


Research

Maternal perspectives on COVID-19 kindergarten learning impacts: a qualitative study of families with low income

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Abstract

In this paper, we aim to understand maternal perspectives on: (1) COVID-19 pandemic learning impacts for kindergartners from low-income households; and (2) Factors that mitigated or exacerbated impacts on learning. We conducted a qualitative study with 22 mothers of low-income households in the United States who had kindergarten-age children. Through in-depth, semi-structured interviews, mothers reflected on their experiences during the 2020–21 school year. We used an iterative approach for developing and revising codes and themes emerging from the transcribed interview data until we reached thematic saturation. Many mothers noted negative learning impacts, but some noted positive impacts that they attributed to active parental engagement in their child's learning. Mothers described several family-level and school-level supports and barriers to their child's learning. Fewer mothers described supports and barriers pertaining to their social circle or their larger community. The most commonly reported supports included: economic and social supports that allowed the time and financial means to engage actively in their child's learning, mental health supports to strengthen family functioning, and regular, timely, and open home-school communication.

Keywords COVID-19 pandemic · Kindergarten · Home learning environment · Parents' experiences · Qualitative

Widespread shutdowns beginning in March of 2020 in response to the global pandemic, affected ~57 million school-age children in the United States [1]. During the subsequent (2020–2021) school year, an estimated 3.4 million U.S. children entered kindergarten [2]—a significant developmental and transitional period during which interactions with family, peers, schools, and community members profoundly shape children's school success [3]. In the 2020–21 school year, many children continued to experience varying learning formats and inconsistent access to schooling [1]. For example, in September 2020, 67% of adults with children under 18 enrolled in school reported that their child participated in distance learning [4]. Out of necessity, many primary caregivers assumed the role of supporting and facilitating children's learning [5–7], engaging in activities such as teaching academic content and monitoring children or assisting with technology during distance learning [8]. Mothers, in particular, shouldered a disproportionately greater share of childcare and schooling responsibilities during what has been termed “a gendered pandemic.” [9–11].

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Kindergartners entering school in 2020 experienced a vastly different education than students one year older, with less face-to-face interaction with teachers and peers and fewer hands-on instructional activities. Reduced access to in-person learning exacerbated educational disparities and led to learning loss and diminished mental health and wellbeing for children and parents [12]. Although the COVID-19 pandemic impacted many children, those from low-income households experienced more continued challenges to health, wellbeing, and education [13, 14]. For example, in the US state of Virginia, whereas 52% of students overall were below benchmark at the end of the 2020–21 school year in one or more foundational learning areas, including literacy, mathematics, self-regulation, and social skills, 67% of students from low-income families were below benchmark, widening existing disparities [15]. Such findings are consistent with research demonstrating low-income status tends to co-occur with other family-level structural, social, and psychological stressors, which are linked to decrements in children's mental, emotional, behavioral, and physical health, cognitive functioning, and academic performance [16].

Because mothers were largely responsible for supporting learning during the 2020–21 kindergarten year [9–11], we need to better understand their perspectives on children's kindergarten experiences, including whether and how the COVID-19 pandemic impacted their learning. Some research from earlier in the pandemic [17, 18] reveals parents feeling stressed and overwhelmed with the time required to support their young children's learning, including accessing materials and completing learning activities. Although parents largely reported challenges with balancing multiple roles (e.g., parent, teacher, professional), some also identified benefits, such as learning more about their child's interests or social and academic needs [17] or reported that they found learning from home to be a positive experience for their child [18]. It is possible that challenges to supporting young children's learning may have changed during the first full school year of the pandemic (2020–21) or that the novelty families experienced earlier in the pandemic, and the associated benefits, had diminished.

Given the co-occurrence of household low-income status with family structural, social, and psychological stressors, we also need to better understand what barriers and supports mothers experienced as they facilitated their child's kindergarten learning. This study draws on interviews of 22 mothers of kindergarten-aged students across eight US states from low-income families to address the following research questions: (1) What are maternal perspectives of the impacts of the COVID-19 pandemic on learning? and (2) What are maternal perspectives on factors that mitigated or exacerbated learning impacts? Guided by the bioecological model of development [19], which suggests the quality and frequency of reciprocal interactions in which children engage in their immediate environments may variously promote or disrupt development, we asked mothers to describe mitigating and exacerbating factors at multiple levels (e.g., child level, family level, school level, community level and beyond).

Research using a bioecological systems perspective conducted during the COVID-19 pandemic has enumerated complex and interrelated systems of stressors impacting families [20–22]. Here, we expected that mothers would describe supports and barriers more often at levels most proximal to the child and family, including the microsystem (the child's immediate environment, such as home and school) and the mesosystem (connections between microsystems, such as interactions between mothers and teachers) and less often at more distal levels, including the exosystem (broader social systems, such as community services) or the macrosystem (cultural and societal systems, such as cultural or political norms). Elevating the voices of mothers whose kindergartners may be at risk for early learning challenges will help us to be better informed and prepared for future situations where school and community activities are disrupted by identifying potential solutions to supporting children and families.

1 Methods

1.1 Study design

With Institutional Review Board approval, we conducted a qualitative study of maternal perspectives of the impacts of COVID-19 on children and their families through in-depth, semi-structured interviews with mothers of kindergarten-age children during the 2020–21 school year; this specific study focused on maternal perspectives on learning impacts. We recruited mothers from a larger study ($n = 117$) examining child health and wellbeing during 2020–21. All mothers were English-speaking, and all infants were born healthy at term between March 2015 and May 2016 at sixteen US hospitals. Beginning in January 2021, all mothers who had agreed to continue participating in studies, and who had reported their educational attainment in the original study were invited to be.

screened for participation in the larger study via a mailed letter.

For the present study, all contacted mothers whose child was kindergarten eligible at the start of the 2020–21 school year who were in the lowest tercile for household income of the study sample (< \$15K per person; calculated by dividing the annual total income from all sources by the number of persons residing in the household) were eligible to participate in the study. Of those contacted, one mother declined to participate, three did not respond, and 22 signed an informed consent form, completed an interview between 6/29/2021 and 9/1/2021, and received a \$50 electronic gift card for participation. The study protocol was approved by the University of Virginia Institutional Review Board for Social & Behavioral Sciences in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments.

1.2 Data collection

We piloted the interview guide with four mothers of kindergarten-age children to improve the clarity of interview questions and probes [23]. The final interview guide focused on maternal perspectives of positive and negative impacts of the COVID-19 pandemic on their child's learning, and factors that mitigated or exacerbated learning impacts (See Table 1 for interview guide questions). When mothers reported impacts on their child, interviewers probed for specific examples and descriptions. Consistent with the bioecological model of development [19], interviewers also prompted mothers to consider mitigating and exacerbating factors at multiple levels, including the family level, school level, and community level and beyond. Each interview lasted between 30 and 60 min. Interviews were conducted by trained interviewers using a virtual meeting platform and were audio-recorded and professionally transcribed. Interviews continued until thematic saturation was reached.

1.3 Data coding and analysis

We systematically and iteratively analyzed the interview data using a combination of deductive coding and aspects of constant comparative methods [24] (e.g., overlap between data collection and analysis, iterative refinement of (sub) themes) and thematic analysis [25] (e.g., identifying and providing detailed descriptions of (sub)themes), allowing concepts and subthemes to emerge during data collection and analysis. Specifically, analysis followed three phases. In the first phase, seven investigators reviewed interview transcripts and independently drafted memos on patterns in the data [26]. The same investigators then met to discuss their initial observations of the data and generate an initial code list. In the second phase, one team member drafted a codebook using the initial codes, and at least two of four investigators coded each transcript independently using *Dedoose*, a qualitative data analysis software program [27]. The codebook was organized according to two domains driven by the research questions: *COVID-19 Pandemic Learning Impacts and Factors that Mitigated or Exacerbated Learning Impacts*. In the third phase, four investigators discussed their application of all codes and the memos they had written. Namely, investigators confirmed the deductive themes informed by the bioecological model of development (e.g., positive and negative learning impacts; family- school- and community-level supports and barriers) [19] and based on the questions in our interview script. Investigators also confirmed all inductive subthemes that emerged, sought and discussed disconfirming evidence, and resolved all disagreements through group discussion. Although no formal inter-rater reliability statistics were computed, our approach involved a rigorous process of independent coding by at least two investigators followed by comprehensive discussion among four researchers, resulting in complete agreement on all coded data.

The team included multiple researchers from varied disciplines (e.g., medicine; education; public health) in the analytic process [28]. Investigators all identified as female. Investigator roles included two graduate students, one undergraduate student, two faculty members in the field of education and human development, and four practicing physicians: one professor of family medicine and public health sciences, and three professors of pediatrics. One investigator was the mother to a kindergarten-age child during the 2020–21 school year and experienced a school closure from March 2020–March 2021. The lead investigator for the study has focused on mixed methods and qualitative research in the field of pediatrics, including topics like mothers' attitudes, knowledge, trust, and decision-making regarding infant and child healthcare, and experiences of racism and quality of care.

Table 1 Interview guide questions for current study

Topic Area	Example questions and prompts
Overview	<ul style="list-style-type: none"> • We are interested to learn more about changes to children's childcare and school experience due to COVID-19. We are also interested to learn about the positive and negative effects of these changes on children's learning and development
Childcare and Schooling Prior to Pandemic	<ul style="list-style-type: none"> • First, I would like you to think back to January 2020 (before the COVID-19 pandemic) and tell me what [child's] childcare or school experience was like
Pandemic-Related Childcare and Schooling Changes Prior to Kindergarten	<ul style="list-style-type: none"> • Now thinking about the period between when the COVID-19 pandemic began (in March 2020) until just prior to the beginning of [child's] kindergarten year, what childcare and schooling changes did [child] experience?
Childcare and Schooling Experience During Kindergarten	<ul style="list-style-type: none"> • Let's turn now to [child's] kindergarten year. Would you describe for me what [child's] childcare and school experience was like when kindergarten began and whether there were any changes during the school year? o If there was a change in schooling structure, probe for when this happened and how (e.g., Was it a gradual change? How and when did they return to face-to-face instruction? Were there different options offered, such as virtual-only instruction?) o How did your role and others' role with childcare/schooling for [child] change with the COVID-19 pandemic, if at all? ■ If there were changes, how did you decide who would take on new roles during this time?
Learning Impacts	<ul style="list-style-type: none"> • How have schooling-related changes impacted [child's] learning and academic development, in areas like language, reading, and math? o Probe for positive and negative impacts, if needed o Can you think of any stories or examples?
Supports and Barriers at Multiple Levels	<ul style="list-style-type: none"> • Now we'd like to hear about factors that have helped and worsened the impact of schooling changes on [child's] learning and academic development • What made things easier and what made things harder in regards to [child] schooling changes? o Probe for factors that helped and worsened learning impacts at the following levels: <ul style="list-style-type: none"> ■ Individual child level (e.g., personality, activity level, preferences, and interests) ■ Family level (e.g., family processes, routines, living situation, interactions with friends, and social circle) ■ School level (e.g., teaching approach, communication, school-provided resources) ■ Community level (e.g., resources, events) ■ Local, state, or federal government (e.g., policies, restrictions, school reopening plans, stimulus efforts)

2 Results

Participants were English-speaking mothers who identified as non-Hispanic Black (41%), Hispanic of any race (36%), and non-Hispanic White (23%). Their children (50% female) were on average, 5 years and 7 months of age ($SD = 1.4$ months), and were born healthy at term between March 2015–May 2016. All participants had household incomes $< 250\%$ of the 2021 federal poverty level for household size. Twenty-seven percent of mothers indicated they were the only adult living in the household and 41% reported there were more children < 18 years living in the household than adults. Additionally, nearly $1/3$ of mothers indicated their employment hours or status was affected during the pandemic (e.g., laid off; reduced hours; change in work location; business closed). See Table 2 for participant demographic information.

Mothers described various learning modalities for their child, including fully remote/virtual/online learning ($n = 11$; 50%), a combination of in-person and virtual instruction during the year ($n = 7$; 32%), in-person instruction throughout most of the school year ($n = 3$; 14%), and homeschooling that began before the pandemic and continued ($n = 1$; 5%). Twenty children (91%) experienced at least some virtual instruction during their kindergarten year. For example, two of the three children who primarily experienced in-person instruction also experienced “a few” weeks of virtual

Table 2 Participant demographic information

Characteristic	Frequency (percentage)	Mean (SD)
Completed in-depth interview	22	
Maternal age (in years) at in-depth interview		
< 30	5 (22.7)	
30–34	7 (31.8)	
35–39	7 (31.8)	
40–44	3 (13.6)	
Maternal race/ethnicity		
Hispanic of any race	8 (36.4)	
Non-Hispanic, Black or African American	9 (40.9)	
Non-Hispanic, White	5 (22.7)	
Maternal formal education attainment		
Less than high school diploma	1 (4.5)	
High school diploma or GED	6 (27.3)	
Some college	8 (36.4)	
College graduate	6 (27.3)	
Graduate school	1 (4.5)	
Family income		
Less than \$20,000	3 (13.6)	
\$20,000–\$49,999	12 (54.5)	
\$50,000–\$79,999	7 (31.8)	
Income status		
< Federal poverty level for household size; 2021	4 (18.2)	
< 200% Federal poverty level	12 (54.5)	
< 225% Federal poverty level	3 (13.6)	
< 250% Federal poverty level	3 (13.6)	
# Adults living in home = 1	6 (27.3)	
# Children living in home > # adults	9 (40.9)	
Maternal employment hours or status affected during pandemic (e.g., laid off; reduced hours; work location; business closed)	7 (31.8)	
Family location (US State)		
CA	9 (40.9)	
FL	3 (13.6)	
NJ	3 (13.6)	
MD	2 (9.1)	
NY	2 (9.1)	
IL	1 (4.5)	
OR	1 (4.5)	
PA	1 (4.5)	
Child's age in months/years and months		66.95 (1.4)/5 years, 7 months
Child sex = female	11 (50.0)	
Child race/ethnicity		
Hispanic of any race	7 (31.82)	
Non-Hispanic, Black or African American	9 (40.9)	
Non-Hispanic, White	6 (27.3)	
Non-Hispanic, other race	0	
Child has Individualized Education Plan (IEP)	5 (22.7)	
Child schooling format during kindergarten year		
Primarily online	11 (50.0)	
Some combination of in person and online	7 (31.8)	

Table 2 (continued)

Characteristic	Frequency (percentage)	Mean (SD)
Primarily in person	3 (13.6)	
Planned homeschooling	1 (4.5)	

instruction for COVID-19-related school closures. Of the seven children who experienced a combination of in-person and virtual instruction during the year, 1 child began in-person instruction in January; 4 children began in March, and 2 began within the last 6 weeks of school or “at the end of the year”. Most children who engaged in some form of virtual learning joined class meetings using a virtual meeting platform. Reports of daily instructional time varied, ranging from half-day or less to full-day.

Themes and subthemes that emerged from the mothers’ lived experiences were in the domains of (1) *COVID-19 pandemic learning impacts* and (2) *Factors that mitigated or exacerbated learning impacts*. We provide an overview of these domains, associated themes and subthemes, and exemplar quotes in Tables 3, 4.

2.1 COVID-19 pandemic learning impacts

Many mothers perceived that their family’s experiences during the COVID-19 pandemic affected their child’s learning in kindergarten. Although some mothers described positive impacts, most mothers described negative learning impacts.

2.1.1 Positive learning impacts

Mothers who identified positive impacts of the COVID-19 pandemic on learning described experiences pertaining to the subthemes of (1) spending more time working individually with their child, and (2) engaging in specific learning activities with their child.

Spending More Time Working Individually With Their Child Some mothers described “investing” time to help their child learn, serving as “a second teacher,” or even “learning together”. For example, a mother of one son attending kindergarten online, who was not working at the time of the interview, explained, “...he’s actually doing well...because he’s had time to get more one-on-one from me and virtually a little bit. It has helped him to thrive and flourish a lot. So he’s actually beyond his grade level.” (Participant 12, age 31, non-Hispanic, Black or African American, not married to child’s father).

Engaging in Specific Learning Activities With Their Child Other mothers credited specific learning activities they engaged in with their child, such as reading together or practicing spelling words, for the positive impacts. One mother of four, who worked part-time, and who homeschooled her daughter before and during the pandemic, explained, “I feel like her problem-solving skills actually increased a lot and I feel like her comprehension skills, like reading comprehension...We’re going to read together, we’re going to listen to these audio books. And so she picks up really well from audio books now.” (Participant 18, age 33, non-Hispanic, White, married to child’s father).

2.1.2 Negative learning impacts

Mothers also identified several negative impacts of the pandemic on children’s learning corresponding to subthemes that the child has (1) fallen behind, and (2) lost interest or motivation in learning.

Child Has Fallen Behind Many mothers expressed worry that their child had not been meeting kindergarten learning expectations or that they had forgotten skills or information they had learned prior to the pandemic. One mother of four, who worked full-time and whose kindergartener attended school online said, “I’m just really worried because I know she’s behind and I know...that every year things get harder and harder, and it gets more challenging. So, I think about that, I think of, will she ever catch up really? Because that’s a whole year and a half of that was lost.” (Participant 17, age 37, Hispanic of any race, not married to child’s father).

Child Has Lost Interest or Motivation in Learning Several mothers described how their child’s kindergarten experiences had contributed to a loss of interest or motivation in learning. One mother, who reported not being able to work while her two children were attending school online explained, “Honestly, as far as learning, he actually seemed like he’s not interested no more. He was interested when he was in person. Far as like reading and everything, he act like he totally don’t remember anything. {...}

Table 3 COVID-19 Pandemic learning impacts: themes, subthemes, and exemplar quotations

Themes (Deductive)	Subthemes (Inductive)	Exemplar quotations
Positive learning impacts	Spending more time working individually with child	"...focusing more on him to help him more because I know, like I said, it was different for me and him as well, for both of us, that we both learn together how to do it at home." (Participant 13, age 26, Hispanic of any race, not married to child's father)
	Engaging in specific learning activities with child	"We were doing spelling bees each week. They'll have words that they'll spell in the house. Every Sunday, we'll do a spelling bee in them. They'll get new words. So her spelling is getting a bit better." (Participant 6, age 32, non-Hispanic, Black or African American, not married to child's father)
Negative learning impacts	Child has fallen behind	"He didn't get the attention that a teacher needs to give to a student who is falling behind, basically... now, he's far behind. Now he needs to take these extra classes. Now, he has to do this extra stuff. So, that's pretty much it. It just took a huge toll on a lot of kids' education." (Participant 3, age 24, Hispanic of any race, separated from child's father)
	Child has lost interest or motivation in learning	"She really didn't want to do anything because she didn't know the teacher and it was a whole new class, new kids, and it was, I think, 20 or 15 kids." (Participant 15, age 35, Hispanic of any race, married to child's father)

Table 4 Factors that mitigated or exacerbated learning impacts: themes, subthemes, and exemplar quotations

Themes (Deductive)	Subthemes (Inductive)	Exemplar quotations
Family-level supports	Family member or paid tutors	"So it was after we got a tutor, then she really started like, 'Okay, she's learning now. She's doing things.'" (Participant 15, age 35, Hispanic of any race, married to child's father)
Family-level barriers	Family structure	"His speech services was impacted because the teacher wanted his background to be extremely quiet. But having two kids on school at the same time was extremely hard also because the speech teacher didn't understand that he had a brother that was in school. So it was like trying to put them in different parts of the household. But they both needed me to sit beside them." (Participant 4, age 27, non-Hispanic, Black or African American, not married to child's father)
School-level supports	Employment	"Again, it was closing down and then all of a sudden we became the teachers, which isn't a problem except for the fact that we worked. So we didn't have time to sit down with him eight hours a day." (Participant 16, age 39, non-Hispanic, White, married to child's father)
	Communication	"They just had amazing amounts of communication. To the best of their ability, I think they really tried to make it as easy as possible for the parents. They often praise the parents and just went out of their way to make us feel like, 'We know this is hard, just do the best you can.' They were really understanding of things came up and you communicated to them that this wasn't working, they would try to help you out with whatever that they could... If you needed to have even a one-on-one time with the teacher, there were set Zoom times where it could be a parent teacher conference. That was always available to us if we needed it." (Participant 19, age 43, non-Hispanic, White, married to child's father)
	Materials and resources	"They made sure that he had access to a computer. They made sure that, although we weren't in school physically, they tried to make learning as fun as possible for him. So he didn't feel as if he was missing out on anything." (Participant 10, age 29, non-Hispanic, Black or African American, not married to child's father)
School-level barriers	Unrealistic expectations	"Like I said, as the teachers were getting more demands on them, they were taking attendance, that was tougher... it was just a long day for a five-year-old, and they gave them breaks, like I said, sometimes they give them like 15 min, 20 min breaks, which was good, but it was just a long day, I think, for a kindergartner, virtually." (Participant 21, age 44, non-Hispanic, White, married to child's father)
	Learning modality	"She didn't like sitting in front of the computer at all. So we had a really hard time with her as far as school and try to get her to learn and participate. It was really bad." (Participant 15, age 35, Hispanic of any race, married to child's father)
	Communication	"One time I think we couldn't get into Google classroom in order to get on the Zoom link. I had no one to talk to. So she missed the day of school because I had no way to communicate to anyone say, 'Hey, this is not working. What should I do?'" That was my biggest issue for me. Communicating it lacked." (Participant 6, age 32, non-Hispanic, Black or African American, not married to child's father)
Community-level and beyond supports	Mental health	"...I spoke to another mom who has three kids and they were all doing the remote learning. And just her being honest with me about how it was also very difficult for her... Just made me not be so hard on myself, or hard on [Child]." (Participant 8, age 37, non-Hispanic, Black or African American, not married to child's father)
	Financial and social	"So that ability to work from home was really great and being able to be compensated for not working, that was nice. To be able to provide the care for my kids and not have to worry about having some stranger watch them or pay someone to watch them while I'm working. So that I think was really great of the government." (Participant 11, age 38, Hispanic of any race, not married to child's father)
Community-level and beyond barriers	Communication	"I feel like it's always last minute, they decide last minute, and that's just not fair. Because people have to work. People have schedules. And you can't just be like, 'Okay, your kids go to school now. Oh no, he's not going to school!' And then what do you do?" (Participant 15, age 35, Hispanic of any race, married to child's father)

So it's just like sometimes I had to literally yell at him or tell him that he's not going to get something in order for him to actually do the work or even let them know what it is that he knows." (Participant 4, age 27, non-Hispanic, Black or African American, not married to child's father).

2.2 Factors that mitigated or exacerbated learning impacts

When asked about factors that either helped mitigate or worsen pandemic-related learning impacts at various levels, mothers primarily described factors at three levels, corresponding to the themes of (1) family-level factors, (2) school-level factors, and (3) community-level and beyond factors.

2.2.1 Family-level factors

Mothers described several family-level factors that impacted their child's learning, pertaining to the subthemes of (1) family member or paid tutor supports, (2) family structure barriers, and (3) employment barriers.

Supports: Family Members or Paid Tutors At the family level, some mothers described siblings, grandparents, or paid tutors as key sources of support for their child's kindergarten learning. Mothers often described being actively involved in facilitating their child's learning. For example, a mother of three who worked full-time, and whose son attended school online explained, *"...he has me, he has his twin brothers who are in the fifth grade, so we're all pitching in, we're all helping him..."* (Participant 10, age 29, non-Hispanic, Black or African American, not married to child's father). Another mother who worked full-time, and whose daughter attended kindergarten online until the end of March 2021, described support from her mother, stating, *"I stayed home with her and my son...We had to learn together and when I thought she knew enough on her own and with my mother's help, then I went back to work in December of 2020."* (Participant 20, age 34, Hispanic of any race, married to child's father). Some mothers described hiring a tutor. One mother of four who worked full-time and whose daughter attended kindergarten online recounted, *"... at some point, it got too complicated for me to help her with her schoolwork and to keep her focused...so then I had to hire somebody to sit there and guide her, just to make sure that she was learning, paying attention and focusing to the best of her ability."* (Participant 17, age 37, Hispanic of any race, not married to child's father).

Barriers: Family Structure Some mothers described family-level factors, ranging from inconsistent parenting practices to challenges facilitating learning for multiple children in the household, which worsened impacts on learning. One mother who indicated she had reduced her work hours to care for her kindergarten-age son and two other children and help them with online schooling said, *"I was trying to help them do their stuff online...But they would go to their dad's house, because I'm divorced, so they would go to their dad's house a couple of days but he would never do any work with them. Then I'd be trying to catch up on the work those other days and it became very troublesome."* (Participant 11, age 38, Hispanic of any race, not married to child's father).

Barriers: Employment Several mothers described how employment circumstances made it challenging to support their child's learning. For example, one mother who worked 45 h per week at a fast-food restaurant recalled, *"So I have to work 10, 12 h...my mom was calling me [at work] and let me know, the computer is not working, he's crying, he's pulling everything on the floor... customers want their food right away, they get mad too, they have problems at their homes too."* (Participant 9, age 44, Hispanic of any race, married to child's father). Another mother who worked full-time and whose kindergarten-age daughter had a younger sibling cited multiple barriers, including transportation, her work schedule, and an abbreviated school day, indicating, *"...she wanted to go in person. I wanted her to go in person. She went in person for about a week or two. It didn't work out for me and my schedule because I would have to be dropping her off. And it wasn't a full day, it was about three to four hours and I couldn't drop her off and then leave work and come and pick her up, and then the daycare wasn't accommodating buses."* (Participant 22, age 31, non-Hispanic, Black or African American, not married to child's father). Some mothers specifically referenced having to reduce their work hours outside of the home or indicated they could not work for pay while their child was attending kindergarten online. For example, a mother of three, whose daughter attended kindergarten online indicated *"...when you have a young child, who's so young, she doesn't know a lot and I can't leave her siblings to do it because they're also in school...If I have to stay home from work in order to help her education, then that's what I chose to do."* (Participant 6, age 32, non-Hispanic, Black or African American, not married to child's father).

2.2.2 School-level factors

The most widely-cited factors that either mitigated or worsened pandemic learning impacts were those at the school level. School-level factors pertained to the subthemes of (1) materials and resources supports, (2) communication supports, (3) unrealistic expectations barriers, (4) learning modality barriers, and (5) communication barriers.

Supports: Materials and Resources Several mothers mentioned school-provided materials and resources, including technology, as being key to mitigating learning impacts. One mother who worked full-time, and whose daughter attended school online, explained, *"I mean, they provided her with technology educational materials... that she needed. That was... a huge help because, like I said, I have four kids and... I didn't have to go shopping out for them or find the means to purchase computers or tablets or anything like that. The other thing that they did do is, I was going through my divorce at that time and I had to cut the internet. So what [they] ended up doing is the school provided hotspots for them, which was really nice."* (Participant 17, age 37, Hispanic of any race, not married to child's father). One single mother, who worked reduced hours to care for her son and his two additional siblings expressed that providing free internet to families *would* have been helpful, saying *"I know this probably would have been impossible, but to just give free internet to people. Because a lot of people... I guess, there's programs you could probably apply for to get free internet but..."* (Participant 11, age 38, Hispanic of any race, not married to child's father).

Supports: Communication Positively, many mothers credited schools with creating and maintaining strong lines of communication. One mother of three who worked full-time while her son attended kindergarten online explained, *"Me and the teacher would communicate a lot... Our communication was how I expect to communicate with other teachers moving forward... these are needs that need to kind of be met in order for my child to be successful."* (Participant 3, age 24, Hispanic of any race, separated from child's father).

Barriers: Communication Additionally, some mothers cited poor or insufficient communication from their child's school as a factor that exacerbated impacts on learning. For example, one mother who had lost her employment to care for her daughter and support her online schooling indicated, *"So resources were very limited and communication was often a little miscommunication. So things will fall through the cracks or not a lot of info given, so that made it a little frustrating, not understanding what they wanted us to do, when they wanted us do it, or how they wanted us to do it, so things like that."* (Participant 5, age 28, non-Hispanic, Black or African American, married to child's father).

Barriers: Unrealistic Expectations Additionally, many mothers cited unrealistic expectations, such as the amount of work assigned, or the amount of time children were expected to focus and remain engaged in virtual learning sessions. One mother of two children who worked part-time explained, *"I think they expected something that was not realistic. It's one thing for a kid to stay on an iPad for two hours watching a video, another thing is to sit there, listening to fifteen other kids screaming, and the teacher trying to teach something. And they're like, 'I don't know what to do.'"* (Participant 15, age 35, Hispanic of any race, married to child's father). Another mother of two, who was not working at the time of the interview, explained that her son's school had unrealistic expectations about her role in teaching, saying, *"And apart from just having the kids sit, it's almost like they expected us to be teacher's assistants. I'm not built for that."* (Participant 8, age 37, non-Hispanic, Black or African American, not married to child's father).

Barriers: Learning Modality Finally, a number of mothers were consistent in reporting that their child preferred learning with a hands-on approach or that they learned best when interacting face-to-face with their teacher. For example, one mother who reported not being able to work while her two children attended school online commented, *"So I mean, they did what it was that they can do, but I honestly don't think virtual is for him. He got to be in front of a teacher."* (Participant 4, age 27, non-Hispanic, Black or African American, not married to child's father).

2.2.3 Community-level and beyond factors

Less frequently, some mothers described factors at the community level or beyond that altered pandemic impacts on learning. Community-level and beyond factors pertained to the subthemes of (1) mental health supports, (2) financial and social supports, and (3) communication barriers.

Supports: Mental Health Speaking on her experience with mental health supports, one mother of four who worked part-time explained, *"I think the community was a big mental health support because we felt like we had other people in the trenches with us who could understand."* (Participant 18, age 33, non-Hispanic, White, married to child's father). More often, mothers expressed that mental health supports for parents and children *would* have been valuable, but were lacking and sorely needed. For example, a mother of three who worked full-time, and whose son attended school online explained, *"I wish we had either a counselor or therapist so that the boys could have someone to really speak to regarding"*

their feelings..." (Participant 10, age 29, non-Hispanic, Black or African American, not married to child's father). Another mother, who reported not being able to work while her two children were attending school online explained, *"I really wish they gave some type of maybe parenting classes or therapy sessions. I believe everybody could use the therapy sessions, even the kids. Because I mean, it was mind blowing. It was hard"* (Participant 4, age 27, non-Hispanic, Black or African American, not married to child's father).

Supports: Financial and Social Some mothers cited local community, state, or federal government supports that indirectly allowed them to devote more time and resources to facilitating their child's learning. Examples included receipt of food or food stamps, clothing, housing support/rental assistance, and utilities assistance. One mother of four, who worked full-time explained, *"Well, there was a lot of resources out in the community that people were able to take advantage of... There was a lot of resources out for people that were financially struggling with their home loans or rental assistance, utilities."* (Participant 17, age 37, Hispanic of any race, not married to child's father). Some mothers also explained that organizations (such as the Special Supplemental Nutrition Program for Women, Infants, and Children; WIC) would contact them regularly to ask whether they needed assistance rather than having to proactively seek assistance, as during pre-pandemic times. However, in some cases, mothers reported that community-level supports were not distributed quickly enough. For example, a mother of one, who was not working at the time of the interview, and whose child attended kindergarten online indicated, *"So I wish they would have updated the schools and the communities first and given us the stimuluses and aid before they did. I think that would have made it easier."* (Participant 12, age 31, non-Hispanic, Black or African American, not married to child's father).

Barriers: Communication Similar to school-level communication barriers, some mothers shared that their community provided insufficient or non-timely communication that had exacerbated pandemic learning impacts. For example, one mother who worked reduced hours to care for her kindergarten-age son and two siblings and help them with online schooling indicated, *"...the lack of communication there... Why is one town having different than what we're having and it didn't make sense?"* (Participant 11, age 38, Hispanic of any race, not married to child's father). Other mothers described that their community did not communicate changes in policies or procedures to them in a timely manner (such as when schools would be open for in-person learning), which made it difficult to plan their family's schedule or arrange for childcare with advance notice. For example, Participant 19 (age 43, non-Hispanic, White, married to child's father) explained, *"We were told probably 10 different times that we were going to be going back to school, and then I would have to tell [Child], 'I'm sorry, honey. They pulled back. Those numbers changed two days before you were supposed to go back.' That was hard."*

3 Discussion

Mothers of children in kindergarten in 2020–2021 from low-income families described several impacts of the COVID-19 pandemic on their child's learning. Although some described their child learning at a faster pace, retaining new information, and advancing beyond grade level expectations, others described learning loss, and diminished motivation, interest, and engagement in learning, and noted that their child had fallen behind. We found that mothers often cited proximal environments and systems, corresponding to the bioecological systems' [17] microsystem and mesosystem, and that they described the more distal exosystem less often. Mothers cited family-level factors as, for some, the most common supports (e.g., helpful instructional support from family members and paid tutors), and for others, the most common barriers to their child's learning (e.g., family structure barriers; employment barriers). Mothers also frequently cited school-level factors as common supports (e.g., strong teacher-parent communication; school-provided resources) and barriers to their child's learning (e.g., poor school-family communication; unrealistic expectations; learning modalities). Few mothers in the study cited community-level factors as being supports or barriers to learning. We elaborate on key findings in the following sections.

3.1 Pandemic-related learning impacts for kindergarteners of low-income backgrounds

Our findings are consistent with reports in the US media and concerns among caregivers and educators that children have fallen "behind" in their academic development and that there is pressure to help them "catch up" [29]. International and US research examining a variety of early learning domains has also revealed pandemic-related decrements in children's academic success in areas such as language [30], reading, and mathematics [31, 32]. Additionally, a systematic review

and meta-analysis of studies from 15 countries found that substantial pandemic-related learning deficits have persisted over time, neither closing or widening [33]. Of concern, learning deficits were reported to be particularly pronounced for children of lower socioeconomic backgrounds. Taken together with national and international trends, findings from the present study suggest that children who entered kindergarten during the 2020–21 school year may require continued academic supports as they progress through elementary school.

3.2 Family-level supports and barriers to learning

In the present study, mothers' rich descriptions of their child's kindergarten experiences suggest they spent a significant amount of time and energy supporting their child's learning during the 2020–21 school year. Consistent with findings from the earlier months of the pandemic [34, 35], despite all mothers in the present study being from low-income households, and many having co-occurring family-level structural, social, and psychological stressors, mothers reported engaging in many specific learning activities with their child (e.g., reading, spelling, homework), and "investing" their time to support their child's learning during the first full school year of the pandemic. Mothers who described factors that mitigated pandemic learning impacts cited that they themselves, a family member, or a tutor were able to work one-on-one with their child or spend more time focusing on and facilitating their child's learning. This finding is consistent with metanalytic evidence suggesting that one-on-one or small group tutoring is an effective strategy for strengthening young children's academic learning outcomes, particularly when tutoring is provided 3 or more times per week (or for at least 50 h over 36 weeks), and when it is provided by trained individuals who receive ongoing support [36, 37]. Thus, prioritizing equitable access to high-quality and high-intensity individual or small group instruction represents a promising strategy for supporting the learning of young children from low-income backgrounds during and after times of disruption, when opportunity gaps may widen. By comparison, when mothers reported factors that exacerbated impacts on their child's learning, they tended to report less active involvement in their child's learning due to family structural barriers (e.g., managing schooling activities for multiple children; single-parent household) and employment barriers (e.g., working outside of the home during school hours; unable to support child's learning while also working from home). Notably, more than one-quarter of mothers in the study were single parents. Single-mother households have reportedly been impacted most negatively by the pandemic, losing access to support networks, and taking on increased unpaid work to fulfill home and family responsibilities [38]. Although our interview sample did not expressly examine differences between single-mother households and households with more than one adult caregiver, interview findings were consistent with prior research from earlier in the pandemic suggesting that mothers (rather than fathers or adult male household members) have engaged in a disproportionate share of childcare and schooling activities during the pandemic [9–11].

Additionally, nearly one-third of mothers in the study reported that their employment hours or status was affected during the pandemic, with common examples of changes pertaining to work hours, work location, being laid off, or experiencing a business closure. Importantly, both mothers who worked from home and mothers who worked outside of the home reported that some aspect of their employment posed barriers to supporting their child's learning. For example, despite being granted the flexibility of working from home, mothers described lacking adequate time to support their child's learning while still meeting their work obligations. Some also mentioned that although they were physically present in the home during school hours, they did not have what they believed to be adequate training or experience to facilitate their child's schooling. Maternal reports of family structure barriers and employment barriers in the present study illustrate how relying on families as co-educators may create similar inequities among students as during pre-pandemic times [39].³¹ Indeed, "engaging families in distance learning is essential to many students' learning but needs to be considered in light of the range of support and capacities that exist in homes and communities" [39]. It is unrealistic to expect that families, especially those with limited financial resources and work choices, be able to increase the amount and intensity of the support they provide for their child's learning, without additional resources.

3.3 School-level supports and barriers to learning

Mothers in the present study also cited communication both as a factor mitigating and exacerbating pandemic learning impacts. For instance, frequent and timely communication at the school level was cited as a key factor mitigating

pandemic impacts on child learning. Mothers reported valuing communication specific to their child's learning and behavior, as well as more general school-level communication about learning activities and resources. Conversely, when communication at the school level was insufficient or not timely, this posed a great barrier for mothers in the study. This was especially true for study mothers of children attending kindergarten virtually. These findings closely mirror those of Australian mothers of young children who reported communication to be a key factor mitigating the pandemic's impact on their engagement in their child's early childhood education and care (ECEC) [40]. In that study, mothers reported valuing frequent, timely and open communication with ECEC providers and communication centered on creating genuine connections with families and children. Thus, frequent and strong home-school communication should be prioritized to enable parents to support their child's learning while remaining connected and engaged.

Mothers in the study also cited school-provided resources, including technology, as a key learning support. Due to financial concerns, some mothers expressed that they would not have been able to furnish learning technology (including Internet access) or other learning materials had they not been provided by the school. Although the provision of technology and learning materials was a key support to children's kindergarten learning, mothers also cited learning modality and unrealistic expectations as key school-level factors that exacerbated learning impacts. These themes are consistent with findings from US-based ECEC providers who were queried about their teaching experiences early in the pandemic. In that study, ECEC providers cited reliable access to technology as a barrier to participation for children of low-income families [41]. ECEC providers in that study also expressed concern about the quality and developmental-appropriateness of virtual learning for young children [41].

3.4 Community-level and beyond supports and barriers to learning

The present study also found that very few mothers reported their social circle or community (besides their child's school) to be a source of support for their child's learning. Although many US media outlets reported on the rise of learning pods (i.e., typically, very small groupings with a few mixed-age students from more than one family), particularly among affluent families during 2020 [42], none of the mothers in the present study sample reported that their child participated in a learning pod or any form of small group learning activities. It is notable that mothers did not frequently cite low-cost or free community-level supports, such as public libraries, parent-teacher organizations, local businesses, or community volunteers, that might have mitigated pandemic learning impacts, nor did they describe learning supports from friends and social networks. However, it is important to acknowledge that many communities were not operating at full capacity during the 2020–21 school year when the study was conducted. Thus the finding that mothers reported limited community resources and supports for their child's learning and development might be a reflection of the pandemic rather than being typical of the community. It is also possible that community-level supports and barriers were more less commonly reported for children's learning and development due to more pressing concerns with meeting basic needs (e.g., food security, housing security). Indeed, the most commonly cited community-level supports included mental health, financial, and social supports. In the areas of financial, social, and mental health supports, it is well established that poverty-related stressors can have adverse effects on family functioning, as well as child development in physical, social-emotional, and cognitive domains [43]. In the current study sample, nearly one-third of mothers reported experiencing a change in employment hours or status during the pandemic and nearly one-fifth lived below the federal poverty level for household size. It is thus not surprising that several mothers in the present study cited financial and social supports and mental health supports as key factors mitigating pandemic impacts on their child's learning—or as supports they would have benefitted from sooner or in greater amounts. Findings from a national survey of parents with children < age 18 earlier in the pandemic also reported mental health and financial concerns. For example, they reported worsening mental health for themselves (27%), worsening behavioral health for their children (14%), loss of childcare (48%), change in insurance status (16%), and greater food insecurity (11%) [44]. In another study investigating mental health concerns and needs in a sample of US caregivers and their children early in the pandemic, almost one quarter reported needing individual or family-based mental health services and many expressed needs related to financial support [45]. Additional policy efforts and funding is warranted to promote screening and treating mental health needs across community settings that families routinely access, such as primary care, ECEC, school, and home visiting [46].

4 Limitations

We acknowledge as a limitation that interviews may not capture all pandemic-related impacts on children's learning. Also, although all mothers in the study were of low-income backgrounds, there was variability in maternal educational attainment, which may have contributed to differences in opportunities and resources to support their child's learning. Indeed, among the dimensions of SES, maternal education is most strongly related to child cognition and learning and is a key predictor of other family resources positively associated with child wellbeing [47]. Mothers in this study were also racially and ethnically diverse, and although it is not possible to examine group differences due to the small sample size, it is important to acknowledge that families from different cultural and racial/ethnic backgrounds might have experienced different pandemic-related impacts and different supports and barriers to their child's learning. Additionally, the qualitative research design precludes the ability to draw inferences about the prevalence of maternal perspectives on children's learning experiences or to generalize findings beyond the study sample. Finally, it is important to acknowledge that although learning from mothers is important, the study does not offer perspectives of other family members, including fathers, additional parents or step-parents, or other caregivers that we know were and are important to children's learning and development, representing an important area of future study. Despite these limitations, hearing the perspectives of mothers of low-income backgrounds with varying experiences during the pandemic serves to amplify mothers' voices about the impact of COVID-19 on learning and the factors that both mitigated and exacerbated challenges they faced.

5 Future research directions

This study examined maternal perspectives on COVID-19 pandemic-related impacts on kindergarteners' learning during the first full school year after the pandemic was declared (i.e., 2020–21). Although children have largely returned to face-to-face schooling at the time of this writing, "the COVID-19 pandemic has altered the academic and developmental landscape in a fundamental way, perhaps permanently" [29]. Pandemic-related challenges families of low-income backgrounds have experienced thus far may continue to contribute to children's learning trajectories over the long-term. Accordingly, and based on the themes and subthemes emerging from interviews, there is a need to raise awareness of existing community-level low- or no-cost resources to support children's learning. Likewise, even though high-quality and high-intensity small group instruction and tutoring programs can be costly, they have demonstrated a high return on investment and effectiveness in improving education outcomes and deserve additional research attention. There is also the need to enhance supports and address barriers at the family- and school-levels that mothers perceive as most impactful, including financial and social supports that afford the time and financial means to engage in their child's learning, mental health supports to strengthen family functioning, and improved home-school communication. Accordingly, additional research is warranted to determine the most effective strategies for promoting awareness and access to financial and social supports as well as research examining the extent to which family- and school-level supports and barriers have changed in post-pandemic times. With most pandemic-related government financial assistance programs ending in 2023, it is especially critical that schools help families address gaps by providing awareness of community supports (e.g., food pantries, low- or no-cost tutoring) offering supportive services directly in schools (e.g., mental health services), and improving or maintaining strong communication with families about children's learning and development.

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Data availability Per the informed consent agreement, raw interview data collected for this research study are not publicly available to protect participant confidentiality and privacy. We recognize the importance of data transparency. Thus, researchers interested in accessing the de-identified and aggregated dataset may contact the corresponding author to discuss data sharing possibilities, subject to Institutional Review Board approval.

Declarations

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and the study sponsor had no role in the: (1) study design; (2) collection, analysis, and interpretation of data; (3) writing of the report; and (4) decision to submit the manuscript for publication. Principal Investigators: Michael J. Corwin, Jennifer LoCasale-Crouch, Eve R. Colson. The authors have no financial or non-financial interests to disclose. The study protocol was approved by the University of Virginia Institutional Review Board for Social & Behavioral Sciences (protocol # 3366) in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments.

Competing Interests The authors declare no competing interests.

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