHILD9: *Yes, then I could leave the house, and everything went back to normal.*

When classes resumed, some children reported staying home for a longer period and continuing to follow prevention measures against infection, such as wearing masks at school for a longer time:

> *I didn't go back when classes started again, because my doctor said it still wasn't time for me to go back to school, so I could protect myself, you know?* (CHILD3)

> *Did you go back at the same time as your friends?* CHILD9: *No, I waited until I got better.* (CHILD9)

> *They stopped wearing masks, and I kept mine on for another month before I stopped using it.* (CHILD2)

Support networks and valuing family time

The uncertainties experienced during this period increased mental health needs. Children mentioned finding support in religious practices, as well as support from family members and friends:

> *For a while, we had online church services, and later they let us go back, you know? We could go to church again.* (CHILD1)

> *My grandpa came over every day to check my blood sugar and take care of me.* (CHILD2)

> *At recess, she (friend) would say, "V., what's your blood sugar? Can you eat?" And if she or I brought a snack, we shared it.* (CHILD6)

Because families were spending more time at home, they needed to reorganize family dynamics. Some participants stayed at other relatives' homes during the pandemic:

> *Did your whole family move to your grandma's house?* CHILD2: *No, it was just me, my mom, and my sister.* (CHILD2)

> *I stayed in my grandma's house in isolation. It was just the two of us.* (CHILD7)

Children came to value family time even more. Stronger family bonds were built through everyday activities such as watching movies, playing games, spending more time with siblings, and helping with household chores:

> *We watched a lot of movies! It was really fun. Since they weren't working, we spent more time together, talking.* (CHILD1)

> *We stayed home playing Uno [card game], playing inside, and making up games with animals.* (CHILD2)

> *I just played with my sister.* (CHILD8)

> *I played, watched TV, and played with my brother; it was fun.* (CHILD11)

> *I remember I used to ask my mom to let me clean the house. I still like cleaning the house.* (CHILD8)

Greater use of electronic devices and playing with pets were also mentioned as ways to cope:

Usually I was on my phone or playing with my dog […]. I tried to do something different at home to forget about it. (CHILD1)

I used to read books to my dog, play with dolls, watch TV, and play hairdresser with my mom. (CHILD13)

DISCUSSION

This study aimed to examine how the COVID-19 pandemic affected the daily lives of children with T1DM from the children's own perspective. The findings indicate changes in several aspects of these children's and their families' lives, particularly psychosocial dimensions, which were highlighted across all interviews. Other studies have likewise documented the psychosocial impact of this period on children's well-being, especially in terms of mental health.[7,24,25] During the pandemic, children and their families faced uncertainties that intensified feelings of fear and sadness. These feelings could progress to anxiety, depression, or increased stress, calling for closer attention to these vulnerabilities.[7,24-28]

Participating children described how school closures disrupted their daily routines and interactions with classmates. This finding is consistent with studies that underscore the profound effects of school closures, the shift to remote learning, and social distancing on children's everyday lives. Among these effects are shifts in regular sleep patterns, with a tendency to go to bed later and, consequently, wake up later, as reported in our interviews.29 In addition, children's screen time increased substantially, both because they needed to attend online classes and because screens became a major source of entertainment at home. This increase may have worsened sleep quality, compounded by a concurrent reduction in physical activity. Taken together, these factors likely contributed to higher levels of anxiety and stress among children.[29,30]

Separation from friends and relatives emerged as a central theme in the interviews. Restrictions imposed by social distancing led to a marked reduction in interactions with peers and family members, which in turn heightened anxiety, stress, and loneliness, with negative emotional impacts on the children in this study. Social distancing also limited opportunities for physical exercise, as many children who previously participated in sports outside the home had to stop these activities. At the same time, some adapted, finding new ways to stay active within their family and environmental constraints. This diversity of experiences aligns with studies indicating the pandemic's impact on children's health behaviors was not uniform: while some children maintained regular physical activity, others faced barriers, including a lack of adequate space at home and fear of exposure to the virus.[31,32] These factors contributed to a shift from outdoor play and physical activity to screen-based activities, resulting in a sedentary lifestyle, which is not recommended for managing T1DM.

Although the scientific literature reports many accounts of children who experienced fear and anxiety during the pandemic,[7,24-28] some interviewees in our study did not describe these feelings. Children's emotional experiences are shaped by multiple factors, including their life histories, perspectives, family context, and age. In our interviews, some participants mentioned reasons for not feeling afraid of the pandemic, such as strong trust in health services or limited awareness of the pandemic's severity at their age. This finding underscores the complexity of children's emotional responses to a global crisis, indicating that there is no single, universal reaction but rather a range of adaptive responses to different circumstances.

During the pandemic, children recognized the importance of self-care and described strategies they used to keep T1DM under control, including being physically active, monitoring blood glucose, and administering insulin. Some narratives highlighted individual efforts to cope with the temporary unavailability of primary caregivers, which fostered greater autonomy in managing the condition. These accounts point to a process of adaptation within the constraints of social distancing measures, in which children had to reorganize their routines and incorporate selfcare practices with greater responsibility and personal initiative. This adaptive capacity can be interpreted as both a coping strategy and a sign of maturation in the context of the health crisis.

During data collection, using puppets as a mediating tool proved effective for facilitating communication with children and encouraging emotional expression. Although this strategy was not formally assessed with specific instruments, we observed during the interviews that children interacted positively with the characters, showing engagement, spontaneity, and willingness to share their experiences. In our experience, using puppets strengthened rapport and attentive listening without compromising the flow of the interview. Even so, a previous study[22] showed that, in some contexts, children's interest in the puppet can interfere with how the interview is conducted, requiring interviewers to balance playfulness with the goals of focused listening. Our findings therefore reinforce this technique's potential while highlighting the need to train interviewers and conduct further studies to systematically evaluate its effectiveness in qualitative research with children.

FINAL CONSIDERATIONS AND IMPLICATIONS FOR PRACTICE

This study examined the impacts of the COVID-19 pandemic on the daily lives of children with type 1 diabetes mellitus (T1DM), contributing to the existing literature. The children described the main challenges they faced during this period, their feelings and emotions, their perceptions of the relevance of self-care, and the coping strategies they adopted, while also emphasizing the importance of family involvement at every stage.

The findings have implications for clinical practice and underscore the need for personalized approaches to T1DM management, especially during crisis, such as pandemics or

other adverse situations, with a focus on mental health support and the psychosocial aspects of children's lives. In addition, these results are relevant to developing public policies that address the impact of the pandemic on children's health, as they highlight the need for psychosocial support and resources to help families cope with the challenges posed by the pandemic and other similar public health emergencies.

Several years after the onset of the pandemic, the insights generated by this study not only improve understanding of T1DM care during health crises but also broaden the perspective on pediatric care in adverse contexts more generally. Strategies such as structured protocols for remote encounters, safe transitions between different care modalities, and strengthening family and community support networks should be considered in planning for future emergencies.

In the scientific literature, this study adds firsthand perspectives from children with T1DM, enriching understanding of how the pandemic affected this population. Finally, these implications extend to the everyday lives of these children and highlight the importance of paying closer attention to the impact of global events on their physical and emotional health.

A potential limitation of the study was the time gap between the start of data collection and the easing of social distancing measures imposed during the COVID-19 pandemic. This temporal gap raises the possibility that children may have forgotten part of their experiences during the pandemic, which could have led to incomplete accounts. In addition, conducting some interviews remotely may have limited children's use of puppets to express themselves.

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DATA AVAILABILITY RESEARCH

Data is available on demand to authors because it is a qualitative study based on interviews that may contain sensitive content. Even with the use of codes and removal of direct identifiers, there remains a risk of reidentification based on context, narratives, and combinations of information. Therefore, in line with ethical recommendations and with the protocol approved by the Research Ethics Committee, access to the data will remain restricted.

CONFLICT OF INTEREST

No conflict of interest.

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