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Journal

Social Psychology of Education, 28(1)

ISSN

1381-2890

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Publication Date

2025-12-01

DOI

10.1007/s11218-024-09986-0

Peer reviewed



“If I can’t help, I find someone who can”: Lower-SES Latine parents’ adaptive responses to math support challenges

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Received: 14 March 2024 / Accepted: 9 October 2024

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Abstract

Latine parents from lower socioeconomic backgrounds in the United States (US) often face challenges when supporting their adolescents’ education in subjects like math. Guided by strengths-based, culturally grounded frameworks, this study explored the challenges Latine parents faced when supporting adolescents’ math learning and how they leveraged their community cultural wealth via specific strategies to address challenges. We conducted semi-structured qualitative interviews with 20 Latine-descent parents (19 mothers, one father; 12 with less than a high school education, five with a high school education, three with some college education) of adolescents (eight girls, 12 boys; eight 6th graders, seven 7th graders, and five 8th graders) attending four middle schools in southern California. Systematic coding and theming of the interview data were used to help identify challenges parents experienced at the individual level (e.g., gaps in content/curriculum knowledge, problems with technology, linguistic differences) and at the contextual level (e.g., conflicting obligations, nonideal circumstances). Parents used their community cultural wealth by employing five strategies: (a) working closely with adolescents, (b) seeking help from their social networks, (c) providing learning spaces and organized activities to help, (d) using digital tools, and (e) hoping to build their knowledge and skills in the future. Finally, analyses revealed emergent linkages between specific math support challenges and adaptive strategies. The findings underscore the utility of leveraging parents’ cultural funds of knowledge and community cultural wealth to understand not just the math-specific needs of Latine families but also how families already actively address challenges to math support.

Keywords Latine families · Adolescence · Math support · Adaptive culture · Community cultural wealth · Funds of knowledge

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1 Introduction

I always think of his career choice. Whatever it is that he decides to do in life, he's going to use math one way or another. As we all know, as we get older and continue learning, it may not seem like you're using math, but you are.¹ – Isabel, mother of Iñigo

Isabel's narrative illustrates how essential US Latine² parents believe math is for adolescents' future careers and lifelong learning (Azmitia et al., 2009). Aligned with these views, developmental theories posit that parents are among the key sources of support for Latine adolescents' math education (Eccles & Wigfield, 2020; García Coll et al., 1996; Starr et al., 2022; Yosso, 2005). Prior studies also document the varied support Latine parents provide (e.g., encouragement, material provision) and their links to adolescents' math motivational beliefs and achievement (Lee & Simpkins, 2021; Simpkins et al., 2020; Tulagan et al., 2022; Wang & Sheikh-Khalil, 2014). Still, despite their promotive role, Latine parents from lower socioeconomic (SES) backgrounds encounter different challenges (e.g., lower education, financial strain) that hinder their support for adolescents (Arellanes et al., 2019; Lechuga-Peña et al., 2018). Adaptively responding to challenges must not be the sole burden of parents alone, and schools must endeavor to remove the academic challenges that families face. However, doing so effectively must account for the funds of knowledge that parents already possess (González et al., 2005; Moll et al., 1992).

According to Yosso's (2005) community cultural wealth model, lower-SES Latine parents leverage distinct cultural resources (i.e., capital) to overcome barriers. However, the ways in which Latine parents use their community cultural wealth to overcome math support challenges are understudied. Addressing this gap may help educators and researchers put forth family-focused efforts to increase students' successes in gateway domains like math that are predictive of later achievement (Almeda & Baker, 2020; National Science Foundation, 2023). Hence, the current study investigated lower-SES Latine parents' math support challenges and their responses to address these challenges.

1.1 Theoretical frameworks

The current study was guided by asset-based theoretical models outlining the ways in which cultural and social contexts shape parenting processes and child development. We were first guided by Yosso's (2005) model of community cultural wealth, which delineates the ways in which racially/ethnically minoritized individuals respond to societal challenges via six overlapping forms of cultural assets. Aspirational capital is

¹Quotations without a Spanish counterpart are from interviews conducted in English.

²We use "Latine" as a pan-ethnic term for individuals who are from or have familial ties to Latin America. This term also encompasses identities that may not align with the gender binary implied by the term "Latino/a". "Latine" originates from scholars in Latin America and is easier to pronounce by Spanish speakers than the term "Latinx", which was developed by LGTBQIA+ communities and scholars in the United States (Villanueva Alarcón, 2022).

the ability to sustain hopes and dreams for the future in the face of barriers, whereas navigational capital involves skills that help individuals successfully move through institutions not created for them. Individuals of color may also employ their social and familial capital to seek support and solidarity within their community networks and family units. Linguistic capital refers to the verbal and social skills individuals possess that allow them to communicate across multiple languages and access their cultural histories and oral traditions. Finally, resistant capital refers to individuals' knowledge to recognize existing inequities and the capacity to challenge the injustices they and their communities experience (Yosso, 2005). The current study elaborates on how parents leverage their community cultural wealth when adaptively responding to math support challenges.

Prior work has examined the ways in which Latine families develop and employ their community cultural wealth when navigating the US schooling system (Larrotta & Yamamura, 2011; Perez-Brena et al., 2018; Quintos et al., 2019). However, one limitation in the literature is the ways in which these cultural assets manifest specifically in the concrete strategies Latine families use to respond to challenges. This gap makes it difficult for educators and researchers to develop practical, family-informed strategies that help lower-SES Latine parents overcome educational challenges and enhance their support for adolescents in subjects like math.

Therefore, we were also guided by culturally grounded adaptations of the family academic socialization model of the situated expectancy-value theory (Eccles & Wigfield, 2020; Soto-Lara & Simpkins, 2022; Starr et al., 2022). One key facet of this model posits that parents' math-specific beliefs (including perceived challenges) inform their capacity to provide diverse forms of support behaviors (e.g., encouragement, provision of materials) that foster adolescents' math development (Eccles & Wigfield, 2020). Recent scholarship expanded upon this model by delineating the active role of culture, highlighting Latine parents' support behaviors (e.g., empowering life lessons and adages) that are culturally grounded, as well as specific barriers (e.g., lower education level, financial constraints) that impede this support (Soto-Lara & Simpkins, 2022; Starr et al., 2022). Although these adaptations elaborate further on Latine parents' culturally relevant math and STEM-related support and challenges, a limitation is that they focus on parents' *proactive* support and do not address the strategies parents employ to respond to the support challenges they face. Hence, in the current study, we also employed cultural adaptations of the family academic socialization model to examine the ways in which lower-SES US Latine parents leverage their cultural community wealth via math-specific strategies that adaptively respond to parents' math support challenges.

1.2 Challenges to Latine parents' math support

Latine people, especially those from lower-SES, immigrant backgrounds, often face challenges related to structural inequities and acculturative stressors due to their distinct sociopolitical locations in the US, which can manifest in their math and broader educational experiences (Cross et al., 2021; Lorenzo-Blanco et al., 2016; Perreira et al., 2006; Quintos et al., 2019; Suárez-Orozco & Suárez-Orozco, 2009). Specifically, Latine parents face many challenges when supporting their adolescents in

math, such as differences between parents' math content knowledge and the ways in which schools themselves teach math (Quintos et al., 2019; Williams et al., 2020), which can dampen Latine parents' math support self-efficacy and increase their math anxiety (Kiss et al., 2020). Furthermore, Latine parents encounter school personnel who are dismissive of the math and other educational needs, as well as the cultural strengths of students and families, making it difficult for Latine parents to seek out help from math teachers (Quintos et al., 2019; Williams et al., 2020; Yoder & Lopez, 2013).

Broader educational challenges may also manifest in specific subjects like math. Limited formal education and knowledge of US school systems are salient educational challenges that inhibit lower-SES Latine parents' ability to support adolescents' math and academic development (Arellanes et al., 2010; Mortier & Arias, 2020; Quintos et al., 2019; Williams et al., 2020). Moreover, cultural mismatches between Latine parents and US schools are common challenges, like when schools serving immigrant Latine communities lack personnel and math teachers who can effectively communicate with non-English speaking parents (Hill & Torres, 2010; Lechuga-Peña et al., 2018; Pstross et al., 2014; Quintos et al., 2019; Yoder & Lopez, 2013). Discriminatory interactions with educators and other parents have also been found to discourage Latine parents' involvement in math, further marginalizing them in math education (Arellanes et al., 2019; Lechuga-Peña et al., 2018).

Moreover, Latine parents can also find themselves restricted in the discretionary time they have to devote to their children's math learning due to other home obligations (e.g., chores, caring for multiple children) and physically demanding, irregular work schedules (Hill & Torres, 2010; Lechuga-Peña et al., 2018; Pstross et al., 2014; Williams et al., 2020; Yoder & Lopez, 2013). Recently, the COVID-19 pandemic exacerbated these challenges with the added stress over the demands of remote learning and the use of digital tools in math and other subjects, which disproportionately impacted lower-SES, Latine students and their families (Park et al., 2021; Soltero-González & Gillanders, 2021). Overall, existing research provides key insights into the math support challenges that lower-SES, Latine parents face. However, a vital next step is uncovering promotive avenues for parents to overcome these challenges.

1.3 Latine parents' adaptive responses to math support challenges

According to Yosso's (2005) community cultural wealth model, Latine cultural values inform parents' adaptive responses to address the math support challenges they face. Prior work find that Latine familial capital and values like *familismo* (i.e., family closeness and cohesion) position Latine parents at the center of students' math education (Calzada et al., 2010; Halgunseth, 2019; Hernández & Bámaca-Colbert, 2016). Social capital and values emphasizing interdependence and community empower Latine parents to actively leverage knowledge brokers in the community (Delgado-Gaitán, 1991; Mortier & Arias, 2014; Pstross et al., 2014; Soltero-González & Gillanders, 2021; Yoder & Lopez, 2013). In math, this social capital may help Latine parents gain knowledge of US-based math content and curricula, enhance math supports at home, and bridge cultural understanding with math teachers (Azmitia et al., 2009; Lopez & Donovan, 2009; Quintos et al., 2019; Williams et al., 2020). These

examples show some ways in which Latine parents can leverage their community cultural wealth to support adolescents' academic development broadly and within math.

However, one limitation in the literature is that studies often only examine a few adaptive responses to challenges at a time (e.g., seeking help from programs to learn how to better communicate with teachers and understand math curricula (Quintos et al., 2019; Williams et al., 2020). However, culturally grounded family academic socialization models posit that Latine parents can engage in a multitude of strategies to support adolescents' academic outcomes, encompassing educational discussions, advice and encouragement, coactivity, and instrumental support (Starr et al., 2022; Tulagan et al., 2022). Recent studies also highlight more cultural support in which Latine parents engage, like providing *consejos* and *ánimo* (i.e., life lessons and encouragement), and seeking help from other socializers to instill *ganas* (i.e., the will to succeed) in students (Ramos Carranza & Simpkins, 2021; Soto-Lara & Simpkins, 2022). Given this diversity of support parents provide adolescents, it is likely that parents may also address math support challenges in more ways than what is currently covered by the literature (Quintos et al., 2019; Williams et al., 2020). Documenting a more comprehensive inventory of Latine parents' adaptive responses can be useful in uncovering avenues to leverage existing strategies that parents already use and enhance their effectiveness in overcoming math support challenges. Thus, the current study also sought to examine a more comprehensive set of strategies that lower-SES Latine parents use to adaptively respond to math support challenges.

1.4 The current study: Leveraging Latine parents' cultural funds of knowledge

Crucial to our research approach was to also leverage lower-SES Latine parents' cultural funds of knowledge. A funds of knowledge framework posits that families possess skills, knowledge, and resources that enhance their children's educational experiences (González et al., 2005; Moll et al., 1992). Historically, owing to deficit views framing lower-SES Latine parents as ill-equipped to support students' learning, family involvement efforts by educational institutions typically prescribe what Latine parents ought to do about their children's education without considering parents' perspectives (Fernandes et al., 2017; Foote et al., 2013; Olivos & Mendoza, 2010; Quintos et al., 2019). In contrast, strengths-based research shows that Latine parents are highly interested and involved in their children's math education (Quintos et al., 2019; Starr et al., 2022; William et al., 2020). In the current study, we integrated a cultural funds of knowledge approach with culturally grounded frameworks to address two research questions. First, what types of challenges do lower-SES Latine parents face when supporting adolescents in math? Second, in what ways do lower-SES Latine parents leverage their community cultural wealth and employ specific strategies to adaptively respond to their math support challenges?

2 Method

The data from this study come from 20 Latine parents of adolescents attending the math enrichment after-school program, Math Community Educational Outreach (Math CEO), located at a Hispanic-serving research university in southern California. Through a university-community partnership, Math CEO provided hands-on, interactive math enrichment activities to middle-school students facilitated by undergraduate student mentors once a week during each academic year. Students attended four middle schools in a neighboring community, all of which had Title 1 status and a wide range of math and reading achievement levels. Students signed up to be in the program voluntarily, with some who needed the most help being especially encouraged by their math teachers. Math CEO is a free program and held meetings virtually in the 2020–2021 academic year and in-person in the 2021–2022 academic year. Moreover, in 2020–2021, Math CEO expanded its programming and created a parent engagement initiative to provide educational resources for parents that reinforced students' math learning in their homes during the COVID-19 pandemic. This partnership led to the development of this current research study, which aimed to understand family academic socialization processes that promote Latine adolescents' math motivation and achievement.

2.1 Participants

Using convenience sampling, parents were recruited and participated in semi-structured interviews in the 2020–2021 or 2021–2022 academic years. Overall, 19 mothers and one father ($N=20$) of middle-school students (11 boys, nine girls) participated in the study. Parents largely reported coming from Latine backgrounds, with nine parents self-identifying as Latino/a or Latin, nine as Hispanic, and eight as Mexican (see Villanueva Alarcón et al., 2022 on the importance of participants' racial/ethnic self-identification). One parent did not report their race/ethnicity. Regarding parents' education level, seven parents reported finishing as far as *la primaria* or elementary school, four parents reported finishing as far as *la secundaria* or middle school, one parent reported finishing their General Educational Diploma, five parents reported finishing *la preparatoria* or high school, and three parents reported having attended college-level classes. Also, 15 parents were educated in Mexico, four in the United States, and one in Guatemala. All families had students who qualified for free or reduced lunch. Finally, eight middle-school students were in 6th grade, seven were in 7th grade, and five were in 8th grade. See Table 1 for the full summary of the participants' demographic characteristics.

2.2 Interview procedures

We conducted recruitment and data collection procedures for the first 13 interviews during the Winter and Spring of the 2020–2021 academic year and the last seven interviews during the Winter and Spring of the 2021–2022 academic year. Parents indicated their initial interest in participating in the study via interest forms emailed

Table 1 Demographic information of study participants

Parent pseudonym	Adolescent pseudonym	Adolescent grade	School pseudonym	Adolescent gender	Parent's race/ethnicity (self-identification)	Family annual income	Parent education level	Location of parents' education
Carmen	Christian	6th	Brock	Boy	Latina	\$30K	Secundaria	Mexico
Daniela	Ian	6th	Brock	Boy	Mexican	\$18K-\$21K	Secundaria	Mexico
Irene	Anthony	6th	Brock	Boy	Mexican	\$40K	Primaria	Mexico
Samuel	Eddie	6th	Brock	Boy	Hispanic	Did not report	Primaria	Guatemala
Zara	Victor	6th	Brock	Boy	Did not report	\$27K	One semester of university	US
Celia	Liliana	7th	Lincoln	Girl	Hispanic	\$34K	2nd year of Secundaria	Mexico
Gabriela	Araceli	8th	Lincoln	Girl	Latina	\$20K	Preparatoria	Mexico
Itzel	Luna	8th	Lincoln	Girl	Hispanic	\$30K	Finishing GED	US
Dolores	Elena	6th	Mesa	Girl	Latino	\$25K	1st year of Secundaria	Mexico
Tania	Arely	6th	Mesa	Girl	Latin, Mexican, Latin-Mexican	\$70K-\$80K	Preparatoria	Mexico
Isabelle	Inigo	7th	Mesa	Boy	Hispanic	\$30K-\$35K	Community college	US
Natalia	Daniel	7th	Mesa	Boy	Hispanic, Latino	Did not report	Secundaria	Mexico
Sofia	Sam	7th	Mesa	Boy	Latina	\$30K-\$40K	One year of university	Mexico
Vera	Lucia	7th	Mesa	Girl	Hispanic, Mexican	\$33K	Primaria	Mexico
Alejandra	Estefani	6th	Pasadena	Girl	Latino, Mexican	Did not report	Primaria	Mexico
Penelope	Emma	7th	Pasadena	Girl	Hispanic	\$36K	High school	US
Zenia	Anna	7th	Pasadena	Girl	Latina, Mexican, Hispanic	\$14K	Preparatoria	Mexico
Adriana	Kenneth	8th	Pasadena	Boy	Hispanic, Latino	\$20K	Preparatoria	Mexico
Martha	Diego	8th	Pasadena	Boy	From Mexico	< \$20K	Primaria	Mexico
Silvia	Eric	8th	Pasadena	Boy	Mexican	\$20K-\$30K	Secundaria	Mexico

Note. *N* = 20. *Primaria* spans Pre-K to 6th grade, aligning with elementary school in the US. *Secundaria* spans 7th grade to 9th grade, aligning with middle school/junior high school in the US. *Preparatoria* spans 10th to 12th grade, aligning with high school in the US

to parents by Math CEO program staff. The interviews transpired over audio-recorded telephone calls or Zoom meetings due to the ongoing COVID-19 pandemic.

We present interview questions from which we extracted relevant data in Table S1 of the Appendix. Most of the data analyzed came from one question set exploring parents' math support challenges and adaptive responses: (a) "Are there things you wish you could do to help your child in math but aren't able to?" and (b) "Are there things you've tried to do to deal with these difficulties?". Follow-up probes were used to elicit a list of challenges and adaptive responses. Interviews lasted from 25 to 70 min, and parents received \$20 for participating. Per parents' preferences, 16 interviews were conducted in Spanish and four were in English.

2.3 Researcher positionality

As a diverse group of researchers, we aimed to be reflexive of how our intersectional belongings shape our researcher positionalities when studying Latine family processes. The lead author is a Filipino American, male, first-generation assistant professor of education and psychology who immigrated to southern California from the Philippines. The second author is a bilingual, second-generation Latina from southern California who has several years of professional and community experience working with Latine families and youth as a program director. The third author is the daughter of Honduran immigrants and a first-generation assistant professor who was born and raised in southeast Texas in a community mainly of Mexican-descent families. The fourth author is a first-generation, immigrant postdoctoral scholar from Mexico raised in northern California, whose research is informed by her Mexican immigrant parents' role in her pursuit of higher education. The fifth author is a female, Italian-descent mathematics and math education professor who is the director of the Math CEO after-school program. Last, the sixth author is a female, White psychology professor raised in southern California, whose research focuses on adolescent STEM motivation, family processes, and organized after-school activities. The research team also included a group of Spanish-speaking, Latina undergraduate research assistants (RAs) who were trained in data collection and analysis.

Collectively, we used our cultural knowledge and content expertise to inform our theoretical and methodological approaches in the current study. As scholars, we apply strengths-based perspectives in our research on family socialization processes and adolescent academic development within Latine populations. As institutional agents, we acknowledge the power and privilege our positions as social scientists hold relative to our participants. From data collection to writing, we collaborated to check each other's biases and assumptions about Latine family processes and highlight the assets Latine parents possess when addressing challenges.

2.4 Analytic plan

2.4.1 Data preparation

Interview audio files were first converted to text using the GoTranscript transcription service, with team members independently checking the accuracy of the tran-

scriptions. For Spanish interviews, one Spanish-English bilingual team member (an RA or one of the co-authors) translated a given transcript to English and a different Spanish-English bilingual team member checked the translation accuracy. For English translations, translators retained Spanish terms and phrases that did not translate well in English and provided bracketed explanations next to the terms or phrases with descriptions (e.g., “To be a *niño educado* [“educated child” as in *education*, meaning beyond school but also when thinking about behavior and morals]...”). To finalize the English transcriptions, the senior research team—which included the three Spanish-English bilingual co-authors—held several group meetings to discuss any revisions to the transcripts and to reconcile disagreements in the translations through team consensus. As a result of these meetings, the Spanish-English bilingual co-authors reached 100% agreement on the accuracy of the translations.

2.4.2 Coding data

First, for each interview, we used process and in-vivo coding to concisely summarize the challenges parents faced in providing math support and their adaptive responses to these challenges and developed an initial coding scheme (Saldaña, 2016). Second, we combined inductive and deductive approaches to create a coding scheme of first-round codes, subcategories, and main categories of parents' math support challenges and adaptive responses (Braun & Clarke, 2012; Saldaña, 2016). We first tallied the first-round codes across the interviews and noted the most frequent codes. Then, we collapsed codes into subcategories and combined subcategories into larger categories based on conceptual similarity and prior literature on Latine parents' challenges (Hill & Torres, 2010; Soltero-González & Gillanders, 2021; Suárez-Orozco & Suárez-Orozco, 2009) and support behaviors (Azmitia & Brown, 2002; Soto-Lara & Simpkins, 2022). Then, we collectively discussed and resolved any disagreements in the coding and classifications.

2.4.3 Axial coding

We conducted the second stage of analysis using axial coding to explore emergent relations between parents' math support challenges and their adaptive responses. Axial coding aims to understand the ways in which the codes and categories are meaningfully connected based on participants' narratives, using diagrams to visualize these emergent linkages (Saldaña, 2016). First, for each interview, we created a diagram via Microsoft PowerPoint that included two columns of the (a) categories of parents' math support challenges and (b) categories of adaptive responses. Second, based on the data, we then added arrows to represent whenever a given participant reported using a category of adaptive response to address a category of math support challenges. Third, across participants, we created an integrative diagram that tallied all of the linkages that emerged from the axial coding. Finally, we examined the most frequent and theoretically meaningful linkages to establish the most representative themes. We provide sample diagrams from our axial coding in Figure S1 of the Appendix. We used independent checks across the research team to evaluate the linkages and ensure the trustworthiness of the findings. As a group, we resolved

ambiguities and disagreements in the analyses to finalize emergent linkages in the axial coding. Materials, data, and codebook for this study are available upon request. The study was not preregistered.

3 Findings

3.1 Latine parents' math support challenges

We present descriptions of Latine parents' math support challenges in Table 2 (see Table S2 of the Appendix for additional example quotations). We found that Latine parents' math support challenges emerged at the (a) individual and (b) contextual levels.

3.1.1 Individual challenges

Latine parents described four individual-level challenges as aspects of their backgrounds, beliefs, and skills that hindered their ability to provide math support. These challenges manifested via (a) gaps in content/curriculum knowledge, (b) dampened self-beliefs, (c) problems with school technologies, and (d) linguistic differences.

Table 2 Descriptions of low-SES, US Latine parents' math support challenges

Category	Description	Sample subcategories
Individual-level challenges		
Gaps in content/ curriculum knowledge	Difficulties in one's understanding of learning content and curricula of math subjects	- Lower education - US/Mexico schooling differences - Longer time since math exposure
Dampened self-beliefs	Negative emotions and perceptions about math or one's ability to provide math support	- Frustration at being unable to help - Lower confidence to help with math schoolwork
Problems with technology	Difficulties in one's fluency with 21st century digital tools used in their child's educational spaces	- Doesn't know how to use computers - Difficulty navigating website/apps - Disliking apps
Linguistic difference	Difficulties with verbal or written interactions with school personnel or with understanding math-related school or learning materials due to limited English fluency	- Does not know English - Lack of school personnel who speaks Spanish
Context-level challenges		
Conflicting obligations	Conflicts in schedules and obligations in one's home and occupation	- Work schedule - House chores - Familial obligations
Nonideal circumstances	Situations and conditions that constrain one's ability to support their child's math learning and development	- Physical/chronic injury - COVID-19 restrictions - Lack of transportation - Lack of school support

3.1.2 Gaps in content/curriculum knowledge

Most parents described how discrepancies between their knowledge about math content and curricula often hindered them from supporting their children more effectively (Table 2). For example, Alejandra discussed her limited education as a particular challenge in helping her son, Esteban: "*Sí, me gustaría poderlo ayudar como si hay un trabajo de matemáticas que no lo entienda [pero] yo sí estudié solo hasta sexto en México.*" ["Yes, I would like to be able to help him, like if there's a math assignment that he doesn't understand...[but] I only studied up to the sixth grade in Mexico."]. As with Alejandra, other Latine parents in our sample lamented having a limited education. Some parents also described other factors contributing to gaps in their content knowledge, such as the length of time that had elapsed since they were exposed to formal math classes and changes to math curricula and standards since their time as students. Nevertheless, these parents often discussed this challenge in the context of wanting to help their children in their math learning, indicating a drive to persist in their support despite these limitations.

3.1.3 Dampened self-beliefs

For a subset of parents, gaps in knowledge co-occurred with lower self-beliefs in their ability to support their children in math (Table 2). For example, Celia expressed dampened self-beliefs in teaching her daughter, Liliana, because of how her daughter was being taught math concepts at school was different from how Celia herself learned math as a student. Signaling a sense of helplessness, Celia vented, "*Si tú la enseñas de otra manera cuando venga a la escuela, ¿qué va a pasar con nosotros?*" ["If you teach her differently when she comes to school, what will happen to us?"]. It was not the case that Celia did not know the math concepts, rather it was that her math knowledge was not aligned with to her daughter's math learning. Hence, gaps in knowledge of math content led to parents' feelings of frustration and doubt about their ability to support their children.

3.1.4 Problems with school technologies

Latine parents also encountered issues with navigating technology commonly used in middle schools (Table 2). Some parents described this challenge in relation to using 21st-century tools such as computers and online apps. For example, Zara expressed her dislike of ALEKS, an online math learning and tutoring program, used in her son's math class. Zara explained, "There's tiny, little numbers... that you have to click here and there... All you do is just click on numbers... It's a little messy. I don't like ALEKS." For Zara, the ALEKS interface made for an uninteresting learning experience for both her and her son. Many other parents also mentioned having difficulties with their children's math learning online, finding class websites like Canvas difficult to navigate. These technological challenges not only led to feelings of frustration for parents but also excluded parents from keeping abreast of their students' math progress. These challenges are troubling, as their children regularly use these tools in school.

3.1.5 Linguistic differences

Linguistic differences between families and schools are often a salient challenge for Latine parents primarily educated in Spanish-speaking countries like Mexico (Table 2). For many parents, these challenges manifested in difficulties with English-language math problems that their children were tackling. Though non-English speaking parents expressed a strong desire to be involved, they often faced challenges that were double-pronged: first, translating problems from English to Spanish and, second, having the content knowledge to help their children solve them. Parents facing this challenge also mentioned that school personnel often did not speak Spanish. Thus, Latine parents often felt excluded from being able to help their children with math schoolwork unless they could translate and understand these problems.

3.1.6 Context-level challenges

Latine parents described contextual challenges as aspects of their social experiences that hindered their math support. Contextual challenges manifested through parents' (a) conflicting obligations and (b) non-ideal circumstances.

3.1.7 Conflicting obligations

Major deterrents to parental involvement for many lower-income parents included their busy schedules and conflicting obligations (Table 2). Many parents like Zara lamented a fear of missing out on helping her son with his math schoolwork as even strategies like talking to her son's math teacher were limited by her busy work life. Household responsibilities also made it difficult for some parents to be more involved in their children's math education. The limited time that parents had during the day complicated their ability to balance different responsibilities. As a result, parents often felt forced to sacrifice their math involvement to tend to their work and home obligations.

3.1.8 Nonideal circumstances

Finally, other contextual challenges manifested in circumstances not conducive to Latine parents' effective math support. Some parents described limitations in their ability to transport their children to and from math enrichment activities and programs (Table 2). Other parents discussed the diminished level of teacher support that was available in previous grade levels. Overall, Latine parents expressed a great desire to support adolescents in math but were hindered by individual- and contextual-level challenges.

3.2 Latine parents' adaptive responses to math support challenges

Our second research aim explored the adaptive responses Latine parents used to address math support challenges. We present summaries of the adaptive responses in Table 3 (see Table S3 of the Appendix for additional example quotes). We found

Table 3 Descriptions of low-SES, US Latine parents' adaptive responses to math support challenges

Category	Definition	Community cultural wealth leveraged	Subcategories
Working with adolescents	Working with and teaching skills to child	-Navigational -Familial -Linguistic	- Coactivity - Direct instructions on tasks
Seeking help from familial and social networks	Asking individuals from one's social & community networks for assistance	-Navigational -Familial -Social	Help from... - <i>Family members</i> - <i>School personnel</i> - <i>Program staff</i> - <i>Other parents</i>
Provisions of spaces and structured activities	Providing spaces, opportunities, and experiential/material goods; includes paid services	-Navigational -Social	- Providing space/structure - Signing up for structured activities
Using digital tools	Accessing and implementing physical and digital resources, tools, and devices	-Navigational -Social	- Using educational social media apps - Using online resources or websites - Using teacher-provided online resources
Aspirations for knowledge- and skill-building	Educating oneself in specific skills and knowledge needed to help child in math specifically and/or in schooling generally	-Aspirational	- Building English language skills - Building technological knowhow - Building math knowledge

three main linkages that emerged regarding parents' responses to math support challenges (Fig. 1).

3.2.1 Linkage 1: Leveraging navigational, familial, social, and linguistic capital through working with adolescents and seeking help from others

First, tapping into their familial, social, and navigational capital, parents reported working with adolescents and seeking help from others as the two most frequent adaptive responses. Further, parents engaged in these adaptive responses to address all math support challenges (Table 3; Fig. 1).

3.2.2 Working with adolescents

First, leveraging their navigational capital, one way that Latine parents circumvented challenges like gaps in math knowledge and dampened self-beliefs was by working with and guiding adolescents in problem-solving (Table 3):

A veces me acerco hacia ella, preguntándole aunque no tenga conocimientos sobre eso, le pregunto, “¿Qué es lo que estás haciendo?” Ella me empieza a explicar, aunque yo honestamente no sepa ni de que me esté hablando, pero me dice, “Es fácil, es así”... Ahí es cuando yo me doy cuenta que, sí, ella está aprendiendo. [Sometimes I approach her, asking her, even though I don't have knowledge about it I ask her, “What are you doing?” She begins to explain,

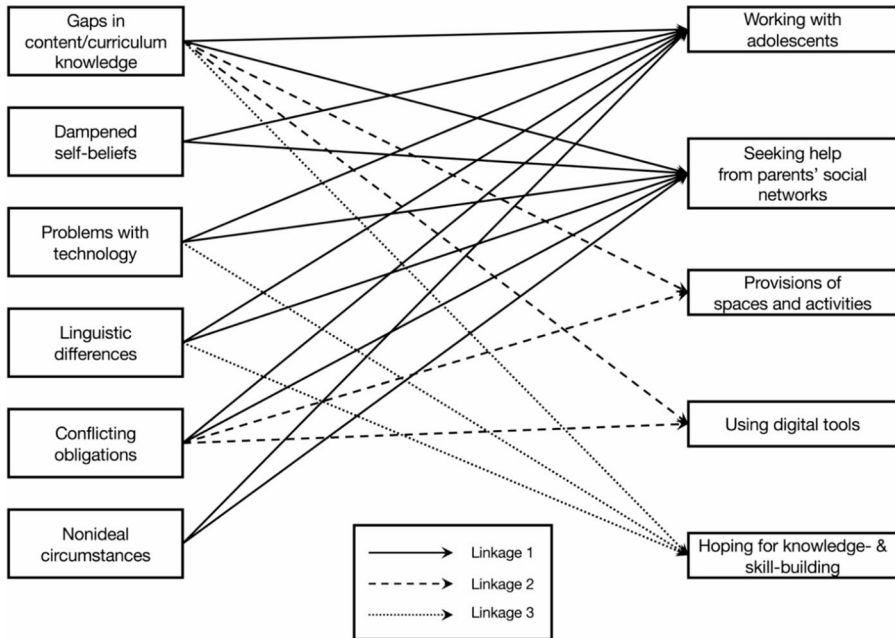


Fig. 1 Findings from Axial Coding Examining Linkages between Math Support Challenges and Latine Parents' Adaptive Responses

although I honestly don't even know what she is talking about, but she says, "It's easy, it's like this" ... That's when I realize that, yes, she is learning.] – Gabriela, mother of Araceli.

Parents' work with adolescents in math schoolwork often focused on ensuring that students carefully read and understood math problems and showed their problem-solving skills (as opposed to showing their children how to solve the math problems directly). These parents assessed their children's learning by observing their children's confidence and ability to explain their problem-solving processes. This strategy also included having adolescents take the lead when working together particularly if there were technological difficulties, like helping parents log onto classroom websites. Moreover, parents found the time to work closely with adolescents on math schoolwork despite their busy work schedules and to explain their nonideal circumstances (e.g., transportation difficulties to after-school math programs) to adolescents.

Finally, while working with their children, some parents also tapped into their linguistic capital along with their navigational capital when facing co-occurring challenges like gaps in knowledge and linguistic difficulties. For instance, when Tania would work with her daughter, Arely, through her math schoolwork that was written in English, she would ask her daughter to explain the problems and to discuss problem-solving strategies in Tania's native language of Spanish (Table S3). In these instances, Tania would draw on both her and Arely's linguistic capital to solve math

problems collectively. Overall, parents' work with adolescents demonstrates their ability to tap into their community cultural wealth to navigate educational institutions and curricula.

3.2.3 Seeking help from parents' familial and social networks

Second, parents embodied cultural values like *familismo* and connections to their local communities by leveraging their familial and social capital and seeking the help of other social figures to address math support challenges (Table 3). In these instances, parents purposefully moved beyond the parent-adolescent dyad to leverage the community cultural wealth of others that they may not possess:

[My brother] is the main person that helps her with all her studies... so when I get home [from work], it's rare for her to be like, "Hey, mom, I need help in this" ... I don't really go back and question her... I trust my brother. – Penelope, mother of Emma.

Gracias que también tienen el programa en la escuela, luego horas de oficina que se quedan los maestros para poderles ayudar si tenían alguna duda o están estancados en alguna materia. Le digo, "Toma ese tiempo para que tú vayas y preguntes... Ahí es la oportunidad que tú puedes tener porque yo no te lo puedo enseñar. Ellos tienen la capacidad para poderte enseñar." [Thankfully, they also have the program at school and then office hours where the teachers stay to be able to help them if they have any questions or are stuck on a subject. I tell her, "Take that time for you to go and ask... That's the opportunity that you can have because I can't teach it to you. They have the ability to teach you.] – Zenia, mother of Anna.

Tapping into their broader familial capital, many Latine parents emphasized how important their whole family unit was in helping adolescents not only academically achieve but also develop as a whole person, with Penelope often reminding her daughter that the whole family has "got each other's backs." Additionally, Latine parents recognized that their children could ask for help from their teachers if parents were not able to directly help, thereby leveraging their social capital available outside of the family. Though Latine parents faced multiple challenges, other family members and educational figures played compensatory roles in supporting adolescents.

3.2.4 Linkage 2: Leveraging navigational and social capital through provision strategies and the use of tools to address knowledge gaps and conflicting obligations

Second, Latine parents leveraged their navigational and social capital by providing learning spaces and structured activities and/or using digital educational tools to address gaps in their math content/curriculum knowledge and/or conflicting obligations (Table 3; Fig. 1).

3.2.5 Provision of learning spaces and organized activities

First, Latine parents provided educational spaces, routines, and experiences conducive to math learning at home in ways that helped adolescents' learning while also working around math support challenges (Table 3). Speaking to parents' gaps in math content knowledge, Itzel explained, "I'm not really good at math like I told you. What we try is to get her (daughter Luna) a desk that she can go in her room and close the door without my babies interrupting her." Moreover, speaking to her busy work schedule, Penelope mentioned creating a household routine and structure around math schoolwork: "I want to say it's just the work. They (her children) have the structure for when they're out of school, like they have to finish the homework so that they can have all the afternoon as their free time." By curating their homes as learning spaces for adolescents, Latine parents leveraged their navigational capital to find ways to work around challenges like content knowledge gaps and conflicting obligations while still instilling the importance of math and education to adolescents.

Latine parents also described the ways in which they provided learning experiences and contexts to help their children in math through organized after-school activities. This provision strategy served as a way for parents to tap into their social capital to address gaps in their math content/curriculum knowledge. Itzel also discussed the positive ways that the Math CEO after-school program was helping her daughter, Luna, in math: "She's been doing really good since she started doing this program after school." For some parents, like Carmen, after-school programs also became a resource to seek help from program staff:

Ellos están yendo a un programa después de escuela; se llama ESTUDIO. Cuando hay algo así que no entiendo, voy también con las muchachas de ahí y les pido ayuda. Busco ayuda extra, luego ellas me explican a mí cómo se hace el problema y ya vengo yo y le ayudo... Casi siempre es lo que hago, buscar la manera de ayudarlo y si yo no puedo, trato de buscar quién le ayude. [They are going to an after-school program; it's called ESTUDIO. When there is something like that that I don't understand, I also go to the girls (staff) there and ask them for help. I look for extra help, then they explain to me how the problem is done, and I come and help him... It's almost always what I do, look for a way to help him and if I can't, I try to find someone to help him. – Carmen, mother of Christian.

The availability of academic after-school programs, like Math CEO and ESTUDIO, was of particular importance to some Latine parents, especially as a complementary resource that compensated for families' lower math content knowledge. These provision strategies relieved parents of their concerns about their gaps in math content knowledge and conflicting obligations.

3.2.6 Using digital tools

Second, although some parents found technology challenging, many Latine parents used digital tools like school-based social media and video websites (e.g., Par-

entSquare, YouTube) to address math knowledge gaps and conflicting obligations (Table 3). To address conflicting obligations, Zara explained how she used technology to leverage her social capital and connect with teachers, "What I do with them, I do contact them through a program that they have called ParentSquare. If I have any questions, I would ask them there, or they would ask me there too." As Zara's busy schedule often precluded her from directly connecting with her son's math teacher, the availability of ParentSquare allowed her to keep abreast of her son's math progress and seek additional support from teachers.

Further, some parents described using YouTube videos as important support tools to work around gaps in their knowledge of math content:

Cuando no entiendo algo... lo que yo hago es usar el YouTube, buscar más o menos lo mismo que él está haciendo y ya ver los videos en el YouTube cómo se hace, cómo lo explican y ya de esa manera le puedo ayudar un poquito más... Si yo veo que más o menos él va a comprender cómo se está explicando, ya le pongo a él el video. Si veo que es video donde él no va a entender mucho, trato de buscar un video donde esté más explicado. [When I don't understand something... what I do is use YouTube, look for more or less the same thing that he is doing and watch the videos on YouTube on how to do it, how they explain it and that way I can help him a little more... If I see that he is going to more or less understand how it is being explained, then I put the video for him. If I see that it is a video where he is not going to understand much, I try to find [another] video where it is more explained.] – Carmen, mother of Christian.

Given the abundance of YouTube videos that cover similar math concepts, parents like Carmen were able to customize the videos to be developmentally appropriate for their children's skill and knowledge level. In these ways, digital videos and social media served as useful navigational resources for Latine parents to adaptively respond to specific challenges like gaps in math content knowledge and conflicting obligations.

3.2.7 Linkage 3: Leveraging aspirational capital for knowledge- and skill-building

Finally, though Latine parents' aspirational capital was apparent throughout their discussion of math support challenges, their aspirations were explicitly illustrated in their hopes to build knowledge and skills that addressed challenges like gaps in knowledge, linguistic differences, and technological problems (Table 3; Fig. 1). This aspirational capital also hinted at parents' need to develop other community cultural wealth. For example, Adriana described the need to strengthen her social capital with educators to obtain resources for building her math knowledge:

Para ayudarlo sería como enseñarnos a los padres cómo ayudar, a lo mejor, tal vez algo pequeño que pudiéramos ayudarlos, porque yo, en realidad no estudié, pero digo, en caso de ir a algunas sesiones que nos ayudaran como padres a ayudar a nuestros hijos, sería perfecto... dando talleres o algo para capacitar a los padres sería bueno. [To help him would be like teaching us parents how to help,

maybe, perhaps something small that we could help them with, because I in fact didn't study, but I say, if we went to some sessions that would help us as parents to help our children, it would be perfect... giving workshops or something to train parents would be good.] – Adriana, mother of Kenneth.

Other parents like Celia expressed a similar aspiration for knowledge- and skill-building as well as social and navigational capital to overcome their problems with technology: “*Eso sería mi propósito, tratar de entender la tecnología para poderles ayudar... hacerles un poquitito más fácil el trabajo, para que estudien menos.*” [“That would be my purpose, to try to understand technology in order to help them [her children]... to make their work a little easier, so that they study less.”] These aspirations for knowledge- and skill-building underscored Latine parents’ determination to eliminate challenges to better support their children in math. Other parents expressed a need for institutional resources to build their linguistic capital (i.e., English skills) to navigate US schools. However, rarely did parents report actually fulfilling these aspirations. Nevertheless, by expressing their aspirational capital, Latine parents illustrated their desire for institutions and educators to develop relevant and concrete strategies for families to strengthen their community cultural wealth and to gain needed knowledge and skills to support adolescents.

In sum, Latine parents tapped into multiple forms of their community cultural wealth through six specific strategies to adaptively respond to the math support challenges they faced. These adaptive responses illustrated the ways in which Latine parents are purposeful and motivated in overcoming multiple challenges when supporting their adolescents’ math learning.

4 Discussion

Integrating culturally grounded models and a funds of knowledge approach, the current study centered on the voices of lower-SES Latine parents to elaborate on the challenges they face when supporting their children in math and the strategies they use to adaptively respond to those challenges. The current study uncovered a diverse set of math support challenges that manifested at the individual (e.g., gaps in curriculum knowledge) and contextual (e.g., conflicting obligations) levels. Findings also delineated the specific ways in which parents adaptively responded to math support challenges by leveraging their community cultural wealth.

Elaborating on Yosso’s (2005) navigational, familial, and social capital, we found that lower-SES Latine parents responded to challenges primarily by working closely with adolescents and seeking help from other members of their family and communities. Further, using their navigational and social capital, findings elaborated on parents’ provision behaviors, affording adolescents with learning spaces and educational tools to address gaps in math curriculum knowledge and conflicting obligations. Finally, parents expressed their own hopes to build their knowledge and skills to overcome math support challenges, leveraging their aspirational capital that is typically overlooked by family socialization models (Starr et al., 2022). Overall, the current study underscores the need for family academic socialization models to

incorporate parents' adaptive responses to support challenges through the lens of community cultural wealth.

4.1 Latine parents' math support challenges

The current study highlighted different ways that parents' math support challenges can manifest within lower-SES Latine families. Prior studies typically examined a small number of educational challenges that Latine parents encounter (e.g., Cross et al., 2021; Lorenzo-Blanco et al., 2016; Perreira et al., 2006; Quintos et al., 2019; Williams et al., 2020). In the current study, we sought to understand a wider range of math support challenges that lower-SES Latine parents face. We found five forms of math support challenges that operated at the individual level (e.g., gaps in math content and curriculum knowledge, dampened self-beliefs, and linguistic differences) and the contextual level (e.g., conflicting obligations and nonideal circumstances).

Notably, modern difficulties manifested within lower-SES Latine families via parents' problems with navigating 21st-century digital tools used in schools (e.g., email, Canvas, and ALEKS). Prior studies document a "digital divide" describing inequities in access and literacy in using technologies in children's education among lower-income and racially/ethnically minoritized communities (e.g., Gandolfi et al., 2021; Park et al., 2021). Extending these findings, however, we also found that parents' problems with technology may not be all-encompassing, as some parents mentioned also concertedly using digital tools to adaptively respond to challenges (e.g., YouTube videos, ParentSquare). This finding highlights the potential for 21st-century digital tools to help Latine parents support adolescents in math and overcoming challenges so long as parents are shown how to use them competently and to their fullest potential. Failing to do so, digital tools used in schools become continual challenges that amplify other math support challenges. In efforts to increase parents' educational involvement, the current study underscores the need for educators to provide resources and scaffolding so that all parents can navigate educational digital tools that might not be user-friendly for adults. Moreover, these findings underscore the need for developmental theory to consider the ways in which modern educational technologies can play an impeding or enhancing role in parents' math support as well.

4.2 Latine parents' adaptive responses to math support challenges

Guided by strengths-based and culturally grounded developmental frameworks (Soto-Lara & Simpkins, 2022; Starr et al., 2022; Yosso, 2005), the other aim of the current study was to go beyond an exclusive focus on Latine parents' challenges and examine how parents respond to these challenges with the resources they have. In the current study, we found that lower-SES Latine parents leveraged their community cultural wealth via distinct strategies to adaptively respond to different math support challenges, extending and corroborating prior studies on Latine parents' responses to structural challenges in US society and education more generally (e.g., Arellanes et al., 2019; Delgado-Gaitán, 1991; Perreira et al., 2006; Pstross et al., 2014; Mortier & Arias, 2014; Soltero-González & Gillanders, 2021; Yosso, 2005).

The primacy of parents working with adolescents and seeking help from their social networks is notable as these strategies reflected values of familism and interdependence within Latine cultures (Calzada et al., 2010; Halgunseth, 2019; Hernández & Bámaca-Colbert, 2016), as well as their leveraging of their navigational, familial, and social capital (Yosso, 2005). Aligned with culturally grounded developmental models, Latine parents' adaptive responses were informed by their community cultural wealth (Soto-Lara & Simpkins, 2022; Starr et al., 2022; Yosso, 2005). Moreover, these strategies manifested in particular ways, ones that demonstrated parents' use of navigational capital as well. Working closely with adolescents entailed helping adolescents understand math schoolwork by deconstructing math questions. Some parents also employed these strategies together, seeking help from others after they tried to help adolescents directly. Hence, even if parents are not clear on the math content, they can still help adolescents not only by checking whether adolescents' homework is complete, but also by helping adolescents think about how to approach math problems and seeking out the help of other more knowledgeable social figures.

Latine parents also tap into other resources to navigate math support challenges, including providing adolescents with spaces and structured activities as well as using digital tools to address these challenges. Though provision strategies are well-documented as a key dimension of parental support (Eccles & Wigfield, 2020), the use of digital tools to support adolescents' math learning (as opposed to these tools being a challenge) is understudied. Parents used digital tools to augment working with adolescents (i.e., using YouTube videos to help adolescents understand math topics) and sought others' help (i.e., using ParentSquare to seek help from teachers and other parents) to work around knowledge gaps and busy schedules. Aligned with child development models (e.g., Eccles & Wigfield, 2020; Starr et al., 2022), these findings extend the literature by highlighting the many adaptive responses that Latine parents engage in to address specific math support challenges in holistic ways.

Finally, our findings highlighted how much Latine parents illustrated their aspirational capital by expressing desires for knowledge- and skill-building to overcome challenges like gaps in math knowledge, problems with technology, and linguistic differences. This theme contributes to our knowledge of family academic socialization, as prior studies on Latine family academic socialization processes largely ignore how parents seek out information and build on their existing skills to better support adolescents in academics (Eccles & Wigfield, 2020; Soto-Lara & Simpkins, 2022; Starr et al., 2022). Still, Latine parents were seldom able to fulfill their hopes to build the knowledge and skills they needed to overcome math support challenges. Nevertheless, these findings highlight specific avenues by which researchers and practitioners can help parents overcome the math support challenges they face, such as creating parent workshops focused on building skillsets that parents are interested in developing.

4.3 Study implications

The current study has implications for the ways in which researchers, educators, and institutions can help enhance lower-SES Latine parents' math support and thereby adolescents' math achievement. Understanding the diversity of parents' math support

challenges, as well as the ways in which they address these challenges, may guide educators and researchers in developing and providing resources that can eliminate parents' challenges directly or enhance parents' adaptive responses to math support challenges. First, increasing the number of Spanish and English bilingual school personnel can eliminate non-English-speaking parents' inability to communicate with schools. Second, providing resources to help parents gain English language skills while also providing math schoolwork materials in both English and the families' native language may be another avenue for educators and researchers to help Latine parents overcome math support challenges. Third, institutional efforts aimed at boosting parents' knowledge of their children's math curricula may focus on ensuring that parents feel more confident about working with their child. Furthermore, designing educational digital tools to be easy-to-use and streamlined may also help Latine parents navigate digital learning spaces that adolescents and educators regularly use. Institutional efforts may also leverage parents' social capital, helping parents identify social and community networks who may directly help adolescents. Given their cultural orientations, Latine families and communities may also enjoy collaboratively building their knowledge and skills together. Finally, intentionally leveraging Latine parents' community cultural wealth and funds of knowledge can help educators and researchers better develop resources and support that are intuitive, practical, and empowering for Latine families.

4.4 Limitations and future directions

Although the current study contributes to the literature on Latine families' adaptive responses to math support challenges, it has limitations that future studies can address. First, the parents in the current study had adolescents attending one or more math/academic after-school programs. Hence, our participants may be a selective sample of parents who are particularly knowledgeable about resources and invested in adolescents' math education. Our study may not fully apply to Latine parents from similar backgrounds whose children are not attending these types of math enrichment programs. For example, a study that examines the views of Latine parents of adolescents who are from the same schools as the sample but *not* attending a math enrichment after-school program may more fully delineate variations in the ways in which parents address math support challenges. Further, studies examining these processes in other STEM or non-STEM domains may provide further clarity into the ways parents experience and address different academic support challenges. The specificity of our sample also extends to the historical time in which we collected our data, namely during the COVID-19 pandemic. Though the particular math support challenges and adaptive responses were often not specific to the pandemic, families were impacted by the constraints during this unique historical period and the findings may not seamlessly apply to pre- or post-pandemic family processes.

Second, except for one family of Guatemalan descent, our study examined Mexican-descent families almost exclusively. As Latine communities are not monolithic and have diverse cultural traditions, knowledge, and experiences, the field can benefit from studies that examine variations in family experiences from a wider range of Latine cultures. Third, although our study centered on Latine parents' voices and

adaptive responses against challenges, we did not examine whether their responses alleviated or eliminated the math support challenges they faced.

Hence, future studies must also examine the extent to which Latine parents' adaptive responses to math challenges predict the magnitude and quality of parents' math support challenges, parents' stress levels, and adolescents' math motivational beliefs and achievement. Nevertheless, current study findings highlight the diversity of parents' math support challenges that educators and researchers can endeavor to eliminate, as well as the adaptive responses that institutional efforts can better enhance so that Latine parents can better support adolescents in math.

4.5 Conclusion

In conclusion, the findings from the current study offer a rich, detailed understanding of what challenges lower-SES Latine parents encounter when they support adolescents in math and the ways in which they adaptively respond to these challenges by tapping into their community cultural wealth. Key to our inquiry was to position Latine parents as expert facilitators and center their voices in adolescents' math development. Lower-SES Latine parents' narratives offered insights into specific strategies they employ to respond to challenges. These insights can guide researchers and practitioners in the design of resources that can help lower-SES Latine parents overcome math support challenges and enhance adolescents' math learning.

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s11218-024-09986-0>.

Author contributions Nestor Tulagan led the study's conceptualization, design, data collection, data management, data analyses, and manuscript preparation and editing. Stephanie Soto-Lara, Kayla Puente, and Perla Ramos contributed to the study's data collection, transcription and translation, data analysis, and manuscript preparation and editing. Alessandra Pantano helped in data interpretation and manuscript editing. Finally, Sandra Simpkins served as a senior advisor, contributing to the study's conceptualization, design, data analysis, and manuscript preparation and editing.

Funding This material is based upon work supported by the National Science Foundation SBE Postdoctoral Research Fellowship under Grant No. 2004278. Any opinions, findings, conclusions, or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation. We are grateful to the coordinators, mentors, and youth participants of the Math CEO program at UC Irvine for their willingness to be a part of this study. Thank you also to the Honda Foundation and University-Community Links Network and others for generously supporting the Math CEO program.

Data availability Data, materials, and coding schemes are available from the corresponding author upon reasonable request.

Declarations

Ethical approval Research procedures were approved and overseen by the Institutional Review Board at the authors' institution.

Consent to participate All participants provided verbal consent to participate in the study.

Competing interests The authors declare that they have no competing interests.

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