It Takes Community:

Supporting Mexican American Youth from Immigrant Families in Math and Science

A dissertation

submitted by

Natalya Zaika

in partial fulfillment of the requirements for the degree of

Doctor of Philosophy

in

Child Study and Human Development

TUFTS UNIVERSITY

August 2022

Committee:

Tama Leventhal, PhD (chair)

Sara Johnson, PhD

Mona Abo-Zena, PhD

Fabián Torres-Ardila, PhD

Abstract

Individuals of Mexican heritage, broadly, continue to be severely underrepresented in science, technology, engineering, and mathematics (STEM) careers (NASEM, 2007). In order to support Mexican American youth in immigrant families (i.e., at least one foreign-born parent) through the STEM pathway, it is important to investigate youth's learning communities that may play a role during a critical time in the STEM pathway—the elementary-to-middle school transition. This dissertation examines Mexican American youth's communities in connection with their schools in their math and science outcomes. I also consider how these associations differ by gender given long-standing gender-based inequities in STEM (Cimpian et al., 2020), yet immigrant advantage in or preference for STEM disciplines (Fuligni, 1997).

Drawing on data from the Early Childhood Longitudinal Study, Kindergarten Cohort: 1998/1999, I focus on a subsample of $N \sim 670$ Mexican American youth who comprise the longitudinal panel to estimate the relative contribution of neighborhoods to youth's middle school math and science achievement, attitudes toward STEM, and teacher-rated math/science proficiency. Appended to these data are publicly-available sources: school data from the Common Core of Data, neighborhood data from the U.S. Census 2000, and National Center for Charitable Statistics (NCCS). Cross-classified or crossed random effects (CCRE) models that account for parallel contexts are used to estimate the contribution of neighborhood social structure (e.g., co-ethnic concentration) and institutional resources (e.g., libraries) to youth's math and science outcomes (e.g., achievement, self-efficacy) in middle school. Moderation analyses examine associations between contexts and outcomes by gender. Findings suggest the social structure may not be accessed consistently or used in ways that were beneficial to youth's math and science outcomes. Pertaining to neighborhood institutional resources, little evidence links them with youth's math and science outcomes; possibility implicating processes within and related to accessing and engaging with formal institutions. Also, no evidence of moderation was found, necessitating further examination of socialization processes. Findings are discussed with regard to processes and policies in neighborhoods that interfere with Mexican American youth's access and engagement; and a broadening of the tools, modalities, techniques, and contexts in which youth's STEM learning is assessed.

Acknowledgements

This dissertation work would not be possible without my own learning community. I am so grateful for each person, event, organization, who I have met across my educational journey to this final milestone. Each experience, event, conversation, kindness, opportunity, and challenge allowed me the chance to deepen my perspectives, learn, and get to this place. Words truly cannot capture my gratitude for all the amazing, inspiring, kind, very patient people I had or met across my journey. Thank you for everything big and small: Your support, friendship, for taking chances on me, discussing places for improvement, reminding me of my strengths, letting me learn from you, and believing in me. I am where I am because of each amazing person who has crossed my path. Thank you.

I would like to acknowledge some of the organizations and people who have made my dissertation possible, in no particular order.

U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics for allowing me to work with the Early Childhood Longitudinal Study, Kindergarten Cohort 1998-1999 (ECLS-K); the Coleridge Initiative, especially Nathan, Ben, and all the others who have helped me review each export. Dr. Tama Leventhal, who with colleagues, thought of the STEM project to which I was drawn. The grant project funding support comes from the National Science Foundation Award No. 1760481 (PI, T. Leventhal).

My committee played such a substantial role throughout my education. I continue to learn from them. I am so grateful to have met each of you: Dr. Tama Leventhal, Dr. Sara Johnson, Dr. Mona Abo-Zena, Dr. Fabián Torres-Ardilae. You took a chance on me and never gave up. Your perspectives were invaluable to helping me grow and learn.

Each member of my family – you are my strength; my grandparents –you are my foundation; my sister—you are my role model. You always were my biggest cheerleader and advocate. Ben – thank you for supporting me, always willing to offer advice about research, jobs, or anything else. To my basically family—Bekkers & Litvaks – thank you for help during every housing move and being my home away from home.

Thank you to Tufts University who allowed me to meet all the amazing and inspiring people who I have in my community. I appreciate the opportunities you have provided me and I hope to honor the learning I have tried to do through my time at Tufts. I am grateful to my Tufts community, Tufts professors, EP Professors, staff (especially Justina, Debbie & Maria), and peers that I met along the way. My cohort (especially Amber, Elise, Melissa, Katie, Xian) you are role models and some of the most inspiring women I know. I look forward to seeing all the amazing places you will go and things you will do. I couldn't have done graduate school without my cohort, my Leventhal Lab/ C3 Lab (especially Maggie & Elizabeth, Julius, Grace, & Fei), academic/ writing tutors, mentors, mentees, and friends (especially Elana, Matt, Anna B., Judith, Patrece Elise M., Lok, Udathari, David, Iván, Yume, Rumeysa, Kate, Kathy, Slav, Anton, John, Rhiannon, Katie, Chelsey), GIFT family (especially Mike, Yara, & Kristen). My students over the years and my research assistants (Jenna, Yasmin, Carolina, Sarah) thank you for pushing my thinking and the Tufts Graduate Research Fund for giving me an opportunity to meet some of these students. Tufts IT team (especially Vick & Jose) and Tufts IRB staff (especially Lara, Christine) took the time to answer all of my millions of questions. And, Sociedad Latina (especially Alex, Yamileth & Abe), thank you for welcoming me and your friendship.

Table of Contents

List of Tables

List of Figures

List of Appendices

CHAPTER ONE: INTRODUCTION

Supporting Mexican American youth who are from immigrant families (i.e., at least one foreign-born parent; hereafter referred to as Mexican American youth[1]) through the science, technology, engineering, and mathematics (STEM) pathway is an urgent social and economic issue. This population[2] is heavily underrepresented in leadership roles and careers in STEM despite comprising a sizeable proportion of the United States population (National Academy of Sciences, Engineering, and Medicine [NASEM], 2007). Thus, retaining and broadening STEM participation of Mexican American youth ensures equitable participation in high-growth fields, such as STEM[3], and also encourages the United States to leverage untapped knowledge and skills of a segment of the population that is important to the country's economic future. Mexican Americans face marginalization in educational opportunities from preschool through post-secondary education, which contributes to the cycle of underrepresentation that unfolds over time and as a function of inequitable contexts (Solorzano et al., 2005). In this dissertation, I focus on an overlooked segment of this cycle, the elementary-to-middle school transition, which receives considerably less attention than other schooling transitions, and youth's communities.

Researchers have long under-valued the role of communities [and neighborhoods] in youth's STEM educational pathway (Xie et al., 2015). This omission ignores communities' historic and cultural significance that has the potential to empower (e.g., social ties—processes[4] that have potential to emerge from social structure, such as co-ethnic concentration) or pose barriers e.g., poverty) to youth's STEM learning (see Ladson-Billings 2006; Moll, 2010).

---

[1] Individuals may personally identify as Mexicano/a, Chicano/a, Mexican American, and in other ways
[2] Available public statistics are limited in their accuracy of counts of intersections of national origin with other dimensions of identity (e.g., gender, immigrant generation).
[3] This dissertation focuses on STEM, but it does not discount the important role of other disciplines
[4] Social processes are shaped by neighborhood social structure, but are beyond the scope of this dissertation

Historical accounts of educational equity for Mexican American youth and their families, highlight how co-ethnic relationships in the community transformed the educational landscape and availability of institutional resources (Bowman, 2014). The social structure (e.g., co-ethnic concentration, which is the focal neighborhood characteristic in this dissertation) can shape social capital and knowledge present that are recognized as strengths by some scholarship, but are often underestimated and under-studied as facilitators of youth's STEM learning (McWayne et al., 2019). Literature on ethnic communities and communities of color, specifically, emphasizes that skills, knowledge, and attitudes are fostered in these locales to counter marginalizing systems and resource disparities (Yosso, 2005). It is clear that youth learn within and through their communities (e.g., Garcia-Reid et al., 2005; National Research Council, 2009). Yet, the research empirically documenting the links between community assets and youth's STEM pursuits is sparse, and even fewer studies explicitly focus on Mexican American youth from immigrant families (as opposed to pan-ethnic Latinx[5] populations), their differential neighborhood assets (e.g., co-ethnic concentration) and institutional resources (e.g., organizations serving cultural, ethnic, and minoritized groups) among diverse populations. Hence, the association between community assets (i.e., social structure, neighborhood institutional resources), accounting for school contributions, to Mexican American youth's STEM pursuits remains largely unknown.

Accordingly, this dissertation can be considered as in the first step in multi-method scholarship about the role of communities for the STEM pursuits of Mexican American youth

[5]Although the term "Latinx" is an inclusive form for Latino/a ethnic identity that is recognized by U.S. institutions and APA standards, it is contested among individuals of Latin American descent (see Kaur, 2020)

from immigrant families during middle school, over and above the contribution of their schools. Then, I consider how these associations differ by immigrant youth's gender[6], given the long-standing gender-based inequities in STEM (Cimpian et al., 2020), and immigrant advantage or preference for STEM disciplines (Fuligni, 1997). Specifically, I investigate the contribution of neighborhood social structure and institutional resources, while accounting for school resources, to Mexican American youth's STEM outcomes in middle school. In the dissertation, I begin with a general conceptual background to undergird the rationale for my integrative conceptual model and consequent analysis. Next, I review available research about characteristics of schools and neighborhood contexts that shape Mexican American youth's STEM pursuits and ways that boys and girls differentially associate with neighborhoods that may have implications for STEM.

It is important to note that this dissertation is informed with my own biases (see Talusan, 2022 for more on this topic). Although this work is a quantitative analysis of secondary data, my identity and my stage of learning shape the methodologic and analytic choices I made and my interpretations from the studies gathered. Thus, I disclose some of my identities that are pertinent to how I think about this research. I am a student, a mentor, a friend, a family member, a 1.75 generation immigrant from a European country, racialized white, cisgendered woman, and slowly acknowledging my own biases in other parts of my identities. I am from a family with two different religious backgrounds; and I grew up mostly middle-class. These intersectional identities, among other dimensions of my identity, contribute to a particular way that I think about the world. This note means I may miss how Mexican American youth from immigrant

[6] For the purposes of this dissertation, given data constraints, and age of the data, in this dissertation gender refers to parent-report of child's biological sex in binary terms. No items were available that differentiated between gender expression and biological sex, nor did items provide options to respond in non-binary ways

families navigate their multitude of identities to engage with their communities amid the sociopolitical climate.

CHAPTER TWO: LITERATURE REVIEW

Theoretical Perspectives and Frameworks

In this dissertation, I investigate Mexican American youth's math and science outcomes during the elementary-to-middle school transition. I focus on the role of two contexts (schools, neighborhoods) and moderation of gender[7] (e.g., boys, girls). I draw on key components of theoretical models and frameworks from developmental science and education to inform Figure 1, which guides this dissertation. In the following section, I describe ecological and relational theories, models from education, and critical and developmental perspectives that all need to be considered in understanding Mexican American youth's STEM pursuits. It is pertinent to note that most studies reviewed examine STEM via school assessments of STEM-content recall, rather than underlying skills (e.g., inquiry, problem-solving) and components of retention (e.g., interest, self-efficacy). Consequently, skills that youth demonstrate in informal experiences in communities may not be reflected in the studies or school-situated assessments.

Communities as Relational and Mobilizing Spaces

First, I bring together ecological and relational perspectives to situate youth's STEM pursuits as dynamic processes that occur within, and as a result of, the multiple contexts in which youth are embedded. Bronfenbrenner's ecological systems theory presents a Eurocentric and somewhat individualistic perspective that disregards interlocking systems of oppression, but brought to the fore of "mainstream" psychology the role of contexts in children's development (Bronfenbrenner, 1979). It conveyed the influence of and interrelations between contexts that

[7] For the purposes of this dissertation, given data constraints and age of the data, gender refers to parent-report of child's biological sex in binary terms. No items were available that differentiated between gender expression and biological sex.

range from proximal (e.g., family, schools, neighborhoods) to those that are distal from the individual (e.g., national cultural values; Bronfenbrenner, 1979). More contemporary theories have shifted the focus from distinct contexts to processes. In particular, relational developmental systems meta- theories (RDST) describe the mutually influential exchanges between individuals and their contexts that guide each of the entities' development (Lerner, 2006). These theories help to understand how youth's and families' characteristics, behaviors, and actions shape the dynamics of contexts (e.g., relationships within a social structure) and concomitantly are influenced by them to spur learning (Overton, 2013). In this vein, each of the different spheres shown in Figure 1 (e.g., "broad context", "community", family") in which Mexican American youth are nested are inextricably tied to youth's STEM pursuits.

These aforementioned theories establish a base framework for this dissertation, but they insufficiently explain how youth's multiple contexts co-act (i.e., schools and neighborhoods for the purposes of this dissertation). Although RDST acknowledges that youth's contexts cannot be separated into distinct spheres, it is sociocultural and socioecological theories that provide a way to unite the social and cultural ecologies of individuals' every day experiences (Chirkov, 2020). From a sociocultural lens, the analysis of children's learning process must "start with analysing their communities and their sociocultural constituents (e.g., the system of social representation or sociocultural models) in relation to people's psychological reactions toward and functioning within them" (Chirkov, 2020, p. 121). The term "community" is used broadly in this definition. However, it highlights that "communities" are relational spaces that are organized by unique social processes, constructed by the multifaceted individuals within them. The comprising social structure uses culturally meaningful processes to organize and relate within community and physical spaces, such as neighborhoods. That is, even as youth may be individual units within the community, they use culturally meaningful processes to organize within their own families, neighborhoods, schools, and other contexts not represented in Figure 1.

The way Mexican American youth use communities to learn STEM requires recognition that history, culture, and inter-relational dynamics make up the social processes that guide how individuals make meaning of and navigate their social landscape (Holloway & Kunesh, 2015). For Mexican American youth in the United States, this means that the legacy of marginalization may function to create a common collective community among Mexican Americans (Moll, 2010). This shared cultural legacy can be mobilized to “disrupt the institutional status quo” and encourage institutions to respond to Mexican American youth’s needs (Moll, 2010; Philbin & Ayón, 2016). These processes must function within a sociocultural landscape in which Mexican Americans have been systemically excluded in education and contexts (e.g., some neighborhoods) due to enduring marks of segregation (see Ladson-Billings, 2006). Intergenerational exclusion implies that mechanisms such as racism, discrimination, xenophobia, and segregation organized particular contexts (García Coll et al., 1996). As a result, the educational sphere that Mexican American youth negotiate is an unequal opportunity structure (García Coll et al., 1996). However, youth are active agents in interactions with contexts. As illustrated in Spencer and colleagues’ (1997) “Phenomenological Variant of Ecological Systems Theory (PVEST)”, youth’s outcomes are based on iterative appraisals of individual-context interactions (M. B. Spencer et al., 1997).

Immigrant-specific theories further highlight Mexican American youth’s challenges in these socially stratified contexts. In the “Integrative Risk and Resilience Model for Understanding the Adaptation of Immigrant-Origin Children and Youth,” Suárez-Orozco et al. (2018) provide a framework to illustrate the ways the social landscape (e.g., attitudes toward immigrants, bilingual or English-only policies) critically shapes immigrant youth's general well-being and academic functioning in host contexts (Marks et al., 2018). Thus, in addition to traversing normative developmental challenges (e.g., school achievement), Mexican American youth must also tackle acculturative tasks (e.g., navigating bi/multilingualism, bi/multiculturalism; Suárez-Orozco et al., 2018). Acculturation is the on-going process when individuals' cultural models contact the culture in the host society, spurring individuals' identity negotiation (Marks et al., 2013; Suárez-Orozco et al., 2018). That is, immigrant youth must resolve the extent to which they maintain, incorporate, separate, or blend heritage culture and dominant host-country cultural models in each setting (Berry, 1997; Berry et al., 1987).

Rather than any identity-context interaction acting distinctly, intersectionality perspectives, led by Black feminist critical scholars, rightly recognize individuals' multiple dimensions of identity that intersect and integrate to shape individuals' responses to their environments (see e.g., Crenshaw, 2016; The Combahee River Collective, n.d.). In this dissertation, this theory means that racialized (i.e., Latinx, Mexican), immigrant (or child of immigrants), and gender (and gendered expectations) identity are entwined. Therefore, along their STEM pursuits, Mexican American youth must simultaneously tackle the marginalization acting on each aspect of their identity within the constrained opportunity structure.

Life Course Theory and the Role of Time

The theories previously described contextualized Mexican American youth's STEM pursuits and acknowledge the importance of historical time. The role of time in children's progress in the STEM pathway necessitates further attention for two reasons: the sequential nature of STEM content and children's development during the elementary-to-middle school transition when foundational STEM content is introduced.

One pillar of Elder's (1998) life course theories can first be applied to the rigid STEM sequence. In life course theories, there are consequences for individuals' developmental trajectories that depend on when key transitions and milestones occur (Elder, 1998). Differences in the timing of events lead to diverging developmental trajectories (Elder, 1998). The presentation of STEM material within an established "STEM track" means that children need to keep pace with the presented curriculum regardless of any variability in individual progress or in the context (e.g., differences in teachers' time spent teaching science content). Rather than encouraging learning, the "STEM track" means that early disparities in achievement threaten to push youth out while they are still learning. STEM curriculum is taught in a hierarchical manner, so a weak understanding or performance on foundational principles and concepts jeopardizes students' advancement in STEM (Xie & Killewald, 2012).

Immigrant youth still may be navigating acculturative tasks throughout elementary school while trying to master the STEM curriculum. Eventually, children who disengage and struggle in STEM subjects may choose to avoid these classes, get counselled out into lower track classes and less prestigious opportunities (Gonzalez, 2015; Valenzuela et al., 2012), or choose to leave school entirely in favor of immediate employment (Museus et al., 2011; Schneider et al., 2006). With a backdrop of differential access to various resources and opportunities, especially among immigrant youth, the rigidity of the STEM pathway creates an inequitable learning structure in which there maybe few opportunities, yet severe consequences.

Secondly, life course theories underscore that learning of foundational concepts and entering the "STEM track" occurs during a formidable time in children's lives—one that serves as a critical point of divergence: the elementary-to-middle school transition. Throughout this transition, youth grow in all domains of development. I highlight the sophistication of cognitive development and changes in social development because of their important connection to youth's STEM pursuits. It is worth noting that although cognitive, social, and identity changes are presented distinctly, these domains are interconnected and mutually influential.

During middle childhood and into adolescence, children experience considerable gains in their cognition that help them comprehend substantially more complex STEM content. Some of the most well-recognized theories from European scholars present children's cognitive development according to three main models: logical consistency, information processing approaches, and continuous change (National Research Council, 1984). These models describe that during middle childhood into early adolescence, children improve their reasoning, broadly, and in mathematical thinking, specifically (Nunes & Bryant, 2015). Information processing approaches assert that as a child acquires (or learns) new information, their cognitive capacities improve yet with constraints to the capacities of the system (e.g., memory function; National Research Council, 1984). These capacities also grow throughout childhood. Lastly, the continuous change model describes that children experience general reorganization of their thinking that allows for automatization (National Research Council, 1984). Despite the prevalence of these models in research scholarship, the National Research Council (1984) acknowledges that they have profound limitations with regard to the role of context, plasticity in the developmental sequence, and youth's responsivity to contexts and culture.

Attention to transitions, context, and culture is important for supporting Mexican American youth from immigrant families for several reasons. First, there is considerable heterogeneity in language-learning among bi/multilingual populations. Depending on the family and community characteristics and practices, the trajectory of language development varies (Suárez-Orozco et al., 2018). Next, transitions or changes in context shape the cognitive loads and paradigms that youth learn. While new environments provide enrichment, they simultaneously require additional cognitive resources for youth's learning (Choi, van Merriënboer, & Paas, 2014). In many schools, elementary school children have one teacher; whereas in middle school, youth have multiple teachers. Each new student-teacher or classroom dynamic can be thought of a new microenvironment that demands additional cognitive resources away from youth's learning. Moreover, depending on the student-teacher relationship, youth are tasked with navigating new interplays between power, identity, and cultural dynamics.

Rogoff and Chavajay (1995) assert that performance on certain cognitive tasks is linked with exposure to formal schooling, practice, and language and values involved in the testing situation (Rogoff & Chavajay, 1995). Therefore, as some immigrant youth adapt to new schooling contexts, they need time, opportunities, and exposure to host-culture language. Unfortunately, school structures segregate some youth who are learning academic English language from mainstream classrooms and limit their exposure to STEM courses during this time, which compromises their advancement in STEM (Valenzuela et al., 2012).

Youth respond to social contexts in novel ways during early adolescence compared with childhood due to growing sophistication in their cognitive capabilities and their ethnic identity development. Beginning around early adolescence, youth are likely to integrate their race and ethnicity into their self-concept (Umaña-Taylor et al., 2014). In Spencer and colleagues' (1997) "Phenomenological Variant of Ecological Systems Theory (PVEST)", the researchers describe that youth update their self-concept based on appraisals of individual-context interactions (M. B. Spencer et al., 1997). Eventually, youth's emergent identities or self-organization of prior experiences contribute to coping strategies that youth use to respond to similar situations across the life course (M. B. Spencer et al., 1997). This context-dependent self-organization can function to push some adolescents to engage more deeply in, or others away from, particular contexts (e.g., STEM classrooms) depending on messaging in the context.

Ethnic and racial identity affirmation, or positive regard toward one's ethnicity, fosters feelings of connectedness with one's ethnic group and belonging that are linked with youth's well-being and achievement (Quintana et al., 2015). However, connection to one's ethnicity or racial identity coupled with advanced ethnic consciousness may heighten awareness about negative attitudes towards one's ethnic group and experiences of discrimination (Quintana et al., 2015). Witnessing these negative attitudes in the broad contexts (e.g., political discourse) or directly in STEM classrooms could harm youth's attitudes around the self (e.g., self-efficacy [feeling about one's ability], self-esteem). According to PVEST, youth[8] may respond to these contextual stressors with behavioral adaptations or coping strategies (e.g., lowered aspirations in STEM careers) that can hinder successful school performance and long-term academic pursuits (M. B. Spencer et al., 1997; Steele et al., 2002). Simultaneously, PVEST also provides avenues for interventions to support both boys and girls through schooling contexts (e.g., social processes from the social structure; M. B. Spencer et al., 1997).

For children in the United States, middle childhood is also marked by the entry into formal schooling, during which they have more exposure to different contexts without parental supervision (García Coll & Szalacha, 2004; Huston & Ripke, 2006). In these contexts (e.g., school, neighborhoods, non-profit social clubs), youth get exposure to non-kin adults and peers and their respective social norms, all of which influence developmental processes in different ways than socialization within the family. Exposure to peers, for example, is linked with changes

---

[8] PVEST was examined in a sample of African American boys, so empirical research [at the time of this writing] determined if the model generalizes across racial and ethnic identity groups

in achievement (e.g., Brown & Larson, 2009), academic attitudes (e.g., M. B. Spencer et al., 1997), interpersonal skills and identity exploration around values, interests, and ethnic and racial identity (e.g., Umaña-Taylor et al., 2014). Youth must learn to navigate, integrate, and "self-organize" these identities to develop long-term productive coping responses and products (e.g., M. B. Spencer et al., 1997).

Among immigrant youth, these extra-familial contexts (e.g., neighborhood institutional resources) serve an additional function of reflecting host-society expectations and cultural norms that can contribute to the ways youth navigate acculturation and their ethnic-immigrant identities across developmental contexts (e.g., neighborhood, school; García Coll & Szalacha, 2004; Suárez-Orozco et al., 2018). Adolescent youth's STEM outcomes may reflect self-organization of their identities in each of the extra-familial contexts within a multitude of cultural, macro, and micro pressures and oppressive systems (M. B. Spencer et al., 1997). In this vein, ome Mexican American youth may choose to respond to math and science in neighborhood social structures and institutional resources in similar ways (see Fordham & Ogbu, 1986; Hamann, 2004). Some Latino/a Critical (LatCrit) perspective also argue that standardized assessments cannot fully capture youth's knowledge, and suggest, for instance, youth's storytelling as one device to understand their learning, struggles, or agentic resistance (Fernandez, 2002). Thus, the importance of the social ecology during the transition between middle childhood to early adolescence suggests a time wherein contexts such as schools and communities have heightened importance for Mexican American youth's development.

Neighborhood Models

Much like individuals, contexts have their own characteristics based on an inherent organization (Overton, 2013). This organization can best be understood through the field of neighborhood research. However, it can be argued that schools are community contexts with an organization analogous to neighborhoods. Thus, in the following section, I focus on elements of neighborhood organization pertinent to both schools and neighborhoods and central to this dissertation study: social structure (co-ethnic concentration) and neighborhood institutional resources (e.g., science museums, libraries).

Neighborhood social structure refers to the sociodemographic composition of a neighborhood based on aggregated information about residents (Leventhal & Dupéré, 2019). From the inception of the field, social structure—primarily poverty—has been used to establish the link from neighborhood-level conditions to individual-level behaviors (Leventhal et al., 2015; Leventhal & Brooks-Gunn, 2000). This association was intended to approximate the social processes that shaped individuals' behaviors. However, in the 1980s and 1990s, researchers began moving away from static views of neighborhood structure to acknowledging the sociocultural mechanisms that acted on (via legislation and institutional practices e.g., credit-loaning, redlining; García Coll et al., 1996; Massey, 1990) and within neighborhoods (Sampson et al., 2002). Thus, scholarship during this time helped to expand the link between context structure and individual behavior.

Although few studies explicitly examine the mechanisms by which neighborhoods influence children and families' outcomes (see Harding et al., 2011), neighborhood structure is thought to transmit its effects to children and families by shaping social processes (e.g., relationships and social ties) among residents (Kohen et al., 2008; Leventhal et al., 2015; Sampson et al., 2002) and playing a role in resource distribution and quality (Leventhal & Brooks-Gunn, 2000; M. L. Small & McDermott, 2006). However, the costs, duration, and logistical challenges of collecting social process and resource data have curtailed the incorporation of these measures into many studies; in lieu of these measures, social structure constructs continue to be widely used due to the ease of their accessibility from public sources.

Of the social structure constructs, neighborhood socioeconomic status (e.g., percent of residents living at or below the poverty threshold) has been most often investigated (Leventhal & Dupéré, 2019). Less attention has been given to the role of neighborhood racial and ethnic composition or ethnic density in children's development, especially the assets and benefits of ethnic communities. However, co-ethnic composition, or ethnic density, may have unique contributions for children of color and immigrant youth (García Coll & Szalacha, 2004).

Although these spaces may were created by racist and xenophobic policies intended to promote segregation and subordination overtly or implicitly and perpetuate socioeconomic disadvantages, residents have transformed them and cultivated strengths to oppose these oppressive systems. Latino/a Critical (LatCrit) theories document this collective resistance and the historic role of communities in youth's education (Delgado Bernal, 2002). To some extent, families have chosen ethnic communities as transient residences due to the social structure and purported social processes (e.g., relationships and ties) that give rise to social capital in these neighborhoods (Hernández-León & Zúñiga, 2002; Logan et al., 2002). For some, these ethnic enclaves can be havens from discrimination (Potochnick et al., 2012; Vega et al., 2011), demonstrations of ethnic pride (Vallejo, 2012), and trustworthy sites to access information, expertise, and tangible resources (Hernández-León & Zúñiga, 2002).

Ethnic communities are abundant in cultural capital that may not be (and has not been) recognized in school systems in the United States (Moll, 2010; Yosso, 2005). Drawing on critical race perspectives, Yosso (2005) challenges the deficit perspectives of communities of color and ethnic communities. Instead, six types of cultural capital cultivated in these communities are described: aspirational capital (maintaining high hopes and dreams for the future), linguistic capital (cognitive and social skills developed through communication in multiple languages or styles), familial capital (values around family and communities), social capital (social networks), navigational capital (skills around maneuvering institutions), and resistant capital (skills and knowledge around resistance; Yosso, 2005). Abo-Zena & Rana (2015) offer an additional form of social capital, spiritual capital, which is associated with immigrant youth's learning, health, and behaviors. Youth can activate these various forms of cultural capital to accomplish and pursue their academic goals. Several ethnographic studies with Mexican American youth, and Latinx youth of other nationalities, find that accumulating cultural capital from communities and schools was profoundly meaningful for resetting youth on positive academic trajectories and promoting academic achievement; it was especially critical for youth with the most stressors in their contexts (Gonzalez, 2015; Stanton-Salazar, 2001; Stanton-Salazar & Spina, 2003).

Undoubtedly, neighborhood structure and community-based institutional resources are related. Neighborhood structure contributes to the ways that community-based resources vary in their quantity, quality, variety, and accessibility (Leventhal & Brooks-Gunn, 2000; M. L. Small & McDermott, 2006). For example, according to Small and McDermott (2006) neighborhood institutions may be more prevalent in immigrant-dense areas because of the cultural capital that immigrants bring, cultivate, and mobilize in their communities (Hernández-León & Zúñiga, 2002). Concurrently, resources may influence the residents who can and cannot afford (or choose) to reside in particular locales (e.g., see topics on gentrification; Hwang & Sampson, 2014). This mutually influential relation between institutional resource dimensions and the social structure suggests a particularly close association among community entities. It is this association, along with the understanding of the cultural assets in neighborhoods, that positions neighborhood, in coordination with, schools as promising pathways to bolster STEM support among youth in the community (The United States Department of Education, 2016).

Furthermore, community-based organizations may help youth build cultural capital that supports their development broadly, and academic pursuits, specifically. Among Mexican American youth in neighborhoods that were economically disadvantaged, youth gained access to various forms of cultural capital by participating in community-based programs and institutional resources (Stanton-Salazar & Spina, 2003). Two such institutions that were identified by youth in the study included universities and religious institutions (Stanton-Salazar & Spina, 2003). Although both of these institutions provide a dense network of positive role models, they vary in the extent to which they are able to help youth connect with the cultural capital in their communities.

The variety of community-based resources poses a challenge to the creation of an organizing framework for how community-based resources influence youth's academic pursuits. One organizing theory, proposed by Small (2006), is that organizations broker resources. Whereas some scholars suggest brokering applies to connecting individuals, Small (2006) applied this concept to organizations wherein organizations form connections to other institutions in order to provide services and information for organizational members. Essentially, Small (2006) suggests neighborhood institutional resources provide primary, or explicit services for patrons, and secondary services, which are variable and responsive to situational and community needs. For example, a religious institution may provide religious services (primary function) and host workshops for naturalization services and referrals for social services (secondary function). In economically strained neighborhoods, these networks compensate or counteract inequitable resource distribution and access (Small, 2006). Thus, through a socioecological lens, these secondary functions or "brokering" demonstrate a dynamic process that acknowledges the community composition and needs.

STEM Pursuits Model for Mexican American Youth from Immigrant Families

Using the above theoretical models and perspectives, I propose the STEM Pursuit Model for Mexican American Youth from Immigrant Families (Figure 1) to guide my research questions. I will empirically analyze key components of the model and detail this process in the analytic strategy.

In Figure 1, I define "STEM pursuit" as the continuation of academic or professional STEM opportunities that, ultimately, lead to knowledge-intensive STEM careers. This operationalization corresponds with the overarching aim of increasing and retaining individuals of Mexican heritage, broadly, through the STEM pathway (NASEM, 2007). For individuals to attain this end goal, they must remain engaged in the STEM-track through three STEM processes that are most associated with STEM pursuits from middle childhood through early adolescence: achievement, attitudes toward STEM, and self-efficacy in STEM (see "Child" in Figure 1; Valla & Williams, 2012; Xie et al., 2015).

In line with the reviewed theories, children or youth are situated in a multitiered, layered social ecology, in which their STEM learning processes are fostered across time. This positioning is because the ultimate aim of STEM education is to prepare all of the next generation of youth with the knowledges and inquiry skills to attend to societal problems. In this study, I focus on the association between youth's STEM pursuits in two contexts, of many, that make up youth's learning communities, schools and neighborhoods, which are positioned on either side of the family-child system. While acknowledging the mutually influential transactions between individuals and their multitude of contexts, for the purposes of this dissertation, I limit the scope of the investigation to be unidirectional: the association between the neighborhood and school contexts with youth's middle school math and science outcomes (i.e., excluding how youth may contribute to their contexts).

STEM Pursuits

According to Xie et al. (2015), three individual processes drive youth's pursuits in STEM: achievement, attitudes toward STEM (e.g., interest), and self-efficacy in STEM (Xie et al., 2015; Xie & Killewald, 2012). And, contexts shape these processes: how youth learn, perform on achievement assessments, seek activities they are interested in, and integrate new feedback with experiences to establish self-efficacious attitudes (Xie & Killewald, 2012). Therefore, in this dissertation, I use indicators of achievement and a construct that approximates self-efficacy in math. Before delving into the role of schools' and neighborhoods' social structure and institutional resources in contributing to these individual processes, I begin with a description of the consequences of a thwarted opportunity structure for high STEM achievement, positive attitudes toward STEM, and robust self-efficacy in STEM.

Considerable research stresses the significance of children's early STEM preparation and proficiency during middle childhood to ensure children have the skills, interest, and confidence in STEM prior to entering middle school—a likely critical point in the STEM trajectory (National Mathematics Advisory Panel, 2008). Although this finding may be daunting, it reflects that mastery in advanced math concepts builds on mastery of early foundations (e.g., facility manipulating small quantities; National Mathematics Advisory Panel, 2008). For instance, one study based on children from six schools in Delaware demonstrated that mastery on a mathematical domain called number competence at kindergarten entry was associated with their math achievement in third grade and growth in math achievement between this time (Jordan et al., 2009). Children from low-income families disproportionately showed an association on average, between lower kindergarten math achievement and lower grade 3 math achievement compared with their peers from middle-income families (Jordan et al., 2009). It is important to note that children's math knowledge may not have been fully captured in the specific type of assessments used. The study also failed to acknowlege that children in low-income families are likely to face compounding challenges to their school performance (e.g., issues related to housing, health). Achievement disparities are likely to widen over time without adequate support across the multiple interlocking systems that impede on school performance (Crisp & Nora, 2012; NASEM, 2011). In this vein, achievement is one an important indicator for STEM pursuits that needs to be examined in context.

Mexican American youth may show achievement lags based on the extent and duration of exposure to contextual stressors. For some youth, normative acculturative processes may suggest that youth need time to adapt before catching-up academically (Suárez-Orozco et al., 2018). According to results from analyses of two national, longitudinal studies (National Longitudinal Study of Youth and the Early Childhood Longitudinal Study, Kindergarten Cohort 1998), Mexican American children from immigrant families generally entered kindergarten with some of the lowest levels of math skills compared with peers, but this group of children also showed rapid gains in the first several years of schooling (Cameron et al., 2015; Reardon & Galindo, 2009). However, these early differences may underestimate Mexican American children's math achievement because of confounding with children's English-language learning (Schnepf, 2007).

Among Mexican American youth in some families, the interplay of low socioeconomic status across the contexts of family, school, and neighborhood can substantially compromise engaged learning and well-being (NASEM, 2019). They may face disproportionate obstacles that accrue from structural barriers (e.g., hyper-segregation) while navigating academic pursuits (Valenzuela et al., 2012). Little access to adequate services and supports across contexts can limit access to learning tools (e.g., digital technology) and enrichment activities; reduce time devoted to schoolwork; and increase risks to physical and mental health (Lee, 2020; NASEM, 2019). As children's achievement suffers over the course of their schooling and other challenges accumulate, these youth may avoid enrolling in STEM courses or drop-out of school entirely (Kotok, 2017; Valenzuela et al., 2012). Therefore, it is important to identify the supports in Mexican American youth's contexts that may counteract some of the stressors.

Barriers to achievement are insufficient to explain under-representation of racial and ethnic minoritized individuals in STEM (Riegle-Crumb, 2006). Instead, some evidence points to attitudes toward STEM—particularly interest—and self-efficacy in STEM (i.e., feelings about one's ability) as critical to long-term STEM pursuits (Drew, 2011; Riegle-Crumb, 2006; Xie & Killewald, 2012). These two factors may be understood through Bandura's (1977) self-efficacy model and Spencer's (1997) PVEST model. Bandura (1977) described individuals' task persistence as based on their conviction that they can successfully perform the task and achieve the intended and desired outcome. Hence, self-efficacy in STEM refers to whether individuals perceive they can master the skills necessary to achieve STEM careers and can attain those careers.

Bandura's model, however, falls short because it ignores the role of social positionality in a discriminatory opportunity structure (García Coll et al., 1996). As highlighted in Spencer's (1997) PVEST model, some children of color may develop attitudes toward STEM and their self-efficacy in STEM that are coping responses to various chronic stressors in their contexts.

When messages in the contexts accumulate and reinforce negative perceptions of an aspect of identity that youth value, youth find ways to adapt to preserve their sense of self (M. B. Spencer et al., 1997). Yet, this adaptation may not be beneficial for long-term academic pursuits.

To promote positive self-efficacy, individuals gather information from several sources to make self-appraisals (Bandura, 1977). Individuals use personal experiences and performance, vicarious experiences, verbal feedback, and emotional arousal to provide feedback about self-efficacy (Bandura, 1977). Contextualizing these cues can be illustrated in the following example: youth evaluate their achievement and attitudes toward STEM in light of feedback from individuals (e.g., teachers) and contextual input (e.g., stereotyped images of scientists) to produce behaviors or conscious thoughts (e.g., "good at math"; M. B. Spencer et al., 1997). Because of a history of negative messages often in schools, some children of color may develop stronger self-efficacy in STEM in contexts outside of school.

At the Intersections of Racialization, Immigrant Status, and Gender

Contexts differentially support the individual processes necessary for STEM pursuits across identities. Latinas represent ~1-3% of individuals in STEM careers (Reichard, 2017); thus, the proportion of Mexican immigrant women in STEM is even more difficult to quantify. From an intersectional and historical perspective, this finding is unsurprising given that the STEM pathway in the United States did not have Chicanos or Chicanas in mind.

Several piecemeal studies document that youth's intersectional identities may be differentially associated with STEM pursuits. For instance, this association is demonstrated in a study with a sample of white boys and girls and Latinx boys and girls that draws on surveys with students from three public high schools in a large metropolitan area in the southwest (Simpkins et al., 2015). Simpkins et al. (2015) documented that Latinas had lower perceptions of their ability in three science disciplines compared with Latinos and white boys and girls. When accounting for parent background, the difference across ethnicity within gender (Latina or white girls) diminished or became non-significant (Simpkins et al., 2015). However, the difference within ethnicity and across gender (Latina or Latino) remained (Simpkins et al., 2015). Another study using nationally representative data from the U.S.'s Department of Education High School Longitudinal Study of 2009 (HSLS:09) reported that even after accounting for a host of student-level covariates (e.g., math and science interest, self-efficacy, identity, utility, occupational aspirations, college major intention), the race or ethnicity-gender gap in declaring a physics, engineering, or computer science (PECS) college major persisted among students who had lower scores but not students who had higher scores (Cimpian et al., 2020). Aspirations and prior intentions were the strongest predictors of persistence in declaring PECS majors in college among high achieving women; hence, the researchers recommend interventions with role-models to ensure continuation. Together these studies provide a partial depiction of an unequal opportunity context in PECS achievement between males and females, across racialized and ethnic identity that begins early in the STEM pursuit pathway. Such studies warrant investigation of whether social structure or neighborhood resources can be leveraged to support STEM pursuits of girls, particularly those who may appear to have low achievement in STEM.

Positioning Mexican American Youth in Historical Time

I start by providing some brief background on Mexican American communities' struggles with inequities in the school system. Understanding the sociohistorical context of Mexican American immigrants' education is important to demonstrate the enduring legacy of discrimination shaping their schools and resources therein. Then, I describe the link between school structure and resources to youth's academic pursuits.

Despite Mexican American communities' legal victories for school desegregation and educational equity since the 1920s, Mexican American youth continue to face obstacles to equitable educational opportunities (Bowman, 2014). Whereas groundbreaking legislation led to attention to unequal school facilities (see Mendez v Westminster) and to the unmet needs of children in multilingual households and youth from undocumented families, opposition to educational equity continues through covert methods, such as inadequate funding for school resources (Bowman, 2014). Since the 1990s, rising tensions towards immigrants, especially those emigrating from Mexico and Latin American countries, led to backlash against immigration policies and supports for children in multilingual homes (Bowman, 2014; Johnson et al., 1997). More often than not, clashes between federal governing bodies, state responses, and public attitudes undercut school resources, language support systems, and other services that benefit Mexican American youth in education (Gándara & Hopkins, 2010).

School Social Structure and Academic Pursuits

The history of discrimination against Mexican Americans has left its mark in schools; marginalization of Mexican American youth in institutions with predominately white staff endures (Ochoa, 2013). Currently, the composition of teachers, staff, and administrators in primary schools continues to be comprised largely of white women, even in the presence of an increasingly ethnically diverse student population (McFarland et al., 2019). One step that is important for Mexican American youth's STEM and academic pursuits generally is increasing representation of Mexican—or even Hispanic—teachers and classroom staff who support children from multilingual households (e.g., bilingual instructors, bilingual class aides; NASEM, 2011, 2018).

One possible mechanism by which the composition of teachers and staff may benefit Mexican American youth's outcomes is through the school climate. This idea draws on research using data from the Council of Urban Boards of Education (CUBE) in which researchers examined the link between the ethnic composition of faculty and students' performance and college matriculation (Hess & Leal, 1997). Researchers found that school districts with a 10% higher composition of ethnic minority staff had a 3.6% higher rate of college matriculation than in districts with fewer ethnic minority staff (Hess & Leal, 1997). Hess and Leal (1997) suggest that this association may be a proxy for school-district-wide changes. Other studies have approximated the school climate through student-level measures reported by Mexican American youth (see Hernandez et al., 2014; Stone & Han, 2005). In both studies, school climate included items about relationships and connections to teachers (Hernandez et al., 2014; Stone & Han, 2005). Together, these studies indicate the teacher composition in a school may be associated with Mexican American youth's achievement and academic attitudes (e.g., competence), perhaps because a higher concentration of Mexican or Hispanic teachers and classroom linguistic support staff provide collective voice to advocate on behalf of Mexican American youth. Moreover, there is recognition that school climate is shaped by social structure factors (e.g., students' immigrant generation) and shared values (e.g., Pong & Zeiser, 2012); yet, analyses tend to omit school social structural characteristics of teachers and administrators.

Alternatively, the teacher and classroom staff composition may increase the likelihood Mexican American youth are comfortable in accessing social capital or "institutional support" within the school. Based on ethnographic interviews with Mexican immigrant adolescents, Stanton-Salazar (2001, 2011) found that students' distrust and fears of being misunderstood were mitigated by teachers who could relate to their experiences and backgrounds. These relationships, in turn, may help youth accumulate social capital within schools and other institutions that youth mobilize for their academic pursuits (Stanton-Salazar, 2011). In other words, a higher concentration of Mexican-origin or Hispanic teachers may be advantageous for Mexican American youth's achievement via social capital accumulation.

It is important to acknowledge that similarity on the singular dimension of ancestry or pan-ethnicity does not guarantee that youth's distrust will be alleviated, but in the context of an otherwise predominately White school staff, this dimension may be meaningful. Drawing on research about the role-modeling hypothesis, Gershenson and colleagues (2018) found robust evidence that Black students' exposure to even one Black teacher between kindergarten and third grade was associated with their long-term academic pursuits (e.g., likelihood of taking college entrance exams). Similarly, teacher composition in primary school may be related to Mexican American youth's STEM pursuits in middle school.

In general, the evidence is unclear about how teacher composition may shape Mexican American youth's academic pursuits generally and especially in STEM. Some empirical work does not identify any statistically significant associations between Hispanic or Latinx teacher composition and Latinx students' academic outcomes (e.g., Downer et al., 2016; Redding, 2019). Rather, Redding (2019) calls attention to the considerable heterogeneity among Latinx populations and argues that the schools' teacher composition may need to be specific to students' national background, not only ethnicity. Therefore, research is necessary to identify the school characteristics that best support Mexican American youth, specifically.

School-Based Resources and Academic Pursuits

As Ladson-Billings (2006) expressed in her presidential address at the American Educational Research Association, school desegregation and funding equity have never been fully realized. As a matter of fact, Crosnoe (2005) found that Mexican American youth are likely to attend schools that are hyper-segregated by ethnicity and socioeconomic status. With roughly half of the revenue for school funding tied to local property taxes, youth who live in low socioeconomic neighborhoods are likely to attend inequitably funded schools. Some research suggests that school fiscal resources are associated with students' standardized test results (Greenwald et al., 1996). However, schools and school districts largely decide how to distribute funds among various school-based resources (e.g., libraries and computer labs; NASEM, 2019). This variability means that the link between the types of resources and their association with students' STEM pursuit remains unclear (Xie et al., 2015). Moreover, the National Academies of Science specifies that disparities in access to learning resources perpetuates inequality, but the committee has yet to recommend the specific school-based resources necessary during the elementary-to-middle years to promote youth's academic pursuits (NASEM, 2019).

Inequities and Supports in Neighborhoods

School will remain one of the contexts for STEM-instruction; however, children's neighborhoods also play an important part. Conditions in the neighborhood contribute to children's academic functioning generally (e.g., Lee, 2020) and can shape youth's unique interests, values, and perspectives in STEM (National Research Council, 2009; Rogoff et al., 2017). Therefore, in the following section, I discuss some of the ways that community social structure and community-based resources are associated with youth's achievement and academic attitudes.

Neighborhood Social Structure and Academic Pursuits

Although Mexican immigrant families live in a variety of neighborhood types, some neighborhood social structures may confer more advantages for youth's STEM pursuits than others. Conceptual work has identified several strengths in ethnic communities (see Yosso, 2005). Empirical studies with both qualitative and quantitative methodologies portray a complex portrait about the role of social structural characteristics in youth's achievement more generally.

Vallejo (2012) suggests that ethnic communities have unique importance for immigrant youth and their families by serving as a supportive entry point for social capital. Using a series of in-depth and conversational interviews, Vallejo (2012) found that many middle-class Mexican Americans who left the ethnic enclave maintained ties to the ethnic enclave or less-affluent co-ethnic families. Thus, it is possible that residents in ethnic enclaves have steady connections to high-status professionals who could foster youth's academic interests and aspirations around STEM.

Likewise, Yoshikawa's (2011) ethnography with documented and undocumented Mexican heritage families suggests that among some of the most vulnerable families, particularly those with at least one undocumented member, ethnic enclaves may be crucial for accessing information and services. Yoshikawa (2011) found that even if participants did not live in Mexican ethnic enclaves, living in Hispanic enclaves provided access to a trusting network. Consequently, through ethnic enclaves, mothers were able to secure educational enrichment for youth and address potential sources of familial stress that could impair children's achievement.

Other research provides conflicting narratives about ethnic enclaves, especially those that are economically disenfranchised. In Stanton-Salazar's (2001) ethnography with Mexican-origin youth who primarily lived in neighborhoods segregated by economic class, race, and ethnicity, Stanton-Salazar emphasized that social oppression in youth's neighborhoods undermined the potential capacity of social capital and resources to optimize youth's academic outcomes. Yet, even in the presence of multiple contextual stressors, Mexican-origin youth established extended networks that “buffered” them from alienation and fostered long-term resiliency (Stanton-Salazar, 2001). Stanton-Salazar’s (2001) research highlighted exemplary cases of youth who accumulated various forms of cultural capital to succeed in school, and their strategies in spite of substantial inequality.

Pong and Hao (2007) affirmed Stanton-Salazar’s observations with their quantitative analysis using national data from the National Longitudinal Study of Adolescent Health. They found that once neighborhood, school, and family background characteristics were controlled, the mean difference in GPA between Mexican American youth compared with non-immigrant White youth was no longer statistically significant (Pong & Hao, 2007). Thus, ethnic enclaves may benefit youth’s academic pursuits, but their role is likely obscured in the presence of structural inequality.

In sum, ethnic enclaves may be particularly meaningful for vulnerable youth. Although economic disadvantage in neighborhoods could compromise Mexican American youth’s achievement, the available networks may be important for other indicators of STEM pursuits, such as interests.

Community-Based Resources and Academic Pursuits

Decades of research have investigated the link between neighborhood socioeconomic status and children’s school outcomes (see Duncan et al., 2017; Leventhal & Dupéré, 2019). The most consistent evidence indicates neighborhood socioeconomic advantage or affluence is associated with children’s achievement and long-term educational attainment (Duncan et al., 2017). Although few studies unpack the mechanisms by which these neighborhood effects operate (see Harding et al., 2011), some evidence suggests the distribution, variety, and quality of institutional resources is a likely route (Leventhal & Brooks-Gunn, 2000; Small & McDermott, 2006; Xie et al., 2015).

Beyond the neighborhood advantage-achievement connection, much remains unknown about the role of institutional resources in youth's academic pursuits, and even more so with respect to STEM (Xie et al., 2015). Yet, the National Science Foundation advocates that informal learning spaces, such as those in neighborhood institutions, are fundamental to increasing equitable and culturally-relevant STEM learning (NASEM, 2011; National Research Council, 2009). Therefore, I review some brief history and then turn to the relevant research about the role of neighborhood institutional resources (e.g., libraries, museums, community organizations) to illuminate their potential in supporting STEM pursuits among Mexican immigrant children.

Neighborhood libraries, museums, and community organizations have a history of disseminating STEM knowledge (National Research Council, 2009; B. Spencer, 2016), so they remain critical to addressing STEM-learning pursuits to this day. Over decades, libraries shifted their goals to respond to national interests (e.g., supporting war efforts, returning soldiers), crises (e.g., Great Depression), cultural changes (e.g., voter education), and professional responsibility (Wiegand, 1999). For instance, during the 1950s Space Race between the U.S. and the former Soviet Union, libraries were fundamental to increasing mass public support and workforce participation in this national goal (B. Spencer, 2016). As libraries responded to the national and local demands, they used various strategies to expose communities to STEM learning opportunities that ranged in scope from encouraging construction of specialty library branches (Vekerdy, 2015), organizing events in partnerships with scientific organizations (e.g., NASA), to providing hands-on learning activities (B. Spencer, 2016). Libraries continue to engage their communities with relevant issues today, such as fostering skills necessary for STEM-literacy and promoting interests around the same (e.g., incorporating new technology; Institute of Museum and Library Services, 2020; Lawler, 2013)

In addition to STEM-specific support, some neighborhood libraries mitigate challenges that may hinder school achievement around language and homework help. In the sparse research about the role of libraries among Mexican American youth, well-staffed libraries fostered community social capital by transforming library spaces into tutoring centers, in which library staff or volunteers supported children with reading and homework year-round (De Souza, 2010; McChesney, 2019). Among children in families with low-income, this library service functioned to buffer against the well-documented summer achievement loss (De Souza, 2010; McChesney, 2019). Children from households with limited English proficiency also benefited via opportunities for language reinforcement which prepared them for the following schoolyear (De Souza, 2010). Together these academically oriented supports may combat school practices that can lead to disproportional rates of referrals of Mexican immigrant children into special education or remedial classes (Museus et al., 2011; Nieto et al., 2012; Valenzuela et al., 2012). This function is important for STEM pursuits because when youth get tracked into lower-level tracks or segregated classrooms, the likelihood of getting promoted to higher-level tracks later in the education pathway is rare (Burris & Garrity, 2008). In contrast, students in higher-level tracks are more likely to get a variety of opportunities and exposure to an engaging and challenging curriculum—conditions necessary for continued STEM pursuits (Burris & Garrity, 2008).

Although both libraries and museums provide a record of scientific history and use a creative array of strategies to engage with the public on important issues (Block, 2008), it is science museums and science centers that more quickly come to mind with regard to presentation of STEM content. Museums are able to afford creative undertakings and experimental strategies to quickly communicate science to communities (Norton & Dowdall, 2016). These practices have established museums as reliable sources of science education to growing numbers of families (Norton & Dowdall, 2016).

Beyond presenting reliable science content, contemporary museums and science centers devise their exhibits and demonstrations with accessible learning in mind. One example, the renowned Boston Museum of Science, constructed a center devoted to educating the public on current STEM issues, and did so through the use of multiple platforms (e.g., virtual platforms, live presentations; T. H. Davis, 2004). Coupling of different practices, including conversations with scientists and games, is intended to support long-term transfer of scientific concepts outside of the museum exhibit (Marcus et al., 2017). Many museums have followed suit to, essentially, turn their science museums into informal classrooms. Without the bounds of a standardized curriculum, museums create spaces where children learn and foster scientific curiosity and inquiry skills through play, their senses, and dialogue (Gutwill & Allen, 2012; Kelly et al., 2002; Root-Bernstein & Root-Bernstein, 2005; Tõugu et al., 2017). These practices suggest museums are far-reaching and influential sites for STEM learning; yet, ironically, their role in children's learning is not well understood or publicized (Block, 2008).

Although community organizations are quite variable in services, scope, and size, promising programs capitalize on various community assets to support students. Valla and Williams (2012) provided a rare review of STEM programs serving underrepresented populations of different age groups. The researchers noted a trend in the goals of these programs among elementary and middle school youth: a focus on maintaining youth's STEM interests and self-confidence in STEM through inquiry-based or hands-on experience using local context

(Valla & Williams, 2012). However, they found few statistically significant links between program components and program effectiveness among elementary and middle school youth. Valla and Williams (2012) suggested that these results may be related to too few evaluations and small sample sizes in the studies to adequately assess links to program effectiveness in promoting youth's STEM pursuits. In addition, the researchers propose that when studies focus on ethnically minoritized youth broadly, they may conceal differential associations across subgroups of youth (Valla & Williams, 2012).

Schueths and Carranza (2012) attempted to overcome this issue by examining links between community-based mentoring programs and program outcomes among Latinx youth at different developmental periods (from preschool to post-secondary school). They found that program effects were most consistently related to Latinx elementary school students' school attitudes, interests, self-esteem, among other social and behavioral outcomes (Schueths & Carranza, 2012). The authors highlighted there were too few studies assessing associations with academic outcomes among Latinx youth to provide meaningful results.

Part of the problem establishing links between community-based organizations and Mexican American youth's academic outcomes (even if not STEM-specific) is that some of the most important resources for youth may be overlooked. For instance, faith-based and religious institutions are indispensable contexts in the lives of many immigrant youth (Abo-Zena & Rana, 2015; Stanton-Salazar & Spina, 2003). In fact, in a study that examined the institutions involved in community-school partnerships, researchers found businesses were overrepresented whereas cultural, recreational, and faith-based institutions were substantially under-represented (Sanders, 2001). Yet, these institutional resources hold significant value for communities of color and immigrant communities because they emerged via the collective organization of communities;

thus, these institutions center their respective communities' values and broker instrumental and cultural capital (Abo-Zena & Rana, 2015; National Research Council, 2009).

In general, neighborhood structure and resources are overlooked as levers in the STEM pathway. Yet, libraries, museums, and community-based organizations attend to key aspects of youth's STEM pursuits. As described, libraries are multifunctional spaces that adapt to communities' needs and can support youth's achievement; whereas museums are often more affluent institutions, so can use various strategies to engage youth's interests and long-term learning. Finally, community-based organizations have potential for focusing on the needs of specific demographic groups through their services, but the empirical research on their efficacy is lacking. To date, there remains sparse systematic research investigating how neighborhood social structure and institutional resources may advance Mexican American youth's STEM pursuits (Valla & Williams, 2012; Xie, Fang, & Shauman, 2015). Bridging this gap in research can reveal potential policy-amendable targets that could support Mexican American youth.

Study Overview

Community contexts have long been overlooked as levers in the STEM pathway. Although schools remain important settings for learning a particular set of analytic and communication tools, communities play a profound role in the STEM pursuits and learning of Mexican American youth from immigrant families. Therefore, this dissertation aims to elucidate the contribution of some community features (neighborhood social structure and institutional resources), while explicitly accounting for schools, within the larger STEM learning ecology as depicted in Figure 1. In this dissertation, STEM pursuits are limited to middle school outcomes defined by youth's math and science achievement, teacher-reported Academic Rating-Scale

(ARS) scores, and youth's Self-Description Questionnaire (SDQ) Math Subscale score. For the purposes of this study, I limited the scope of my examination of communities to youth's neighborhoods (defined by their zip code) and investigated them with respect to their social structure (ethnic concentration) and quantity of institutional resources (science museums; libraries; education organizations; youth centers, clubs, and organizations [hereafter referred to as youth organizations for brevity]; organizations serving cultural, immigrant, and ethnic minoritized groups [hereafter referred to as cultural organizations for brevity]; religious and faith-based organizations [hereafter referred to as religious organizations for brevity]; and STEM-focused organizations). After testing associations between neighborhood social structure and institutional resources and youth's math and science outcomes, I assessed whether these associations differed for boys and girls to acknowledge the role of gender socialization in long-term STEM pursuits. Specifically, I address the following questions in my dissertation:

Research question 1 (RQ 1): *What is the relative contribution of neighborhood social structure and institutional resources to Mexican American youth from immigrant families' math and science outcomes in middle school, accounting for school structure and school-based resources?* I hypothesize that neighborhood social structure will not be associated with youth's math and science achievement scores, after accounting for school structure and school-based resources. However, I predict that, on average, there will be an association between higher levels of co-ethnic concentration, but higher scores on youth's SDQ math subscale, even after accounting for school structure and school-based resources. Institutional resources substantially vary in their distributions, thus my expectations around associations between the availability of institutions and youth's math and science outcomes differ somewhat by resources. I expected few neighborhoods to have science museums and STEM organizations; yet, I hypothesize that both science museums and STEM organizations will be positively related to youth's math and science outcomes, even after accounting for school social structure and school-based resources. As discussed in earlier sections, libraries and other non-profit organizations are influenced by local property taxes. Therefore, I expect that any associations between these institutional resources and youth's outcomes will be evident when controlling for background characteristics of families and neighborhoods. Notwithstanding this expectation, I hypothesize that the number of libraries and education organizations will have favorable associations with youth's math and science achievement and teacher-reported ARS scores, but no links to youth's SDQ math scores. In contrast, I predict that more youth centers, clubs, and organizations, cultural organizations, and religious organizations will be related to youth's higher teacher-reported ARS scores and SDQ math subscale scores; but they will not be related to their math and science achievement.

Research question 2 (RQ2): *Does gender moderate associations between contexts and Mexican American youth from immigrant families' math and science outcomes?* Given the research reviewed, I hypothesize that interactions between neighborhood social structure and institutional resources will be more favorable for boys' math and science outcomes, and less so for girls' math and science outcomes.

CHAPTER THREE: METHODS

Data

In this dissertation, I drew on data from the Early Childhood Longitudinal Study, Kindergarten Cohort of 1998-99 (ECLS-K) to which I appended publicly available data on schools to improve model estimation and on neighborhoods to investigate additional constructs. I briefly describe each of these data sources in this section and provide further details in *Measures*.

ECLS-K is a longitudinal study that investigated the learning environments of ~21,490[9] kindergarten students and a panel subsample through eighth grade (seven rounds of data collection; fall and spring of kindergarten, 1998-1999; fall and spring of 1st grade, 1999-2000; spring of 3rd grade, 2002; spring of 5th grade, 2004; and spring of 8th grade, 2007; Tourangeau et al., 2009).

Using a multistage probability sampling design, NCES/IES intended to select a nationally representative cohort of youth who were in kindergarten in 1998-99[10]. For the purposes of the ECLS-K study, representation primarily was focused on broad racial or pan-ethnic Hispanic identity categories of kindergarteners, rather than all identities within each racial or ethnic group. In the three following stages of the sampling design, race-ethnicity was considered along with several stratification or selection criteria. Across all stages, NCES/IES oversampled Asian and Pacific Islander children to meet sample target goals.

---

[9] Counts are rounded in accordance with NCES/IES reporting regulations

[10] Although children who entered elementary school during grade 1 may be part of the "freshened" cohort sampled by NCES/IES, these children were not included in the analysis due to my use of weights

First, counties or groups of counties, defined primary sampling units (PSU), were created that accounted for 1994[11] population estimates of five-year old children by race or pan-ethnicity (i.e., Latinx or Hispanic; Tourangeau et al., 2001). Of these, roughly 25% of PSU were selected due to their size alone; whereas the remaining ~75% were stratified by Metropolitan Statistical Area (MSA) designation, region of the United States, racial-ethnic concentration, and 1988 per capita income.

Next, schools were selected with a probability proportional to their weighted size (based on kindergarten enrollment) from each PSU; private and public schools comprised separate sampling strata. Schools that were not included in the Common Core of Data (CCD) record of public schools in the United States (i.e., newly operational in spring 1998; or run by the Bureau of Indian Affairs, the Department of Defense) were separately reviewed and added to the sampling frame as appropriate (Tourangeau et al., 2001).

Lastly, children were selected from schools. To meet the sampling goals of creating an approximately self-weighting sample of kindergarten children [with respect to race or Latinx or Hispanic ethnicity], children who identified as Asian and Pacific Islander children constituted separate sampling strata from youth of other race and ethnicities. Within these sampling frames, children had equal probabilities of selection regardless of exceptionalities or their language (Tourangeau et al., 2001). However, because the sample design did not explicitly seek to meet representation of all marginalized learners (e.g., children with physical, learning, language exceptionalities; children who are multilingual; children in highly mobile or migrant families),

---

[11] These data were the most up-to-date estimates at the time of the study design

these youth may be under-represented in the data unless they are over-represented within their racial-ethnic group and geographic region.

Information gathered on children comes from multiple sources (i.e., child assessments, interviews, teacher questionnaires, parent interviews, school administrator questionnaires, and observations). For children who were not yet proficient in reading English in kindergarten or first grade, they were permitted to skip reading assessments and were administered math assessments in Spanish. Parent interviews were administered in English, Spanish, or select other languages.

Direct child assessments included achievement tests and interviews. Assessments were reviewed to ensure they were developmentally appropriate and met national curriculum standards. Children received math achievement tests beginning in kindergarten; whereas science achievement tests were administered starting in grade 3. Child interviews began at grade 3 data collection and included questions about their perceptions of their abilities, interest in school subjects, and social interactions, and other experiences (see *outcomes* for more details).

Parents or guardians, teachers, and school administrators also were interviewed (Tourangeau et al., 2009). Parents or guardians described background information about their families and their children at each round of data collection. Teachers reported on youth's academic skill proficiency since kindergarten. Expectedly, these measures changed across years to reflect grade-appropriate national standards and were reviewed to follow educator guidelines. Teachers provided information about their background, teaching experience, classroom practices/pedagogies, and assessed sampled children at most rounds of data collection. Data from school administrators during spring data collection included information about the schools' student and staff demographic composition, institutional and fiscal resources, and organizational philosophies. Finally, study interviewers conducted systemic social observations of school-based resources (e.g., libraries, computer-labs), noting the availability and quality of the resources.

Attrition is expected in a longitudinal study, resulting in sample fluctuations across the seven rounds of data collection (see Tourangeau et al., 2009 for details). From the selected child sample in the first round (*N* ~ 21, 490 children), the unweighted response rate was ~92%. In the final round of data collection, grade 8, ~12,130 of the base year sample was still eligible for assessments; this group had a response rate of ~80%. Unweighted completion rates (response rates conditional on base year responses) at grade 8 for child assessments, parents, teachers, and school administrators were ~78%[12], 73%, 77%, 75-77%[13], respectively.

In addition to the comprehensive data NCES/IES compiled on youth's schools, I appended data from the CCD. These data are the primary record of public schools in the United States and provide annual information on primary and secondary education institutions (National Center for Education Statistics, n.d.).[14] Generally, CCD data include information on the sociodemographic composition of students, with attention to some student groups who may be marginalized in schools (students who receive free or reduced lunch; migrant populations), teachers, teacher-student ratios, and graduation rates. Several measures (e.g., %students receiving free and reduced lunch) were included in the imputation models to off-set the high percent of missingness that was expected from survey non-response.

With regards to the neighborhood data, I complemented the available information with additional sociodemographic information from the 2000 Decennial U.S. Census. In this way, key

---

[12] Some variation contingent on the type of assessment

[13] Variation across teacher questionnaire types and subject

[14] Given that the overwhelming majority of students are in public schools (vs private institutions) other databases were unnecessary

neighborhood covariates (i.e., concentrated advantage) and predictors (o-ethnic concentration) could be constructed. Data from the Internal Revenue Service (IRS) Business Master files, from the National Center for Charitable Statistics (NCCS) data archive was retrieved and merged with youth's geocoded neighborhoods (residential zip code tabulation areas). These data include classifications of non-profit organizations according to National Taxonomy of Exempt Entities codes and activity designations. As described in the *Measures*, organizations were chosen as focal neighborhood predictors that may be related to youth's achievement, teacher-reported proficiency, and self-efficacy.

Sample Design

This dissertation focused on Mexican American youth from immigrant families (children born in Mexico or children of immigrant parents). Given the focus on the intersection of Mexican and immigrant identities, Mexican-immigrant heritage was defined as individuals who were born in present-day Mexico. The "Mexican" and "immigrant" sub-sample was based on caregiver-reported responses to items about child's country of birth (reported during the kindergarten year), parent(s)' country of birth (reported during grades 1-5), child's Hispanicity (reported during the kindergarten year), and/or Hispanic group as Mexican/a or Chicano/a (question only available spring grade 1). Immigrant generation used the aforementioned countries of birth to designate an immigrant generation. Discrepancies that increased the sample size were coded as immigrant generation 1-2.

The sample for this study was created in two stages: an imputation sample and an analytic sample. The imputation intended to include Mexican American youth regardless of immigrant generation[15] and who had a non-missing value for the chosen panel weight (~900 cases). In the second stage, I limited analyses to Mexican American youth who were first and second immigrant generation and were part of the longitudinal sample (i.e., had a non-zero and non-missing panel weight) for the chosen panel weight (~670). In addition to these criteria, youth were included in either of these samples if they had at least one school and neighborhood ID (i.e., school identifier code, residential zip code tabulation area) across elementary school waves (rounds 1-5).

The same panel weight was used as criteria for both the imputation and analytic samples. This weight provided non-zero values in three circumstances: for children who had child assessment or interview data available for five of seven rounds of data collection (spring-kindergarten, spring-first grade, spring third grade, spring-fifth grade, and spring-eighth grade); children who were exempt from assessments due to exceptionality that could not be accommodated (e.g., blindness or deafness); or children who are missing child assessment data in kindergarten and first grade because they have not reached English proficiency according to the measure administered in the ECLS-K study.

Children who were exempt from assessments due to exceptionalities represent less than 1% of the full ECLS-K sample at grade 8. In most cases, children with exceptionalities were accommodated with alternative settings, scheduling or timing, health care aides, personal assistive devices, and assessments in large print formats (Tourangeau et al., 2009). Similarly, kindergarten and first graders who were proficient in Spanish but not English were provided

[15] Given that the item about Mexican heritage was asked only once and during grade 1, any caregivers who trace their child's heritage to Mexican ethnic groups may be not be captured in the imputation sample. However, in such case, their attrition from the study would also exclude them via the panel weights.

math assessments in Spanish. Child assessments, however, were not available in languages other than English or Spanish. In third grade and beyond, assessments were given to all sample youth in English without screening for English-proficiency, so weights did not have to adjust for multilingual youth during these years.

It should be noted that although the use of panel weights is important to account for the design effects and correct for sample attrition, it is another way by which some vulnerable youth are excluded from representation in the analysis. In particular, youth in highly mobile, migrant, or families with mixed, undocumented, unauthorized entry may be substantially under-represented in this study because of the likelihood of missed school (Alcantara, 2013). In addition, analytic sample criteria excludes children who are home-schooled.

Youth in the analytic sample attended ~220[16] different schools with up to *n* ~20 youth per school (*M*= 3.05 [2.84]) youth per school). Each school drew on youth from up to four different neighborhoods. The majority of these schools only include youth from one neighborhood (*n* ~170; 76%). Approximately 19% (*n* ~40) of schools enrolled students from two neighborhoods, and the remaining schools include student populations that came from three or four neighborhoods.

Turning to the neighborhoods, students lived in ~250 different neighborhoods with up to ~20 youth per neighborhood (*M*= 2.69 [3.10] youth per neighborhood). The majority of these neighborhoods had youth in one school (*n* ~220; 88%). The remaining neighborhoods included youth who fed into two different schools (~10%; *n* ~20 neighborhoods) or even into three or four schools (2% neighborhoods). Because schools do not show that they draw on youth from a single

---

[16] Note rounding of clusters and sample counts per NCES/IES regulations to prevent inadvertent disclosure

neighborhood and neighborhoods do not funnel youth to a single school, the absence of this pattern indicates the nesting structure is *not* perfectly hierarchical. Rather, the contexts that youth are nested in are crossed. Therefore, it appears that the data are well-suited for a cross-classified analysis to investigate the research questions.

Measures

Operationalizing contexts. Because the measures and analyses undertaken in this study accounted for context and were generally time-invariant, youth had to be nested or linked to a single school and neighborhood. Youth's schools were defined by their first geocoded school ID, but an indicator was included to flag a change in schools across elementary school waves. Neighborhoods were operationalized by youth's first non-missing residential zip code tabulation area (ZCTA). For ~90% of the analytic sample, this first ZCTA was from fall kindergarten; for ~10% of youth, the ZCTA is from spring kindergarten; any remaining cases[17] had this linking ZCTA based on data from grade 1. Similar to schools, an indicator was included in the analyses if youth changed ZCTA between waves.

Youth, family, and locale covariates. Full statistical models included a host of covariates related to youth characteristics that account for selection bias, or families' constraints and affordances in choice of schools and neighborhoods; and individual or contextual characteristics linked to youth's achievement (Leventhal et al., 2015; Leventhal & Dupéré, 2019). Generally, covariate data were collected during the kindergarten year (wave 1 and 2).

Youth's characteristics included age at kindergarten entry (years), gender (girl = 0; boy = 1), and exceptionality (based on the ECLS-K composite of several types of exceptionalities

---

[17] Value redacted in accordance with NCES/IES sample reporting guidelines

[learning, activity, communication, hearing, vision, socioemotional]; no = omitted referent; yes = 1). Family characteristics included mother's age at first birth (years), family composition (two-parent household [no = 0; yes = 1]; siblings [no = 0; yes = 1]), and highest level of education of parents (3 levels: less than high school, high school degree or equivalent [omitted referent], and more than high school). Three additional covariates captured family or household socioeconomic circumstances: at least one full-time working parent (no = 0; yes = 1), whether anyone in the household received public assistance in the past 12 months (no = 0; yes = 1), and income-to-needs ratio (ratio of the household income to the poverty threshold based on household size and year). Also, to account for possible role modeling within the family a covariate was included about parents' occupation. Specifically, whether either of youth's parents were employed in a STEM field (no = 0; yes = 1). STEM field designation followed the coding described in Bowden et al. (2017). Family residential mobility during early childhood was designated by places lived from age 4 months to end of grade 1 based on data from fall and spring grade 1 (child lived $\leq$ 1 homes = 0; child lived in $\geq$2 homes = 1; Anderson et al., 2014; Leventhal, 2018). Lastly, a Spanish-English language index aimed to capture bilingualism and language preference (National Academies of Sciences, Engineering, 2018; Rumberger & Larson, 1998; Stanton-Salazar & Dornbusch, 1995). Youth's The index was of the average of nine items reflecting the languages within home, parent(s)/ parent-figures proficiency with English, youth's language to parent(s), and parents' interview language. It was rated on a 5-point rating (1 = *Spanish-language household*, ~ 3 = *bilingual/ multilingual household*, and 5 = *predominately English-language household*) and then lower-limit centered for analysis (α = .96).

Lastly, to account for the sampling design, Mexican American families' residential patterns, and differences in educational and labor market demands, I included covariates for region of the country (dummy coded: West [omitted referent], South, and Other (Northeast, Midwest) and urbanicity (city = omitted referent; suburb/rural = 1). Groups were collapsed due to small within-group sample sizes.

School covariates. Youth's school characteristics accounted for the school climate via youth's belonging (i.e., student composition) and social evaluative theories (e.g., frog pond effect; Crosnoe, 2009) that are linked with achievement. Student compositional variables draw from school administrator reports during the spring kindergarten survey. Covariates included school sector (public = 0, private = 1), percent of youth receiving free or reduced lunch, percent of students identifying as Hispanic, and percent of multilingual youth in school designated "Limited[18] English Proficiency (LEP)."

Neighborhood covariates. Concentrated community advantage was selected to account for neighborhood socioeconomic conditions due to its well-established empirical and conceptual association with achievement (Anderson, Leventhal, & Dupéré, 2014; Leventhal & Dupéré, 2019). ZCTA-level data from the 2000 United States Census were merged with youth's neighborhood clusters (described earlier) to create a factor score of using principal factor analysis with regression method. The factor score was comprised of three items (based on percent of households with income ≤ $75K, percent of residents age 25+ with a BA or higher, and percentage of residents age 16+ employed as professionals/mangers), which had high inter-item correlations (range r = [.73, .94], Cronbach's alpha α= .92. Other covariates were considered (e.g., %residents in STEM, concentrated disadvantage factor, %residential stability),

[18] This is a designation schools place on students learning multiple languages. However, it should be noted this is grounded in deficit-perspectives of multi-lingual learners and centers English, rather than welcomes multilingualism (Beatty et al., 2021). In addition, it ignores the reality that language-learning is a process.

but had high correlations with concentrated community advantage (e.g., %residents in STEM and community advantage r >.90).

School predictors. Youth's social and school-based resources were included as the focal school variables. School social structural variables reflected teacher composition based on school administrator reports during kindergarten (collected during the wave 2 data collection). These variables included percent of Hispanic teachers[19] and bilingual teachers (i.e., English-as-a-Second Language (ESL) or bilingual instruction teachers) and the number of classroom support personnel (full-time or part-time equivalent staff). Other forms of social structure variables were considered, but the selected variables were chosen based on items that had the least missing data and would provide the most stable estimates in imputation and regression models. In addition, changes to school administrator questionnaires prevented identifying the relative proportion of teachers or aides who support bilingual or ESL classrooms to the school's overall teacher population.

The availability and quality of school libraries and computer labs are promising for cultivating youth's interests and engagement, but the research is insufficient. School-based resources were evaluated by NCES/IES interviewers at youth's schools using SSO. They include library and computer lab quality index. Both quality indices consisted of eight items (e.g., lighting in the space adequate) on which interviewers rated the resource as not adequate = 0; or adequately meets need =1. The final index scores were summed across the items. Both the library quality index internal reliability (Cronbach's alpha α = .93) and the computer lab quality index had high internal reliability (Cronbach's alpha α = .99).

---

[19] Data on percent of Hispanic teachers at grade 5 is not available from ECLS-K, but available from CCD

Neighborhood predictors. Similar to school characteristics, neighborhood focal predictors included social structure and institutional resources.

Neighborhood social structure approximated co-ethnic concentration via a factor score created using three variables from the United States 2000 Census: the percent of residents who are Hispanic or Latino; percent of residents who are foreign-born; and “linguistic isolation,” which is termed as the percent of households that speak a language other than English in their household (Siegel et al., 2001). The three census items had high internal reliability (Cronbach alpha $\alpha = .93$).

Then, seven neighborhood institutional resources were tested to investigate their contribution to youth’s math and science outcomes. For purposes of this study, I proxy the number of a particular neighborhood resource (i.e., availability) as access to the services and programs that may be offered. Although this strategy has its limitations and will be discussed in later sections, this approach provides a first step in the investigation of the contribution of these resources.

I focus on the availability of seven non-profit organizational categories (science museums, libraries, educational organizations, youth centers, clubs, and organizations; cultural organizations; religious organizations; and STEM-focused organizations (excluding museums) based on data aggregated from the NCCS for years 1998, 1999, and 2000 (see Table 4 for correlations across years by institutional resource). Organizational categories were created in several steps. Most important, I relied on the designations from the National Taxonomy of Exempt Entities (NTEE) major group (e.g., B = education). Then I selected key NTEE activity classification code that may be pertinent conceptually to the category (NTEE-CC; e.g., 94 = remedial reading and encouragement). Next, I filtered the results with the IRS subsection codes (e.g., 03 = Religious, educational, charitable, scientific, and literary organizations). Additional steps were undertaken for some categories to confirm their relevance (i.e., visual inspection, exclusion/inclusion of specific IRS codes, use of STEM-relevant key words).

In the final stages, I adjusted for influence of large organizations that may function as multi-site networks by retaining one record per NTEE-CC from organizations with the same name within the same zip code. The particular resource quantities were summed by zip code; merged to youth's neighborhood for the respective year; and averaged across years for each youth.

To reduce the number of resources considered, I examined the correlations across all categories and factored or aggregated groups, as necessary. I checked variable distributions, and skewed and kurtotic distributions were trimmed (i.e., winsored) at the 99th percentile to reduce the influence of extreme scores (e.g., see Trussel & Patrick, 2012).

The final set of institutional resources included the following:

Quantity of science museums. These institutions were coded to be representative of science museums, discovery centers, and children's museums, which include age-appropriate interactive activities that build exploration and inquiry skills.

Quantity of education-serving organizations. These organizations were coded to include organizations that provide educational activities, advocate for students and families (PTA, PA, PTO), provide curriculum support, and improve educational conditions; but do not include the formal primary and secondary schools, and universities and colleges. However, the activities of the organizations (i.e., PTA) included often involve coordination with schools (i.e., PTA). For a select set of codes, string search was used to determine if they were more appropriate for the library category. In addition, given the age of the children, preschools and daycares were included in this group.

Quantity of libraries and affiliate groups. These institutions were primarily general libraries, which provide services and adapt to their communities' needs (in contrast to topic-specific libraries that may have more narrow missions). This coding included library groups that raise funds to improve the quality and quantity of resources and services (e.g., Friends of the Public Library).

Quantity of youth-serving organizations, clubs, and community centers & community recreational centers and groups. This category identified organizations that worked directly with youth, but may focus on youth's development more broadly. These organizations also may provide a network of adults from the community (e.g., adult & child matching programs). In addition, this category included community-serving resource codes (e.g., neighborhood centers, camps, clubs [such as 4-H]), which were combined to make a youth organization factor.

Quantity of organizations that serve ethnic-cultural, immigrant, and minoritized populations. This group included organizations that may act as cultural brokers, including organizations that advocate for minoritized populations and intersectional issues (e.g., organizations whose activities are classified as minority rights, immigrant rights)

Quantity of religious and faith-based organizations. These organizations included institutions of any denomination or faith

Quantity of STEM-focused non-profits. This category included organizations that shape an opportunity structure for youth, reflect a network of professionals and role models that may serve to promote youth's interests (e.g., science advocacy) and provide experience via internships or youth employment.

Outcomes. I use measures of math and science achievement and self-efficacy in middle school (grade 8). The measures discussed have been used with diverse samples, but less often with Mexican American youth from immigrant families.

Math and science achievement. Two forms of achievement: child assessments and teacher-reports are used. Child assessment scores were drawn from the direct cognitive assessments, which were developed for ECLS-K with the consultation of experts involved in the National Assessment of Educational Progress and national curriculum review (Najarian et al., 2009). ECLS-K assessment batteries are analogous to assessments administered in other longitudinal surveys (e.g., National Educational Longitudinal Study; NELS:88; Najarian et al., 2009).

The child assessment scores were provided in multiple forms. Standardized T-scores were chosen because they allow for score comparisons between individuals (Najarian et al., 2009). These scores are rescaled from item-response theory-based scores that produced theta estimates, which are estimates relative to the population (Najarian et al., 2009).

In addition, I included teacher-report of children's academic discipline proficiency. These evaluations provide a different perspective on the child's achievement. These data were collected from children's grade 8 math or science teachers, who were asked to complete the Academic Rating Scale (ARC; Robinson & Lubienski, 2011) to assess student's progress on six (for science) or seven (for math) domain-specific skills (e.g., ability to apply mathematical/science concepts to "real world" problems) on a 5-point rating scale, from 1 = "poor" to 5 = "outstanding."

Responses from the math or science were combined into one variable to eliminate the designed missingness (compared with completely at random). To offset this procedure, I also incorporated an indicator for whether the reporter was a math or science teacher. Both math and science subscales had high internal reliability (Cronbach's alpha α = .96, .96, respectively).

Self-efficacy in math. This outcome draws on items about interest and competence in math coursework and classes from the Self-Description Questionnaire II (Marsh, 1992) in which students responded to 16 statements. I used the four-item math subscale of this set of questions (e.g., I enjoy doing work in math) on which youth responded to a 4-point rating scale, from 1 "not at all true" to 4 "very true" (Cronbach's alpha α = .90).

Analytic Plan

Data preparation. Preparatory steps included appending data sources together and conducting preliminary data exploration on variable missingness and correlations among constructs of interest. Additional variables were chosen to serve as auxiliary variables to improve estimation during the multiple imputation procedure (Enders, 2010).

Multiple imputation was performed in R using the Multivariate Imputation by Chained Equations ('mice') package, which uses available data to estimate distributions from which missing estimates are selected for each multiply imputed dataset (van Buuren, 2015). Imputation parameters (i.e., iterations, quantity multiply imputed datasets) were adjusted based on examination of convergence patterns. In addition, predictive matrices and method of imputation was adjusted based on variable relationships (i.e., collinearity, auxiliary, circular reference for items within scales). Sample design weights could not be used as intended with the analytic approach and software. Therefore, they were used as variables in the imputation and contributed to model parameter estimation.

Following the imputation, the multiply imputed data were inspected, and re-centered, binned, and transformed, as necessary.

Model Building Procedure

In this study, I employed cross-classified models, a specific type of multilevel regression that accounts for imperfect and multiple hierarchical data structures (i.e., children sampled from schools and neighborhoods, in tandem). Imperfect hierarchies may occur when children do not attend the neighborhood school because they have multiple schools in their neighborhood, or their neighborhoods use school-choice policies or lottery systems (Cafri et al., 2015). Therefore, these models allow researchers to model children's reality more accurately than in other types of models. Because these models simultaneously estimate associations within two contexts, they should improve the precision of standard errors and may reduce over-estimating the contribution of any single context (Shi et al., 2010). In the following section, I detail the key stages of the model-building procedure undertaken.

Unconditional models. In the first stage of the model building procedure, I estimated three sets of null models predicting each of the grade 8 outcomes to ensure there was sufficient variation at each of the context levels (neighborhood, school) and partitioned in the crossed-classified model. Variation at the context levels, or intra-class correlations, was compared across the two-level hierarchical model and the cross-classified model to ensure the model structure for estimation was appropriate for the data. Based on these results, I determined that math and science achievement could be modelled as cross-classified models, but teacher-reported ARS and youth's SDQ math scores required "perfectly" nested multi-level models due to the little between-level variance. (Detailed results of the null models is elaborated in the results).

Next, I executed the preliminary multilevel models, which included (one focal neighborhood predictor) to determine if there was any association between neighborhood social and institutional resources and youth's math and science outcomes. Then I modelled the neighborhood predictors together to evaluate joint distributions. Then, I addressed research question 1 with main effects multivariate models that included covariates (child, family, locale, school and neighborhood covariates) and school social structure and school-based resources. These models contributed to explaining any spurious association in the STEM outcome that may have existed with the single predictor models.

To address the second research question, whether gender moderates associations between neighborhood social structure and institutional resources and Mexican American youth's outcomes, interaction terms (focal neighborhood predictors and binary gender) were added to the regression models for research question one.

Significance level adjustment. In this study, I focused on eight focal neighborhood predictors (one social structure and seven institutional resources). Given that I tested multiple joint hypotheses, my analyses were susceptible to type 1 error, falsely rejected the null hypotheses and identifying a significant result. Therefore, to deal with this issue, I adjusted the significance level using the Hochberg adjustment. In this approach, observed p-values are first ranked by their magnitude from smallest to largest. Then, the nominal significance level (α = .05) is adjusted for the rank-ordered i^{th} hypothesis such that:

$$\alpha_i' = \frac{\alpha}{m - i + 1}$$

where m = the number of joint hypotheses tested; I = the rank-order of the hypothesis test. Then, the observed p-value for the focal neighborhood predictors was compared to the respective adjusted significance level. In the Hochberg approach, comparisons begin with the largest observed p-value and conclude with the hypothesis test in which the null is rejected at the adjusted significance level. Any smaller p-values are interpreted as below the adjusted significance level (Chen, Feng, & Yi, 2017). The Hochberg approach is considered less conversative than Bonferroni and Dunn-Sidak corrections and more powerful than the Holms approach. In the Results chapter, I present significant results using the adjusted error rate (see Tables for both adjusted and unadjusted results).

CHAPTER FOUR: RESULTS

In this chapter, I first describe the sample characteristics. Then I discuss results of the quantitative secondary data analysis about the relative contribution of neighborhood social structure and institutional resources, accounting for the contribution of school structure and school-based resources for Mexican American youth in immigrant families (RQ1). Finally, I present results about whether gender moderates associations between neighborhood social structure and institutional resources with youth's math and science outcomes (RQ2).

Analytic Sample Descriptive Statistics

In the following section, I describe the resultant background, family, school, and neighborhood characteristics of youth who make up the analytic sample (see Table 2 for child-level sample descriptive statistics; see Table 3 for context-level descriptive statistics). Note, all counts are rounded to adhere to NCES/IES data privacy regulations.

This dissertation investigated the long-run (grade 8) math and science outcomes of the longitudinal panel; therefore, it included children who were enrolled in kindergarten in 1998 during either fall or spring, with a mean age of 5.4 years old (SD = 0.377 years; range = 3.1-6.8 years old). The Mexican American youth from immigrant families in the sample included first-generation immigrant youth (born in a country outside the United States) and second-generation immigrant youth (born in the United States to a parent who was born outside of the United States). The vast majority (~88%) are second-generation immigrant and are bilingual $M = 1.8$ (SD = 1.18; range = 0-4) according to the Spanish-English language scale. A small percentage of children had documented and/or parent-reported exceptionalities (i.e., learning, activity, communication, hearing, vision, socioemotional; $n = 8\%$). In most situations, youth were provided with accommodations (e.g., alternative settings); whereas in instances when youth could not be accommodated, they were permitted to skip particular assessments.

In general, the majority of youth lived in two-parent families (*n*= 570; 86%) with siblings (*n*= 590; 88%) in their kindergarten year. Approximately a third of these youth had parents whose schooling would equate to high school completion (*n*= 210; 31%), and one-fourth of the youth had a caregiver who continued schooling beyond high school (*n*= 180; 26%). In their homes, at least one caregiver was working full-time (*n*= 560; 84%) and roughly 11% had at least one caregiver working in a STEM field[20]. Mothers were identified as working in STEM disciplines more often than fathers (6.8%, 5.3%, respectively). On average, youth's families were on the low end of the economic spectrum, with an average income-to-needs ratio *M* = 1.5 (SD = 1.44; range = 0-20.6), signifying incomes 150% of the poverty threshold or low-income. The majority of youth resided in the West (*n* = 410; 61%) and in cities (*n* = 450; 67%).

The sample of Mexican American youth from immigrant families overwhelmingly attended public schools (*n* = 92%). On average, youth attended schools in which just over half of the students were eligible for free or reduced lunches (*M* [SD] = 58.06[33.07]), 41% of the student population identified as Hispanic, and almost one-quarter of students were designated as "LEP" (*M* SD] = 22.83 [25.46]). Statistically, this sample of youth attended schools that had somewhat smaller Hispanic student population than other Hispanic peers in 2000 (Pew Research Center, 2021); and according to more recent standards, their schools were hyper-segregated with high numbers of multilingual youth (Department of Eduation, 2017). On average, youth's schools employed under a fifth of teachers who identified as Hispanic (*M* [SD] = 17.6[24.00])

[20] Based on the STEM designation described in the method section, similar to Bowden et al., 2017

and staffed less than 10 teachers and aides for ESL classes (*M* [SD] = 7.68 [13.34]). Lastly, youth's schools scored high on the resource quality index for libraries and above average, yet variable, on computer lab quality according to interviewer observations.

Youth's neighborhoods showed some variation on socioeconomic and demographic indicators. Their neighborhoods ranked somewhat low to average on the concentrated advantage factor score [relative to the full Mexican American population] (factor *M* = 0.48, *SD* = 1.21) and somewhat low on the neighborhood co-ethnic concentration factor score (*M* = -0.41, *SD* = 1.00). In general, it was uncommon for youth's neighborhoods to have science museums (13% had at least one science museum across three years), more than one library (7% had more than one library across three years), or more than a couple of organizations that served cultural, immigrant, and minoritized groups (*M* = 2.25, *SD* = 2.77). However, their neighborhoods had several education organizations (*M* = 4.97, *SD* = 3.71) and a sizeable number of religious and faith-based organizations (*M* = 12.48, *SD* = 9.46). The average resource factor scores for youth organizations, centers, and clubs and factor score of STEM organizations centered around approximately zero and standard deviation of one because of standardization, but were right-skewed, meaning that within the range of scores, the majority of neighborhoods had few numbers of organizations that made up the factor and resulted in lower factor scores.

Of note, youth's math achievement scores in grade 8 were roughly one-third a standard deviation from the standardized national average (*M* = 46.76, *SD* = 9.12); whereas youth scored roughly two-thirds below the standardized national average at the kindergarten assessment. Youth's science achievement scores in grade 8 were roughly half a standard deviation from the standardized national average (*M* = 45.23, *SD* = 8.96); whereas youth scored seven-tenth below the standardized national average during the grade 3 assessment. There were no standardized national averages for the other outcomes. Youth's average for teacher-reported ARS scores was one third of a standard deviation below the scale middle. Youth's average for SDQ math scores were at the scale middle. Correlations among the outcomes were small to high (ranging .19-.76). Expectedly, math and science achievement were most correlated with each other (r = .76) and SDQ math scores were the least correlated with other outcomes. Diagnostic plots of model residuals generally showed that data met statistical assumptions of normality. As might be expected given the ECLS-K study design and that outcomes were measured in schools, schools had more variation in model outcomes than neighborhood contexts.

RQ1: Contribution of Neighborhoods Accounting for Schools

Unconditional models: confirming modeling approach. Intraclass correlations (ICC), which quantify (ρ [rho]) the proportion of between-cluster variance to total variance (Aguinis, Gottfredson, & Culpepper, 2013; Snijders & Bosker, 2012), were calculated for each outcome using unconditional models for "perfectly" nested hierarchical models and for CCRE models. Alternatively, these correlations can be interpreted as the similarity between students from the cluster (school, neighborhood, school and neighborhood; Aguinis, Gottfredson, & Culpepper, 2013). The ICC for the "perfectly" nested MLM—ranged from 4.2% to 10.3% across all of the outcomes—indicating sufficient variance between clusters (either school or neighborhood) for a multilevel modeling approach. However, the ρ differed based on the clustering unit used in the hierarchical model. Math achievement, science achievement, and teacher-reported ARS scores had higher ρ when the clustering unit was the school (10.1% vs 9.0%; 12.0% vs 10.3%; 5.8% vs 5.2%, respectively); whereas the ρ for youth's SDQ math scores was higher when the clustering unit was at the neighborhood (4.2% vs 1.8%).

In the CCRE models, ICCs were calculated for school, neighborhood, and the crossed classification (schools and neighborhood), when possible. Achievement and ARS score models converged; whereas, the model estimating SDQ math scores did not converge, so no ICC could be calculated. The ICCs revealed that between-neighborhood variation was 2.1% for math, 0.2% for science, and 0.05% for ARS scores. The ICCs showed between-school variation for math, science, and ARS scores of 8.3%, 11.9%, 4.5%, respectively. The variation for the crossed classification was expectedly highest (10.4%, 12.1%, and 4.6% for math, science, and ARS scores, respectively).

Given the results of the ICCs, the math and science achievement outcomes were estimated as CCRE models. The ARS was estimated using “perfectly” nested hierarchical models clustered by school because in both the “perfectly” nested MLM models and CCRE models, there was more variance between schools than between neighborhoods. Importantly, the ICC of the ARS scores with CCRE models showed that too little variance was at the neighborhood-level (0.05% compared with 4.5% variance between-schools). In line with the rationale for ARS scores, models estimating SDQ math scores were modelled as “perfectly” nested hierarchical models clustered by neighborhood because more variance was revealed between neighborhoods than between schools in the MLM models.

Main effects of neighborhood and school social structure and institutional resources. In the first step to address RQ1, math and science outcomes were regressed on each focal neighborhood predictor (social structure or institutional resource) independently according to the model structure determined in the previous step. Then, simultaneous models with all focal predictors were estimated. The final step incorporated covariates into the model. I present the results of each in turn, by outcome. In the following sections, I present significant results only.

Youth's math achievement. In the univariate CCRE models, there was a significant association between fewer libraries in the neighborhood and youth's higher math achievement scores (see Table 4). This univariate CCRE model had an R^2=.017, which can be interpreted as 1.7% of the variance in youth's grade 8 math achievement scores is explained by the number of neighborhood libraries. Yet, they explained ~11% of the neighborhood variance and ~21% of school variance in youth's math achievement scores. The global[21] effect size, f^2, for the model was small according to Cohen's (1992) guidelines.

The simultaneous model with all of the neighborhood predictors failed to converge. However, the model could be estimated without the social structure (i.e., neighborhood ethnic concentration, which accounts for 73% of the between-neighborhood variance in youth's math achievement). In the simultaneous model without ethnic concentration, neighborhood institutional resources explained 2.8% of the variance in youth's math achievement, considered a small effect. These neighborhood resources explain roughly 18% of the neighborhood level variance in youth's math achievement.

As was evident in the reduced models and by the small between-level variance at the neighborhood level, CCRE models of youth's math achievement necessitated that only one focal predictor was entered into the model with covariates, school social structure, and school-based resources. There were no statistically significant associations between neighborhood social structure and institutional resources and youth's math achievement, beyond school social structure and school-based resources. Yet, in each of these eight models, greater school library quality was associated with youth's higher math achievement.

---

[21] Global effect size and local effect size are equivalent in univariate models

Youth's science achievement. In univariate CCRE models, results showed that higher neighborhood ethnic concentration was associated with youth's lower science achievement scores (see Table 5). This univariate CCRE model had an R^2=.019, which can be interpreted as 1.9% of the variance in youth's grade 8 science achievement scores is explained by the neighborhood ethnic concentration. Although it added variance to the neighborhood level, it explained ~12% of school variance in youth's science achievement scores. The global[22] effect size, f^2, for the model was small. In the model with neighborhood social structure and institutional resources estimated simultaneously, they approximated 3.6% of the variation in youth's science achievement scores, generally reflecting a small effect size. However, these neighborhood predictors explain all of the neighborhood-level variance in youth's science scores. Results echoed the separate models, such that neighborhood ethnic concentration was unfavorably associated with youth's science achievement scores (see Table 8).

As with math achievement, CCRE models of youth's science achievement necessitated that only one focal predictor was entered into the model with covariates, school social structure, and school-based resources. There were no statistically significant associations between neighborhood social structure and institutional resources, accounting for covariates and school social structure and school-based resources. There were no statistically significant associations between school social structure and school-based resources and youth's science achievement, either.

Teacher-reported ARS score. In the "perfectly" nested MLM univariate models, no significant associations between teacher-reported ARS scores and neighborhood social structure

[22] Global effect size and local effect size are equivalent in univariate models

and institutional resources emerged. In the model with the neighborhood social structure and institutional resources estimated simultaneously, no resources showed statistically significant associations with youth's teacher-reported ARS scores.

Building on the univariate models, the next set of models had focal predictors added separately and simultaneously. In these separate models, no statistically significant associations for neighborhood social structure or institutional resources emerged. Across these eight models, higher computer lab quality was associated with youth's lower teacher-reported ARS scores after accounting for covariates. In the simultaneous model, there were no neighborhood social structure or institutional resources that showed statistically significant associations with youth's teacher-reported ARS scores. However, higher school computer lab quality was associated with youth's lower teacher-reported ARS scores.

Youth's SDQ math score. In the "perfectly" nested MLM univariate models, associations between youth's SDQ math scores and neighborhood social structure and institutional resources were non-significant. In the model with the neighborhood social and institutional resources estimated simultaneously, they jointly explained roughly 2.8% of the variance in youth's SDQ math scores, which corresponds to a small effect. Yet, the neighborhood social and institutional resources explain 74% of the between-neighborhood variance in youth's SDQ math scores. Results showed no statistically significant associations between youth's SDQ math scores and neighborhood social structure and institutional resources.

Estimation for youth's SDQ math scores built on the univariate models with neighborhood focal predictors added separately and simultaneously to the covariate models. In the separate and simultaneous models, no statistically significant associations between neighborhood social structure or institutional resources with youth's SDQ math score were evident. There also were no statistically significant associations between school resources and youth's SDQ scores.

RQ2: Moderating Role of Gender

Similar to RQ1, addressing RQ2 involved a two-step procedure. First, reduced models were estimated to reveal any evidence of gender moderating associations between school and neighborhood social and institutional resources with youth's outcomes. Then, full models with covariates intended to show if the significant interactions remained or emerged when background characteristics were controlled. I present the results of each in turn, by outcome. All models built on the model structure described in earlier steps (i.e., math and science achievement estimated with CCRE models; ARS score estimated clustered at the school level; and SDQ math score estimated clustered at the neighborhood level).

Youth's math achievement. For math achievement, no significant interactions with neighborhood or school predictors were found in the reduced or full models.

Youth's science achievement. For science achievement, no significant interactions with neighborhood or school predictors were evident in the reduced or full models. Moreover, several of the reduced models failed to converge, including the models with interactions with neighborhood libraries, STEM organizations, and computer lab quality. These full models, however, converged.

Teacher-reported ARS score. No significant interactions with neighborhood or school predictors emerged for the ARS score models in the reduced or full models.

Youth's SDQ math score. Again, in both the reduced and simultaneous SDQ math score models, there were no statistically significant interactions between youth's gender and neighborhood or school predictors.

CHAPTER FIVE: DISCUSSION

Although youth's math and science learning is relational, context-dependent, and spans across physical settings, the breadth of empirical research presents a narrow scope of the settings and dynamics in which many youth actually learn (National Research Council, 2009; Xie et al., 2015). Neighborhoods, the physical setting of youth's communities, are underestimated settings whose potential strengths can be harnessed to support youth's math and science learning (TIES/STEM Learning Ecosystem Community of Practice, 2021). Moreover, overlooking neighborhoods, or communities more broadly, in youth's STEM learning is particularly costly in terms of establishing inclusive STEM fields because it fails to acknowledge that many youth of color may experience marginalization in schools (National Research Council, 2009). As such, in this dissertation, I built on research that addressed these gaps. Drawing from a nationally-representative sample of kindergarteners from ECLS-K, I investigated the neighborhood social and institutional resources that may be related to Mexican American youth's math and science middle school outcomes. Then, I examined whether associations between neighborhood resources and youth's STEM outcomes differed for boys and girls. In this chapter, I provide interpretations of the results, which by in large were null, but also highlight important directions for future research, practice, and policy in supporting and understanding math and science outcomes among a large and influential segment of the population, Mexican American youth from immigrant families.

Interpretations of Findings

This section describes results about the relative contribution of neighborhood social structure (co-ethnic concentration) and institutional resources (science museums, libraries, education organizations, youth organizations, religious organizations, and STEM organizations), to the middle school math and science outcomes of Mexican American youth from immigrant families accounting for the school context.

Social (Not Relational) Structure

I generally hypothesized that co-ethnic concentration would provide Mexican American youth with social capital and access to role models that would benefit their self-efficacy—but not math and science achievement—net of neighborhood advantage. Contrary to my expectations, there was no evidence that neighborhood co-ethnic concentration was associated with youth's math and science outcomes, net of background characteristics. There are several reasons that may help to explain why neighborhood social structure was not associated with youth's outcomes as anticipated. These reasons highlight that the social structure may not reflect trusting relationships and networks in neighborhoods, which is where the historic power of "community" is thought to lie, or be related to issues of access. The following section delves into these possible mechanisms further.

Families' Fears and Choices. No statistical association between the neighborhood social structure and youth's math and science outcomes may reflect families' filtering processes. Immigrant parents may struggle to help their children access existing social capital in the social structure because of their fears or concerns navigating unfamiliar socio-cultural landscapes. For instance, in areas with community violence or conflicts with police, parents may choose to limit children's exposure to their neighborhoods as an active strategy to protect their youth (Coates, 2015). Safety may be a key reason that parents choose to curb access to the neighborhood social structure, especially given the age of their children in ECLS-K. Hence, the null association to youth's math and science outcomes may be conflated by families' concerns and choices around safety.

Instead, parents may utilize this period of children's development to reinforce cultural values within the home; and thereby, suggesting contexts such as the family and home more significantly predictive of outcomes during this period. Whereas mothers primarily aimed to reinforce [educational] values within the home during middle childhood, they reduced this form of support and promoted resource seeking within the community in adolescence (Bhargava et al., 2017). Yet, the social structure characteristics were measured during middle childhood, so any associations of social structure for youth's outcomes were not evident in this dissertation. Thus, even in the presence of a particular social structure, parents may provide youth with little exposure to the neighborhood social structure explaining the lack of statistical association (Harding et al., 2011).

Aside from concerns, another way families may filter youth's STEM not establish relationships within the social structure is through their own perception of the neighborhood social structure. In Marrow's (2011) ethnography of Hispanic families in new residential locales families' connectedness to their community was not necessarily based on the co-ethnic composition of the neighborhood. Social structure interacted with family, urbanicity, and other contextual characteristics in complex ways. For instance, families may not have interacted with the social structure based on their perception of "friendliness" in their communities. Similarly, Yahirun et al., (2015) found that youth's connection to the social structure was not necessarily related to neighborhood social structure, but shaped largely by ethnic identity and processes within families and among family members. Therefore, aligned with some past research, no simple association between social structure and youth's outcomes may be present.

As further evidence of the complexity in understanding neighborhood social structure, it is important to note that in the separate univariate model neighborhood social structure was associated with youth's science achievement, but not in the full model with covariates (e.g., region). This finding suggests that the relation between neighborhood social structure and youth's worse science achievement was largely explained by child, family, other contextual, and regional factors. For example, youth who had higher science achievement scores, on average, lived in the regional south of the United States compared with their respective peers. Given residential patterns, it is possible that youth from the South likely represent a substantial of share of students from Texas; whereas Mexican American youth from immigrant families in the West largely were those in California. Policies may have shaped youth's outcomes in these areas, which help to explain these results. Specifically, English-only policies in schools were implemented at the time when these youth began elementary school, but to differing extents in these states. The English-only movement, which began in the 1990s, attacked bilingual education and ultimately disbanded it with the passage of Proposition 227 in California in 1998 (Gándara & Hopkins, 2010). Hence, the negative association between the South and youth's science achievement may be related to lost access to bilingual education. The consequence could also have been schools adopting subtractive policies that compromised youth's academic functioning, widened achievement gaps, increased dropout rates and special education enrollment, and decreased science program participation of youth who were bi/multilingual (Gándara & Hopkins, 2010). Therefore, with a backdrop of these policies, it is unsurprising that regional differences help to explain outcomes.

Availability Does Not Equal Utility, Quality, or Access. Next, it is possible that the social structure was not beneficial to the math and science outcomes examined in this study. Instead of favorable for math and science, the social capital assumed to be present in the social structure may be advantageous for processes, such as youth's linguistic abilities, socioemotional skills, school behaviors, or motivation more generally, which were beyond the scope of this dissertation. For example, Yosso (2005) describes that the social structure in some ethnic communities may promote linguistic capital, which is the intellectual and social skills gained from communicating and learning multiple languages. This linguistic capital or multilingualism has well-documented cognitive benefits generally and for STEM (NASEM, 2018). However, contemporary school assessments or national standardized assessments—as used for some of the outcomes—may not capture these advantages to math and science outcomes (National Academies of Science, 2017).

Social structure may also provide long-term benefits, but across a duration not evident in the dissertation. For instance, social structure may promote self-esteem and positive cultural identity for Latino/a students through mentoring relationships (i.e., a form of social capital) (Schueths & Carranza, 2012). A mixed method study that employed a randomized intervention of mentoring relationships found that mentoring relationships shaped youth's educational and occupational outcomes via helping to define youth's attitudes about themselves and belonging; encouraging resilience and perseverance in the face of obstacles; and providing instrumental support with practical challenges (Schwartz et al., 2013). These socioemotional advantages may influence school outcomes over time, but their contribution may not be adequately captured with achievement or proficiency assessments. Moreover, these benefits occur in the presence of high-quality and effective social capital that can be accessed. The measure of social structure in this dissertation is not necessarily informative about social capital quality and utility as it relates specifically to youth's math and science outcomes.

Lastly, no association between social structure and youth's outcomes may suggest that the access to the social structure is impeded in other ways. Barriers may be related to the geographic landscape, built environment, and/or families' transportation constraints (Small & Adler, 2019). The majority of the sample resided in the West of the United States, where the sprawling landscape in many locales may hinder the development of social capital. That is, the physical environment may constrain opportunities for contact and relationship-building within the social structure because of the travel required (Small & Adler, 2019). Therefore, no significant association between social structure and youth's outcomes may suggest that families may not be able to reach and leverage the available social structure for their youth's math and science outcomes.

Pitfalls of Proxy and Static Variables. Notwithstanding the above explanations for the findings, the coding of neighborhood social structure may help explain the lack of findings. Specifically, this index may not be appropriate for the Mexican American youth in our sample because there are cultural nuances across the pan-ethnic Latino or Hispanic communities. For instance, families with Mexican or Cuban origins vary considerably in experiences (e.g., migration histories, governmental aide and resettlement support, reception in the United States). However, the neighborhood social structure index was created from variables that collapsed ethnicities and migration histories (i.e., percent of Hispanic residents in the zip code; percent of foreign-born persons in the neighborhood; and percent of households considered "linguistic isolation" [languages other than English in the home]). As a consequence, the scale may be too broad and imprecise to detect associations between neighborhood social structure and Mexican American youth's math and science outcomes, regardless of similarities pertaining to language and ethnicity/racialization (e.g., Portes & Rumbaut, 2014). Therefore, neighborhood social processes necessary to bolster Mexican American youth's outcomes may not be present in the ways I anticipated.

The construction of the social structure index also highlights the limitations of using static variables (e.g., census variables) to approximate dynamic and relational processes (Leventhal & Dupéré, 2019). Census variables are single time-point estimates of neighborhood sociodemographic information. Although this practice is often used to approximate likely social processes within neighborhoods, it falls short in estimating the relationships, their strength, and the utility of networks within communities (Granberry, 2014; Sampson et al., 2002). In addition, benefits of the social structure are contingent on processes that need to be maintained and reinforced over time for youth to reap long-run benefits of the social structure and its processes therein. As such, the static variables may not accurately capture processes that support youth's math and science outcomes or at the appropriate times (i.e., when social capital may have been available and used).

Institutional Resources: Trust-Worthy Partners or Alienating Structures?

In contrast to expectations, only one neighborhood institutional resource was related to youth's outcomes. Specifically, the number of libraries was associated with youth's worse math achievement; but this association was no longer significant when background characteristics were controlled. In general, there is little evidence from this dissertation to link neighborhood institutional resources with youth's math and science outcomes, net school and background controls.

Negative Processes Within Institutions. In contrast to my expectation that there would be a positive association between the number of libraries and youth's outcomes; the negative association suggests the number of libraries in youth's neighborhoods was detrimental to their math achievement. One reason for this association may be because youth had negative experiences when engaging with these institutions. Library programs may perpetuate deficit perspectives about Latinx populations and immigrant families without critical assessment of materials, pedagogical approaches, staff and services (Dávila & Xu, 2019). Such environments may alienate youth from immigrant families from further library participation or contribute to youth's unfavorable self-perceptions through implicit messages in resources and services (Collins, 2018; National Academy of Science, 2004). The long-term consequence is what Stanton-Salazar (1997) describes as the "institutionalization of distrust," wherein Mexican American youth may be hesitant to engage with formal organizations because of a history of marginalization with institutions (Stanton-Salazar 1997). Thus, as youth engage with formal institutions, such as libraries, negative attitudes are reinforced, and in turn, harm their math outcomes.

It is important to note that the association between libraries and youth's achievement was attenuated (and no longer significant) in the presence of background characteristics (e.g., Spanish-English language scale, region), suggesting these characteristics help to explain the link. As described earlier with respect to the social structure, the sociopolitical context also shapes families' comfort with institutional resources. It is likely that all formal institutions were affected by this it. Understandably, youth and their families, particularly if there are concerns related to their language, accents, or legal entry authorization, would respond to formal institutions with greater caution than under welcoming conditions.

Yet, in all, there is little evidence the neighborhood institutions examined are related to youth's math and science outcomes in middle school. Although I had reason to hypothesize a theoretical link to youth's outcomes, these null findings are unsurprising in the data because of the broader context in which the study was framed.

In addition to the ramifications of the sociopolitical climate, the educational landscape was not focused on youth's STEM learning at the time the neighborhood institutional variables were constructed. Rather, the shift in attention to youth's STEM-learning increased around the time this cohort sample was finishing elementary school or entering middle school (NASEM, 2007). Even as attention to STEM-learning has amplified, non-profit and other community-based organizations are dependent on local taxes and their own resource constraints may not implement STEM programs. Particularly when funds are limited, neighborhood institutions may have to choose between the types of programs and services they offer. In an American Library Association survey conducted in 2008 and distributed nationally to librarians, responses revealed that whereas librarians may be interested in STEM exhibits, they may not host STEM exhibits (Figueroa et al., 2015). This paradox is especially pronounced in rural areas and libraries with small visitorship (Dusenbery, 2014). Resources (staff, materials, fiscal) in these areas may be more restricted than in busier and populated areas. Under such financial constraints, the choices of neighborhood institutions to not focus on STEM disciplines may be understandable. These same pressures may also limit whether neighborhood institutions are equipped to support math and science learning in ways that meaningfully contribute to Mexican American youth's math and science outcomes.

Other Contexts. Rather than the processes within institutional resources, processes within the home may shape how families help to make sense of interactions with institutional resources. It was expected that families filter information from the neighborhood for children and youth (Shuey & Leventhal, 2019). Among Mexican American families, for whom family relations play a central role, this filtering function may be critical (Caldera & Lindsey, 2015). Math and science skills may be developed more within the home, and then practiced within the community. For instance, in a study on the role of religious organizations in children's math skill development, Taylor (2013) found family conversations provided strategies for mathematical thinking and calculating tithing (religious charitable giving). Then, it was in religious and faith-based organizations where children rehearsed their learned math skills (Taylor, 2013). For this reason, neighborhood institutions may not be strongly associated with youth's outcomes beyond other contexts, such as the family.

Other contexts (e.g., family, peers, informal community settings) and institutions that were not explicitly examined may be more meaningfully associated with Mexican American youth's math and science outcomes than those in this dissertation. All of the organizations that were selected for investigation in this dissertation are considered formal institutions—underscored by the fact that they were catalogued and recognized by the IRS as official operating tax-exempt institutions. Due to the source of these data, some non-profits—although operating—may not be indexed and missing from the database. Moreover, as noted by ethnocultural researchers, learning occurs in informal and unstructured settings, as well. Informal settings such as barber shops and community gardens may allow youth to take on multiple roles (e.g., listener, leader, apprentice) within a single event or experience, which may be more meaningful for youth than formal structured settings (Rogoff et al., 2016). This missing link between learning and relevance is consistent with recommendations from the National Research Council (2009). Yet, STEM-teaching has oft neglected tying lessons with practical and meaningful application (National Research Council, 2009; United States Department of Education, 2016). Together, the results suggest that additional informal settings that are personally-relevant to youth's everyday experiences (e.g., digital spaces such as video games) could be investigated to determine their contribution to youth's math and science outcomes.

Socialization and Intersectional Identity

Given disparities in STEM socialization for boys and girls in various contexts (e.g., school, neighborhood), the following sections interpret the findings pertaining to RQ2 –whether gender moderated associations between neighborhood structure and institutional resources and youth's outcomes. Contrary to my hypotheses that there would be differences in how neighborhood social and institutional resources are related to math and science outcomes for boys and girls among Mexican American youth from immigrant families, no such difference was found. The results from my dissertation depart from much of the research suggesting a moderating role of gender in the association between learning contexts and youth's STEM outcomes (e.g., Ngo & Dustan, 2019). I discuss possible explanations for these findings.

Similar Resource Experiences Across Gender. There were no significant main effects of neighborhood institutional resources net of background characteristics and school contexts; therefore, it is not surprising that there were no significant moderating associations. The findings may suggest similarities among boys and girls because of comparable experiences broadly or specifically related to interactions with resources in schools and neighborhoods. As discussed earlier, Mexican American youth from immigrant families may find mainstream institutions alienating due to sociocultural, linguistic, socioeconomic, and structural barriers (Stanton-Salazar, 1997). These barriers may be related to the processes within institutional resources or the services, staffing, and materials offered which contribute to the sense of belonging among Mexican American youth (Dávila & Xu, 2019). Both boys and girls are equally likely to face these obstacles when navigating institutional resources.

Resource Interactions Unrelated to Gender. Among Mexican American youth, gender processes may not be the driving force of STEM disparities. Rather, other characteristics may more prominently distinguish how resources and social and institutional resources are linked to their math and science outcomes. These characteristics may include bi/multilingualism or bi/multiculturalism, exceptionalities, family SES, skin color, among other characteristics that have historically been associated with experiences of structural exclusion (Scott et al., 2021; Stanton-Salazar, 1997). For instance, Latinx and Black youth, youth with exceptionalities, youth who are learning multiple languages, and youth from low-income households are disproportionately more likely to get recommended for lower academic "tracks", ESL classes, and receive punishments that compromise in-class learning time compared with their respective peers (Burris & Garrity, 2008; Children's Equity Project & Bipartisan Policy Center, 2020; Valenzuela et al., 2012). Once on these tracks, it is more difficult to catch-up, especially in disciplines that teach content in a particular sequence, such as math and science (Valenzuela et al., 2012). In a similar vein, youth who are bi/multilingual, bi/multicultural, or have exceptionalities—for example—may not receive the supports they need in neighborhood institutions, which also can affect their math and science learning. Thus, boys' and girls' math and science achievement and self-efficacy may be similarly impeded based on the services and resources at neighborhood institutions because other factors are driving the difference in learning.

Family Socialization Processes and Resources. It is also plausible that families' intersectional identities (i.e., cultural, ethnic, immigrant) and processes play an unexpected role in gendered socialization in STEM. That is, although research suggests that Mexican American families differently socialize boys and girls (Brown & Chu, 2013), there may be variation in the extent of this process across immigrant generations. Accordingly, no moderation by gender may be evident. It is important to recognize that the analytic sample was largely second generation immigrant youth, which may be less likely to reflect origin country cultural traditions in some families or in different ways than their parents. Gendered socialization processes may be less traditional or prominent compared with older generations of Mexican individuals. Consistent with this explanation, Hsieh (2019) found few differences by immigrant generations of Latinos and by gender in motivational beliefs (comprised of utility, interest, and self-concept) among a sample of high school students in the United States. Also, the intersection of identities may function to shape how parents socialize their children. For instance, parents' perception of their children as "American" may transform educational aspirations, such that they negate gendered stereotypes in STEM (Louie, 2012). These practices may also include minimizing the difference in autonomy and monitoring given to boys or girls when they interact with resources (Dumka et al., 2013). This rationale may be plausible especially because gender disparities in math and science outcomes were not present across all models. Because of these rationales, there were no differences between resources and youth's outcomes as a function of gender.

Next, because of youth's age, families may similarly engage (or limit) their youth's interactions with resources at this time. Interactions between youth and resources were measured when youth were at the start of elementary school. Another way that developmental processes may inform the interpretation of results relates to the stage of ethnic and gendered identity development at this age. During middle childhood and into early adolescence, youth's ethnic, racial, and gendered identities are not as complex and nuanced as they will become during the later adolescent years (Umaña-Taylor et al., 2014). This situation may explain why gendered associations with resources were not observed.

Limitations

In this study, I aimed to investigate neighborhood social structure and institutional resources that may be beneficial for the math and science outcomes of Mexican American youth from immigrant families, while explicitly accounting for the school context. Despite the strengths of this dissertation, there are several limitations that merit discussion. I review some of these considerations to help illuminate the results more fully.

Representation

Under-Representation of Some Groups. One of the strengths of this study is that it investigated STEM among an important section of the population, whose patterns of STEM achievement and STEM self-efficacy have only recently been disaggregated from broader racial and ethnic categorizations. It is important to remember, however, that some groups continue to be under-represented in the data (Roosa et al., 2012). For example, underrepresentation includes families with mixed forms of authorization in the United States and youth whose legal status in the United States is subject to change with different policies. These families may be the least likely to use community resources, but they may also need community resources the most (Suárez-Orozco et al., 2011).

Averages Across Heterogeneity. Within-ethnic group analyses undertaken in this dissertation on Mexican American youth from immigrant families highlight the possibility that some patterns (e.g., gendered associations with contexts) may depart from national population-averaged predictions. Within-ethnic group analyses assume that there are shared ethnic, cultural, or meaning-making processes (Helms et al., 2005); still, it is crucial to underscore that no group is a monolith. The models estimated average associations across substantial diversity, even within this sample of Mexican American youth from immigrant families. Moreover, these analyses provide average associations that are not reflective of any one individual (Rose, 2015).

I attempted to control for some of the heterogeneity among this group with covariates and moderation analyses (by gender). Yet, other relevant dimensions of youth's background exist that are critical for their math and science achievement and interactions with resources such as their own cultural orientation. These identity dimensions may be difficult to investigate using secondary data with quantitative methodologies. To illustrate, "Mexican" heritage was operationalized by a child's or parent's birth place as Mexico, which may not fully reflect youth's own ethnic and cultural identity because of factors such as age of emigration (Suárez-Orozco et al., 2018). Youth make sense of their identity by interpreting interactions between them, their contexts, and the organizing systems of power and discrimination (Scott, et al., 2021). Even as youth's identity filters through multiple contexts (e.g., family, community; see Figure 1), their cultural identification as "Mexican," "American," and its blends are based on their own iterative negotiation of practices and values, which are part of a context-dependent, dynamic process that continues over time for youth in immigrant families (Suárez-Orozco et al., 2018). Most statistical procedures fall short in capturing this blended and dynamic identity among youth. These processes undoubtedly shape how youth and their families choose to engage with neighborhood social structure and institutional resources.

While the within-ethnic group analytic approach has advantages, comparing across other population groups (e.g., family authorization status) is important to better identify how different aspects of identity shape youth's STEM outcomes. In families where parents have unauthorized status, it is likely that results would similarly show no association between neighborhood resources and youth's STEM outcomes. Although some immigrant parents may be unfamiliar with the programs and services available to them, immigrant noncitizen parents may hesitate to use services they are aware of due to fears about the legal impact on children's future opportunities (Yoshikawa & Kalil, 2011). Suárez-Orozco et al. (2018) discuss that youth and their families' use of services plummets from childhood through adolescence, in particular, as they recognize barriers to opportunities, rites of passage (e.g., drivers' license), and "ways of being."

Measures

It is crucial to recognize the limitations in the measures used in this dissertation. As briefly discussed in prior sections of this dissertation, I attempted to study resources using availability as a proxy. The availability of particular resources in the neighborhood, however, cannot be equated with youth and families' access, engagement (or extent of engagement), quality of resources and services, and youth's perception of those resources and services.

Regardless of the number of neighborhood resources, there may be "effect heterogeneity," or differences in the strategies families employ within the neighborhood (Harding et al., 2011). For example, in the presence of few resources, families may choose to use any available resource; whereas in the presence of increasing numbers of a resource, families may try multiple resources to determine which best meets their needs. Without additional indicators of resource accessibility and the ways youth engaged with institutional resources, it is possible that the contribution of particular resources is not adequately captured.

In addition, it is worth noting that the way dynamic processes (e.g., accessing and utilizing social structure and resources; STEM learning) and outcomes were measured limits understanding of STEM learning among marginalized identities. Processes were approximated using single-source static variables (e.g., census variables) and reflected unidirectional mechanisms; and youth's STEM outcomes also were based on single-reporter and single-time point measures in grade 8. Yet, social processes and learning are dynamic, relational, and shaped by the intersectional identities of both youth and their embedded communities. Hence, future directions in research may benefit from understanding the interplay of identity in individuals and among the community (Talusan, 2022).

Finally, achievement outcomes and teacher-reported ARS scores used items and guidelines from national curriculum standards. Yet, standardized assessments are fraught with multiple biases, privilege a narrow scope of knowledge, and problematize differences in skills and how skills are communicated (Stewart & Haynes, 2016). The SDQ math subscale scores were used to proxy self-efficacy, but they, too, may not represent the dynamic nature and extent of the processes involved in self-efficacy (e.g., prediction of successfully achieving future aims). All of these measurement considerations point to pathways for future research.

Generalizability

Caution in interpreting the findings from this dissertation is merited. They may not be generalizable to contemporary populations because of the age of the data. The last wave was collected almost a decade and half ago and the demographic composition of the United States has continued to change (Musu-Gillette et al., 2017). However, there is continued growth in the United States-born Mexican American population compared with the growth in the population due to migration (Noe-Bustamante et al., 2019). In this vein, immigrant youth in the study were operationalized as youth who are first to second generation immigrants, with the overwhelming majority of the sample second generation immigrant youth (~90%). Therefore, the sample investigated may have some applicability to contemporary populations in the United States.

Although I did not specifically investigate the sociopolitical climate in this dissertation, it can be reasonably expected that families, communities, and formal institutions respond to sociopolitical pressures. These youth entered elementary school during a time when anti-Latino anti-immigrant sentiments manifested in English-only instruction in schools in California, Massachusetts, and Arizona and xenophobic legislation that destabilized the safety of Mexican immigrant communities (Gándara & Hopkins, 2010; Philbin & Ayón, 2016). Even as some English-only policies have since been overturned, there continues to be a polarized sociopolitical climate, enpowerment of Immigration and Customs Enforcement (ICE), and challenges to the legality and permanence of Deferred Action for Childhood Arrivals (DACA) and Temporary Protected Status (TPS) orders (e.g., Society for Research in Child Development [SRCD], 2018). As summarized by SRCD (2018), this sociopolitical climate poses a threat to the well-being, safety, and academic engagement of Mexican American youth from immigrant families. Thus, Mexican American youth faced educational hurdles and a contentious sociopolitical climate then, when the ECLS-K data was collected, and now (Marks et al., 2018).

There are also limitations to generalizability due to the educational landscape, which has changed over the course of the past two decades to focus more on STEM during this time (Calderon, 2000; Farkas, 2015; Henriquez, 2018). Not only are there more activities and practices around STEM today, but there are innovative initiatives around promoting long-term STEM-career retention (Henríquez, 2018). This retention may be bolstered by practices that re-envision where education takes place (TEDx Talks, 2012). Some initiatives include STEM ecosystem and community-based approaches, wherein schools, family, community stakeholders, and neighborhood organizations partner to support youth's educational progress and learning (Henríquez, 2018; STEM Funders Network, 2021). In short, the way immigrant families engage with neighborhood institutions around STEM now may not be analogous to the way youth and their families engaged with resources vis-à-vis STEM during their participation in the ECLS-K study.

Furthermore, generalizability may be compromised because “community” continues to be redefined; and in some ways, is less restricted to neighborhood boundaries for youth. This truism seemed especially evident with the emergence of the global Covid19 pandemic and exponential growth in technology and digital media in the last decade. Both have allowed families to bypass neighborhood boundaries and reconceptualize access to communities, institutional resources, and social capital. Although the ways many youth and families access resources has changed, there continue to be inequities (e.g., digital divide) across segments of the population based on various family characteristics or circumstances (e.g., SES, homelessness; Lee, 2020). Taken together, contemporary studies of communities will need to account for these changes and the experiential meaning of “communities” among different segments of the population and employ appropriate tools to study them.

Implications and Future Directions

In spite of the null findings, this dissertation points to important areas for future research, practice, and policy to support Mexican American youth from immigrant families along the STEM pathway, leverage the role of communities, and strengthen disciplinary methodology that better reflects families’ lived realities. Rather than using the null findings to assume that no social or institutional resources matter for Mexican American youth from immigrant families, these findings present an opportunity to look more deeply into the processes within resources to understand why their expected relevance does not equate to measurable outcomes.

Research

First, future research needs to recognize the relational nature of learning. That is, multiple members participate in learning around a central goal to support youth’s achievement—often referred to as “communities of practice” (Wenger, 1998). Currently, there are few measures of dynamic learning processes in the research literature. In addition, the relational aspect of learning or a "community of practice" learning approach may not have been adequately assessed. In this dissertation, there were no measures for family members to assess various processes in the multifaceted learning dynamic that led to youth's self-efficacy and achievement in STEM. Relational measures might also be able to overcome some of limitations and biases in assessment formats and more wholistically capture the multiple components of engagement involved in youth's learning. Future research is tasked with developing "culturally-sustaining" relational measures and examining learning with dynamic approaches.

Through traditions such as community-participatory action research and ethnography, researchers can develop "culturally sustaining" measures that address some of the concerns around bias in assessments (Moll, 1995). That is, community members jointly work with researchers to define components of social processes or learning (e.g., behavioral engagement; National Academies of Science, 2004). They may depart from the social processes most often investigated in nationwide longitudinal studies. As Yosso's (2005) community cultural wealth model illustrates, the social processes within communities of color are not adequately represented in many studies and assessments (e.g., ECLS-K), so research and practice may benefit from more research and integration in this area.

Both qualitative (e.g., phenomenology) and quantitative (e.g., ecometrics) analytic techniques can be leveraged to create better measures of relational learning processes. As an example, in large-scale studies, ecometric statistical techniques provide a way to average neighborhood-wide responses across multiple reporters (Mujahid et al., 2007). This approach is more reliable than simply averaging across the sample because ecometric techniques account for background characteristics of neighborhood residents. It is one form of incorporating multiple reporters to triangulate processes such as youth's STEM learning.

Also, the results provide some evidence that it can be insightful to explore the statistical potential for modelling more than one context simultaneously. Although there are benefits to focusing on a single context, examining the contribution of two contexts in tandem prevents over-estimating the contribution of each context and more realistically points to influential resources that are salient despite conservative models. The use of cross-classified models also presents math and science outcomes that reflect youth's lived realities more accurately than single context modelling approaches. In these approaches, youth's STEM learning is acknowledged as a process that is not isolated to classrooms, but rather youth's pursuits are nested within a multi-context learning community. Still these analyses cannot show the mechanisms that underlie the associations.

Practice

In terms of practice, we will need to rethink assessments: how we assess individuals in the learning process (e.g., youth, teachers), contexts where we assess individuals, and give space for individuals' own self-assessments. First, practitioners will need to assess their own biases. Then, it will be important to incorporate multi-modal methods to allow youth to show their dynamic STEM learning as it unfolds. It is critical to note that assessments need to go beyond language-heavy testing formats to acknowledge where youth are in their STEM learning, English-language learning, and not diminish their multicultural/ multilingual identities. Alternative formats can recognize that youth's skills vary and are not necessarily captured through language-laden formats. Through assessments, feedback, and perspectives of teachers, families, and others in their community, it may be possible to see youth's learning progress and their use of skills in other contexts outside of school in order to acknowledge that learning is dynamic and relational. Simultaneously, practitioners need to be mindful of how families are incorporated into this process to mitigate harms, especially to the most vulnerable families.

Regarding contexts of assessment, some programs that work in partnership between neighborhood institutions, schools, and families allow youth to demonstrate and practice their knowledge in spaces that “simulate” or “recreate” family or community. In these spaces, trusted teachers can support youth’s practice with multiple skills (e.g., communicating science, multi/bilingualism) without burdening vulnerable family systems. These settings may also be helpful in situations when youth’s parents are navigating their own STEM learning, family stressors, or may not know how to communicate STEM in ways that is expected in current national STEM assessments or “school STEM” assessments.

Policy

In terms of policy, if the goal is to make sure that the next generation can access the resources they need to be competent in STEM, confident in their abilities, and ready to apply their knowledge and skills for the big challenges with which society is faced, it is important to invest in STEM opportunities in out-of-school culturally-relevant settings, so that STEM learning has relevance and synchrony for diverse learners. Moreover, practical application of real-world problems allows youth to apply their skills and may be more effective assessments than school-based assessments alone. These practical assessments may realistically echo the settings in which some youth learn; thereby creating synchrony between learning context and assessment context (Rogoff et al., 2016).

Finally, policies must strengthen communities rather than disrupting and dividing them, in order for youth and families to access their neighborhood social structure and its STEM supports, if necessary. Yet, unexamined practices and policies can cause more harm than safety to communities. As an example, during the time of the ECLS-K study, the extent of anti-Latino/x and anti-immigrant sentiments in the United States fueled legislation in Arizona and other states that empowered Immigration and Customs Enforcement (ICE) to stop and detain individuals who they thought may be unauthorized to be in the United States (Suárez-Orozco et al., 2011). Such policies fueled fears in communities and prevented access to various community assets and supports that may be beneficial for youth's STEM learning. Instead, promising policies and initiatives strengthen the connections across stakeholders, sectors, community organizations, and families to provide youth with culturally-relevant experiences for play and learning from failure (The United States Department of Education, 2016).

Notwithstanding the study's limitations, these null findings suggest that neighborhood social structure and institutional resources are not supporting a substantial segment of the population in ways anticipated. This possibility underscores an urgent need to examine processes and policies within institutional resources (and the broader context) that alienate Mexican American immigrant families from taking advantage of their services and programs. Therefore, next steps require connecting with communities, stakeholders, and families to jointly—as communities—to discuss helpful processes and policies.

Conclusion

In order to build more inclusionary STEM pathways, it is crucial to critically examine the resources and assets in the communities of Mexican American youth from immigrant families. Despite the limitations discussed, this dissertation provides directions for future work by taking a more wholistic perspective of youth's learning in their communities by modeling neighborhood and school contexts simultaneously than studies that account for single contexts. Specifically, the results emphasizes a need to examine processes and policies in neighborhoods that interfere with Mexican American youth's access and engagement; and a broadening of the tools, modalities, techniques, and contexts in which youth's STEM learning is assessed.

References

Abo-Zena, M. M., & Rana, M. (2015). Religion. In C. Suárez-Orozco, M. M. Abo-Zena, & A. K. Marks (Eds.), *Transitions: The development of children of immigrants* (pp. 80–96). NYU Press. https://www.jstor.org/stable/j.ctt15zc7rf.10

Alcántara, D. (2013). *Latino youth experiences of immigrant policy, enforcement, and exclusion: Exploring risk and resilience.* (Accession No. 1545476) [Masters thesis, University of Massachusetts Boston]. ProQuest Publishing.

Alcántara, D. (2018). *Latino immigrant youth development in anti-immigrant contexts: Exploring adaptive cultures as resources promoting competencies and wellness.* (Accession No. 10788404) [Doctoral dissertation, University of Massachusetts Boston]. ProQuest Publishing.

Anderson, S., Leventhal, T., & Dupéré, V. (2014). Exposure to neighborhood affluence and poverty in childhood and adolescence and academic achievement and behavior. Applied Developmental Science, *18*(3), 123–138. https://doi.org/10.1080/10888691.2014.924355

Anderson, S., Leventhal, T., Newman, S., & Dupéré, V. (2014). Residential mobility among children: A framework for child and family policy. *Cityscape*, *16*(1), 5–36. http://www.jstor.org/stable/26326856

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, *84*(2), 191–215. https://doi.org/http://dx.doi.org/10.1037/0033-295X.84.2.191

Beatty, L., Acar, S., & Cheatham, G. A. (2021). Translanguaging in inclusive classrooms: Learning with children and families. *Young Exceptional Children, 24*(3), 1–16. https://doi.org/10.1177/10962506211002536

Berry, J. W. (1997). Immigration, acculturation, and adaptation. *Applied Psychology: An International Review*, *46*(1), 5–68. https://doi.org/10.1111/j.1464-0597.1997.tb01087.x

Berry, J. W., Kim, U., & Minde, T. (1987). Comparative studies of acculturative stress. *International Migration Review, Special Issue: Migration and Health*, *21*(3), 491–511. https://doi.org/10.2307/2546607

Bhargava, S., Bámaca-Colbert, M. Y., Witherspoon, D. P., Pomerantz, E. M., & Robins, R. W. (2017). Examining socio-cultural and neighborhood factors associated with trajectories of Mexican-origin mothers' education-related involvement. *Journal of Youth and Adolescence, 46*(8), 1789–1804. https://doi.org/10.1007/s10964-016-0628-6

Block, M. (Host). (2008, November 24). A history of museums, 'The memory of mankind' [Audio podcast episode]. In *All things considered*. NPR. Retrieved from https://www.npr.org/templates/story/story.php?storyId=97377145

Bowden, M., Bartkowski, J., Xu, X., & Lewis Jr., R. (2017). Parental occupation and the gender math gap: Examining the social reproduction of academic advantage among elementary and middle school students. *Social Sciences*, *7*(2), 6. https://doi.org/10.3390/socsci7010006

Bowman, K. L. (2014). Pursuing equity at the intersection of school desegregation, English-language instruction, and immigration. In *The pursuit of racial and ethnic equality in American public schools: Mendez, Brown, and beyond* (pp. 31–54). Michigan State University Press. https://www.jstor.org/stable/10.14321/j.ctt13x0p5t.8

Brown, C. S., & Chu, H. (2013). Gendered conceptions of ethnicity: Latino children in middle childhood. In S. S. Chuang & C. S. Tamis-LeMonda (Eds.), *Gender roles in immigrant families* (pp. 139–153). Springer Science + Business Media. https://doi.org/10.1007/978-1-4614-6735-9_9

Brown, B. B., & Larson, J. (2009). Peer relationships in adolescence. In R. M. Lerner & L. Steinberg (Eds.), *Handbook of adolescent psychology* (3rd ed., pp. 74–104). John Wiley & Sons, Inc.

Burris, C. C., & Garrity, D. T. (2008). *Detracking for excellence and equity*. ASCD.

Cafri, G., Hedeker, D., & Aarons, G. A. (2015). An introduction and integration of cross-classified, multiple membership, and dynamic group random-effects models. *Psychological Methods*, *20*(4), 407–421. https://doi.org/10.1037/met0000043

Caldera, Y. M., & Lindsey, E. W. (Eds.). (2015). *Mexican American children and families: Multidisciplinary perspectives*. Taylor & Francis.

Calderon, I. (2000). Mentoring minority high schoolers: One museum's success. *History News*, *55*(4), 18–21.

Children's Equity Project, & Bipartisan Policy Center. (2020). *Start with equity: From the early years to the early grades*. https://childandfamilysuccess.asu.edu/sites/default/files/2020-10/CEP-report-101320-FINAL_0.pdf

Chirkov, V. (2020). The sociocultural movement in psychology, the role of theories in sociocultural inquiries, and the theory of sociocultural models. *Asian Journal of Social Psychology*, *23*(2), 119–134. https://doi.org/10.1111/ajsp.12409

Choi, H.-H., Merriënboer, J. J. G. van, & Paas, F. (2014). Effects of the physical environment on cognitive load and learning: Towards a new model of cognitive load. *Educational Psychology Review, 26*(2), 225–244. https://www.jstor.org/stable/43549793

Cimpian, J. R., Kim, T. H., & McDermott, Z. T. (2020). Understanding persistent gender gaps in STEM. *Science (New York, N.Y.)*, *368*(6497), 1317–1319. https://doi.org/10.1126/science.aba7377

Collins, K. H. (2018). Confronting color-blind stem talent development: Toward a contextual model for black student STEM identity. *Journal of Advanced Academics*, *29*(2), 143–168. https://doi.org/10.1177/1932202X18757958

Crenshaw, K. W. (2016). Demarginalising the intersection of race and sex: A black feminist critique of anti-discrimination doctrine, feminist theory, and anti-racist politics. *Framing intersectionality: Debates on a multi-faceted concept in gender studies*, *1989*(1), 25–42. https://doi.org/10.4324/9781315582924-10

Crisp, G., & Nora, A. (2012). *Overview of Hispanics in science, mathematics, engineering and technology (STEM): K-16 representation, preparation and participation*. https://www.hacu.net/hacu/H3ERC_Research_Initiative.asp

Crosnoe, R. (2005). Double disadvantage or signs of resilience? The elementary school contexts of children from mexican immigrant families. *American Educational Research Journal*, *42*(2), 269–303. https://doi.org/10.3102/00028312042002269

Crosnoe, R. (2009). Low-income students and the socioeconomic composition of public high schools. *American Sociologial Review*, *74*(October), 709–730.

Dávila, D., & Xu, Y. (2019). Transcending the challenge at the library: Disrupting deficit perspectives about Latinx immigrant families. In G. Onchwari & J. Keengwe (Eds.), *Handbook of research on engaging immigrant families and promoting academic success for English language learners* (pp. 186–204). IGI Global. https://doi.org/10.4018/978-1-5225-8283-0.ch010

De Souza Briggs, X., Popkin, S. J., & Goering, J. (2010). *Moving to opportunity: The story of an American experiment to fight ghetto poverty*. Oxford University Press, Inc.

Delgado Bernal, D. (2002). Critical race theory, Latino critical theory, and critical race-gendered epistemologies: Recognizing students of color as holders and creaters of knowledge. *Qualitative Inquiry*, *8*(1), 105–127.

Department of Eduation. (2017). *Our nation's English learners*. https://www2.ed.gov/datastory/el-characteristics/index.html

Downer, J. T., Goble, P., Myers, S. S., & Pianta, R. C. (2016). Teacher-child racial/ethnic match within pre-kindergarten classrooms and children's early school adjustment. *Early Childhood Research Quarterly*, *37*, 26–38. https://doi.org/10.1016/j.ecresq.2016.02.007

Dumka, L. E., Gonzales, N. A., McClain, D. D., & Millsap, R. E. (2013). Family, culture, gender, and Mexican American adolescents' academic success. In S. S. Chuang & C. S. Tamis-LeMonda (Eds.), *Gender roles in immigrant families* (pp. 155–175). Springer Science + Business Media. https://doi.org/10.1007/978-1-4614-6735-9_10

Duncan, G. J., Magnuson, K., & Votruba-Drzal, E. (2017). Moving beyond correlations in assessing the consequences of poverty. *Annual Review of Psychology*, *68*(1), 413–434. https://doi.org/10.1146/annurev-psych-010416-044224

Dusenbery, P. B. (2014). The STEM education movement in public libraries. *Informal Learning Review*, *124*, 14–19.

Enders, C. K. (2010). *Applied missing data analysis*. The Guilford Press.

Farkas, M. (2015). Making for STEM success: Creating a community of tinkerers. *American Libraries*, *46*(5), 27.

Fernandez, L. (2002). Telling stories about school: Using Critical Race and Latino Critical Theories to document Latina/Latino education and resistance. *Qualitative Inquiry, 8*(1), 45–65. https://doi.org/10.1177/107780040200800104

Figueroa, M., Landgraf, G., Lippincott, J. K., Taylor, N. G., Subramaniam, M., Waugh, A., Bertot, J. C., Sarin, L., & Morehart, P. (2015). Forecasting the future of libraries. *American Libraries*, *46*(3/4), 28–45.

Fordham, S., & Ogbu, J. U. (1986). Black students' school success: Coping with the "burden of 'acting white.'" *The Urban Review, 18*(3), 176–206. https://doi.org/10.1007/BF01112192

Fuligni, A. J. (1997). The academic achievement of adolescents from immigrant families: he roles of family background, attitudes, and behavior. *Child Development*, *68*(2), 351–363. https://doi.org/10.1111/j.1467-8624.1997.tb01944.x

Gándara, P., & Hopkins, M. (Eds.). (2010). *Forbidden language: English learners and restrictive language policies*. Teachers College Press.

García Coll, C., Lamberty, G., Jenkins, R., McAdoo, H. P., Crnic, K., Wasik, B. H., & García, H. V. (1996). An integrative model for the study of developmental competencies in minority children. *Child Development*, *67*(5), 1891–1914.

García Coll, C., & Szalacha, L. A. (2004). The multiple contexts of middle childhood. *The Future of Children*, *14*(2), 80–97. http://www.jstor.org/stable/1602795

Gonzalez, L. M. (2015). Barriers to college access for Latino/a adolescents: A comparison of theoretical frameworks. *Journal of Latinos and Education*, *14*(4), 320–335. https://doi.org/10.1080/15348431.2015.1091315

Granberry, P. J. (2014). More social than capital: Social capital accumulation through social network exchange among legal and unauthorized Mexican migrants. *Social Science Journal*, *51*(4), 590–597. https://doi.org/10.1016/j.soscij.2014.09.002

Greenwald, R., Hedges, L. V., & Laine, R. D. (1996). The effect of school resources on student achievement. *Review of Educational Research*, *66*(3), 361–396. https://doi.org/10.3102/00346543066003361

Hamann, E. T. (2004). Lessons from the interpretation/ misinterpretation of John Ogbu's scholarship. *Intercultural Education, 15*(4), 399–412. https://doi.org/10.1080/1467598042000313421

Harding, D., Gennetian, L., Winship, C., Sanbonmatsu, L., & Kling, J. (2011). Unpacking neighborhood influences on education outcomes: Setting the stage for future research. In G. J. Duncan & R. J. Murnane (Eds.), *Whither opportunity?: Rising inequality, schools, and children's life chances*. Russell SAGE Foundation.

Helms, J. E., Jernigan, M., & Mascher, J. (2005). The meaning of race in psychology and how to change it : A methodological perspective. *American Psychologist*, *60*(1), 27–36. https://doi.org/10.1037/0003-066X.60.1.27

Henríquez, A. (2018). NYSCI neighbors: Creating locally driven authentic opportunities for immigrant parents in a STEM ecosystem. In M. Caspe, T. A. Woods, & J. Kennedy (Eds.), *Promising practices for engaging families in STEM learning* (pp. 137–146). Information Age Publishing.

Hernández-León, R., & Zúñiga, V. (2002). *Mexican immigrant communities in the south and social capital: The case of Dalton, Georgia*. Center for Comparative Immigration Studies, UC San Diego. http://escholarship.org/uc/item/9r5749mm

Hernandez, M. M., Robins, R. W., Widaman, K. F., & Conger, R. D. (2014). School belonging, generational status, and socioeconomic effects on Mexican-origin children's later academic competence and expectations. *Journal of Research on Adolescence*, *26*(2), 241–256. https://doi.org/10.1111/jora.12188

Hess, F. M., & Leal, D. L. (1997). Minority teachers, minority students, and college matriculation: A new look at the role-modeling hypothesis. *Policy Studies Journal*, *25*(2), 235.

Holloway, S. D., & Kunesh, C. E. (2015). Cultural processes and the connections among home, school, and community. In S. M. Sheridan & K. E. Moorman (Eds.), *Processes and pathways of family-school partnerships across development* (pp. 1–117). Springer International Publishing. https://doi.org/10.1007/978-3-319-16931-6_1

Hsieh, T. Y., Liu, Y., & Simpkins, S. D. (2019). Changes in United States Latino/a high school students' science motivational beliefs: Within group differences across science subjects, gender, immigrant status, and perceived support. *Frontiers in Psychology*, *10*(February), 1–12. https://doi.org/10.3389/fpsyg.2019.00380

Huston, A. C., & Ripke, M. N. (2006). Middle childhood: Contexts of development. In A. C. Huston & M. N. Ripke (Eds.), *Developmental contexts in middle childhood* (pp. 1–22). Cambridge University Press.

Hwang, J., & Sampson, R. J. (2014). Divergent pathways of gentrification racial inequality and the social order of renewal in Chicago neighborhoods. *American Sociological Review*,*79*(4), 726-751. https://doi.org/10.1177/0003122414535774

Institute of Museum and Library Services. (2020). *Annual performance report: Fiscal year 2019*.

Johnson, J. H., Farrell, W. C., & Guinn, C. (1997). Immigration reform and the browning of America: Tensions, conflicts and community instability in metropolitan Los Angeles. *The International Migration Review*, *31*, 1,055-095.

Jordan, N. C., Kaplan, D., Ramineni, C., & Locuniak, M. N. (2009). Early math matters: Kindergarten number competence and later mathematics outcomes. *Developmental Psychology*, *45*(3), 850–867. https://doi.org/10.1037/a0014939.

Kaur, H. (2020). *Why people are split on using "Latinx."* CNN. https://www.cnn.com/2020/08/12/us/latinx-term-usage-hispanics-trnd/index.html

Kohen, D., Dahinten, S., Leventhal, T., & Mcintosh, C. (2008). Neighborhood disadvantage: Pathway of effects for young children. *Child Development*, *79*(1), 156–169. https://doi.org/10.1111/j.1467-8624.2007.01117.x.

Kotok, S. (2017). Unfulfilled potential: High-achieving minority students and the high school achievement gap in math. *The High School Journal, 100*(3), 183–202. https://doi.org/10.1353/hsj.2017.0007

Ladson-Billings, G. (2006). From the achievement gap to the education debt: Understanding achievement in U.S. schools. *Educational Researcher*, *35*(7), 3–12. https://doi.org/10.3102/0013189X035007003

Lawler, T. A. (2013). Calling all science explorers!: Targeting tweens with STEM. *Children & Libraries; Chicago*, *11*(3), 47–52.

Lee, N. T. (2020). *Bridging digital divides between schools and communities*. Brookings Institute. https://www.brookings.edu/research/bridging-digital-divides-between-schools-and-communities/

Lerner, R. M. (2006). Developmental science, developmental systems, and contemporary theories of human development. In W. Damon & R. M. Lerner (Eds.), *Handbook of child psychology* (Vol. 1, Issue 1, pp. 1–17). Wiley & Sons, Inc. https://doi.org/http://dx.doi.org/10.1002/9780470147658.chpsy0101

Leventhal, T. (2018). Neighborhood context and children's development: When do neighborhoods matter most? *Child Development Perspectives*, *12*(4), 258–263. https://doi.org/10.1111/cdep.12296

Leventhal, T., & Brooks-Gunn, J. (2000). The neighborhoods they live in: The effects of neighborhood residence on child and adolescent outcomes. *Psychological Bulletin*, *126*(2), 309–337. https://doi.org/10.1037/0033-2909.126.2.309

Leventhal, T., & Brooks-Gunn, J. (2011). Changes in neighborhood poverty from 1990 to 2000 and youth's problem behaviors. *Developmental Psychology*, *47*(6), 1680–1698. https://doi.org/10.1037/a0025314

Leventhal, T., & Dupéré, V. (2019). Neighborhood effects on children's development in experimental and nonexperimental research. *Annual Review of Developmental Psychology*, *1*(1), 149–176. https://doi.org/10.1146/annurev-devpsych-121318-085221

Leventhal, T., Dupéré, V., & Shuey, E. A. (2015). Children in neighborhoods. In M. H. Bornstein & T. Leventhal (Eds.), *Handbook of child psychology and developmental science* (7th ed., pp. 493–533). John Wiley & Sons, Inc.

Logan, J. R., Alba, R. D., & Zhang, W. (2002). Immigrant enclaves and ethnic communities in New York and Los Angeles. *American Sociological Review*, *67*(2), 299–322.

Louie, V. (2012). *Keeping the immigrant bargain: The costs and rewards of success in America*. Russell Sage Foundation.

Marks, A. K., Godoy, C., & García Coll, C. (2013). An ecological approach to understanding immigrant child and adolescent developmental competencies. In L. Gershoff, R. Mistry, & D. Crosby (Eds.), *The contexts of child development* (pp. 75–89). Oxford University Press.

Marks, A. K., Mckenna, J. L., & Coll, C. G. (2018). National immigration receiving contexts. *European Psychologist*, *23*(1), 6–20. https://doi.org/10.1027/1016-9040/a000311

Marrow, H. B. (2011). *New destination dreaming: Immigration, race, and legal status in the rural American South.* Stanford, CA: Stanford University Press.

Marsh, H.W.(1992). *Self Description Questionnaire (SDQ) II: A theoretical and empirical basis for the measurement of multiple dimensions of adolescent self-concept. An interim test manual and a research monograph.* SELF Research Centre.

Massey, D. S. (1990). American apartheid: Segregation and the making of the underclass. *The American Journal of Sociology*, *96*(2), 329–357.

McWayne, C. M., Doucet, F., & Mistry, J. (2019). Family-school partnerships in ethnocultural communities: Reorienting conceptual frameworks, research methods, and intervention efforts by rotating our les. In C. M. McWayne & F. Doucet (Eds.), *Ethnocultural diversity and the home-to-school link*. Springer. https://doi.org/10.1007/978-3-030-14957-4_1

Moll, L. C. (2010). Mobilizing culture, language, and educational practices: Fulfilling the promises of Mendez and Brown. *Educational Researcher*, *39*(6), 451–460. https://www.jstor.org/stable/40793353

Mujahid, M. S., Diez Roux, A. V., Morenoff, J. D., & Raghunathan, T. (2007). Assessing the measurement properties of neighborhood scales: From psychometrics to ecometrics. American Journal of Epidemiology, 165(8), 858–867. https://doi.org/10.1093/aje/kwm040

Murphey, D., Bandy, T., & Moore, K. A. (2012). *Frequent residential mobility and young children's well-being*. Child Trends.

Museus, S. D., Palmer, R. T., Davis, R. J., & Maramba, D. C. (2011). Special issue: Racial and ethnic minority students' success in STEM education. *ASHE Higher Education Report*, *36*(6), 1–140. https://doi.org/10.1002/aehe.3606

Musu-Gillette, L., de Brey, C., McFarland, J., Hussar, W., Sonnenberg, W., & Wilkinson-Flicker, S. (2017). *Status and trends in the education of racial and ethnic groups 2017*. Retrieved from http://nces.ed.gov/pubsearch

Najarian, M., Pollack, J. M., & Sorongon, A. G. (2009). *Early Childhood Longitudinal Study, Kindergarten Class of 1998–99 (ECLS-K), psychometric report for the eighth grade (NCES 2009–002).* National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education. Washington, DC.

National Academies of Sciences. (2004). *Engaging schools: Fostering high school students' motivation to learn*. National Academies Press. https://doi.org/10.17226/10421

National Academies of Sciences. (2017). *Promoting the educational success of children and youth learning English: Promising futures*. National Academies Press.

National Academies of Sciences, Engineering, and Medicine. (2007). *Rising above the gathering storm: Energizing and employing America for a brighter economic future*. National Academies Press. https://doi.org/10.17226/11463

National Academies of Sciences, Engineering, and Medicine. (2011). *Expanding underrepresented minority participation: America's science and technology talent at the crossroads*. National Academies Press. https://doi.org/10.17226/12984

National Academies of Sciences, Engineering, and Medicine. (2018). *English learners in STEM subjects: Transforming classrooms, schools, and lives.* National Academies Press. https://doi.org/10.17226/25182

National Academies of Sciences, Engineering, and Medicine. (2019). *Monitoring educational equity*. National Academies Press. https://doi.org/10.17226/25389

National Center for Education Statistics. (n.d.). *About CCD*. Common Core of Data: America's Public Schools. https://nces.ed.gov/ccd/aboutccd.asp

National Research Council. (1984). *Development during middle childhood: The years from six to twelve*. National Academies Press. https://doi.org/10.17226/56

National Research Council. (2009). *Learning science in informal environments: People, places, and pursuits*. National Academies Press. https://doi.org/10.17226/12190

Neuman, S. B. (2002). The role of school libraries in elementary and secondary education. *Teacher Librarian*, *30*(1), 74–75.

Ngo, D., & Dustan, A. (2019). Closing the STEM gender gap: Choice, access, and policies in Mexico City high schools. *Economics*.

Nielen, T. M. J., & Bus, A. G. (2015). Enriched school libraries. *AERA Open*, *1*(4), 233285841561941. https://doi.org/10.1177/2332858415619417

Noah, A. J., & Landale, N. S. (2018). Parenting strain among Mexican-origin mothers: Differences by parental legal status and neighborhood. *Journal of Marriage and Family, 80*(April), 317–333. https://doi.org/10.1111/jomf.12438

Noe-Bustamante, L., Flores, A., & Shah, S. (2019). *Facts on Hispanics of Mexican origin in the United States, 2017*. Retrieved from https://www.pewresearch.org/hispanic/fact-sheet/u-s-hispanics-facts-on-mexican-origin-latinos/

Nunes, T., & Bryant, P. (2015). The development of mathematical reasoning. *Handbook of child psychology and developmental science*, 1–48. https://doi.org/10.1002/9781118963418.childpsy217

Ochoa, G. L. (2013). *Academic profiling: Latinos, Asian Americans, and the achievement gap*. University of Minnesota Press. www.jstor.org/stable/10.5749/j.ctt5hjjwp.4

Overton, W. F. (2013). Relationism and relational developmental systems: A paradigm for developmental science in the post-Cartesian era. *Advances in Child Development and Behavior*, *44*, 21–64. https://doi.org/http://dx.doi.org/10.1016/B978-0-12-397947-6.00002-7

Perreira, K. M., Chapman, M. V., & Stein, G. L. (2006). Becoming an American parent: Overcoming challenges and finding strength in a new immigrant Latino community. *Journal of Family Issues*, *27*(10), 1383–1414. https://doi.org/10.1177/0192513X06290041

Pew Research Center. (2021). *Racial disparities in U.S. public school populations have declined somewhat over the last two decades*. Retrieved from https://www.pewresearch.org/fact-tank/2021/12/15/u-s-public-school-students-often-go-to-schools-where-at-least-half-of-their-peers-are-the-same-race-or-ethnicity/ft_21-12-03_schoolrace_3/

Philbin, S. P., & Ayón, C. (2016). Luchamos por nuestros hijos: Latino immigrant parents strive to protect their children from the deleterious effects of anti-immigration policies. *Children and Youth Services Review*, *63*, 128–135. https://doi.org/http://dx.doi.org/10.1016/j.childyouth.2016.02.019

Pong, S., & Hao, L. (2007). Neighborhood and school factors in the school performance of immigrant children. *The International Migration Review*, *41*(1), 206–241. https://doi.org/10.1111/J.1747-7379.2007.00062.X

Pong, S., & Zeiser, K. L. (2012). Student engagement, school climate, and academic achievement of immigrant children. In C. García Coll & A. K. Marks (Eds.), *The immigrant paradox in children and adolescents: Is becoming American a developmental risk?* (pp. 209–232). American Psychological Association. https://doi.org/10.1037/13094-009

Portes, A., & Rumbaut, R. G. (2014). Making it in America: Education, occupation, and entrepreneurship. In *Immigrant America: A portrait* (4th ed., pp. 112–160). University of California Press.

Potochnick, S., Perreira, K. M., & Fuligni, A. J. (2012). Fitting in: The roles of social acceptance and discrimination in shaping the daily psychological well-being of Latino youth. *Social Science Quarterly*, *93*(1), 173–190. https://doi.org/10.1111/j.1540-6237.2011.00830.x

Quintana, S. M., Chavez, T. A., & Ramirez Stege, A. M. (2015). What does it mean to be Mexican American?: Children's and adolescents' perspectives. In Y. M. Caldera & E. W. Lindsey (Eds.), *Mexican American children and families: Multidisciplinary perspectives* (pp. 13–26). Routledge.

Redding, C. (2019). A teacher like me: A review of the effect of student-teacher racial/ethnic matching on teacher perceptions of students and student academic and behavioral outcomes. *Review of Educational Research*, *89*(4), 499–535. https://doi.org/10.3102/0034654319853545

Reichard, R. (2017, September). 10 Latinas making their mark in the STEM world. *Remezcla*. https://remezcla.com/lists/culture/latinas-stem-science-technology-engineering-mathematics/

Robinson, J. P., & Lubienski, S. T. (2011). The development of gender achievement gaps in mathematics and reading during elementary and middle school: Examining direct cognitive assessments and teacher ratings. *American Educational Research Journal*, *48*(2), 268–302. https://doi.org/10.3102/0002831210372249

Rogoff, B., & Chavajay, P. (1995). What's become of research on the cultural basis of cognitive development? *American Psychologist*, *50*(10), 859–877. https://doi.org/10.1037/0003-066X.50.10.859

Rogoff, B., Callanan, M., Gutiérrez, K. D., & Erickson, F. (2016). The organization of informal learning. *Review of Research in Education*, *40*(1), 356–401. https://doi.org/10.3102/0091732X16680994

Rogoff, B., Coppens, A. D., Alcalá, L., Aceves-azuara, I., Ruvalcaba, O., López, A., & Dayton, A. (2017). Noticing learners' strengths through cultural research. *Perspectives on Psychological Science*, *12*(5), 876–888. https://doi.org/10.1177/1745691617718355

Roosa, M. W., Knight, G. P., & Umaña-Taylor, A. J. (2012). Research with underresearched populations. In H. Cooper (Ed.), *APA handbook of research methods in psychology, Vol 1: Foundations, planning, measures, and psychometrics* (pp. 101–115). American Psychological Association. https://doi.org/10.1037/13619-007

Rose, T. (2015). The end of average: How we succeed in a world that values sameness. HarperOne.

Rumberger, R. W., & Larson, K. A. (1998). Toward explaining differences in educational achievement among Mexican American language-minority students. *Sociology of Education*, *71*(1), 68–92. https://www.jstor.org/stable/2673222

Sampson, R. J., Morenoff, J. D., & Gannon-Rowley, T. (2002). Assessing “neighborhood effects”: Social processes and new directions in research. *Annual Review of Sociology*, *28*(1), 443–478. https://doi.org/10.1146/annurev.soc.28.110601.141114

Sanders, M. G. (2001). The role of “community” in comprehensive school, family, and community partnership programs. *The Elementary School Journal*, *102*(1), 19–34. https://www.jstor.org/stable/1002167

Santos, C. E., & Toomey, R. B. (2018). Integrating an intersectionality lens in theory and research in developmental science. *New Directions for Child and Adolescent Development*, *2018*(161), 1–9. https://doi.org/10.1002/cad.20245

Schneider, B., Martinez, S., & Owens, A. (2006). Barriers to educational opportunities for Hispanics in the United States. In M. Tienda & F. Mitchell (Eds.), *Hispanics and the future of America* (pp. 179–227). National Academies Press. https://www.nap.edu/catalog/11539/hispanics-and-the-future-of-america

Schueths, A. M., & Carranza, M. A. (2012). Navigating around educational road blocks: Mentoring for pre-K to 20+ Latino/a students. *Latino Studies*, *10*(4), 566–586. https://doi.org/10.1057/lst.2012.43

Schwartz, S. E. O., Rhodes, J. E., Spencer, R., & Grossman, J. B. (2013). Youth initiated mentoring: Investigating a new approach to working with vulnerable adolescents. *American Journal of Community Psychology*, 1–15.

Scott, J. C., Mcdermott, E. R., Harris, A. N., Johnson, K. G., Pinderhughes, E. E., & Spencer, M. B. (2021). Looking through a kaleidoscope: The phenomenological ethnic-racial socialization conceptual model and its application to U.S. Black and Latino youth and families. *The Journal of Social Issues*. https://doi.org/10.1111/josi.12480

Shi, Y., Leite, W., & Algina, J. (2010). The impact of omitting the interaction between crossed factors in cross-classified random effects modelling. *British Journal of Mathematical and Statistical Psychology*, *63*(1), 1–15. https://doi.org/10.1348/000711008X398968

Shuey, E. A., & Leventhal, T. (2019). Overlapping contexts: The role of neighborhoods and parenting for child development. In M. Bornstein (Ed.), *Handbook of Parenting* (3rd ed.). Routledge.

Siegel, P., Martin, E., & Bruno, R. (2001). Language use and linguistic isolation: Historical data and methodological issues. *Washington, DC: US Census Bureau*, *April 2001*, 167–190. https://www.census.gov.edgekey.net/hhes/socdemo/language/data/census/li-final.pdf

Simpkins, S. D., Price, C. D., & Garcia, K. (2015). Parental support and high school students' motivation in biology, chemistry, and physics: Understanding differences among latino and caucasian boys and girls. *Journal of Research in Science Teaching*, *52*(10), 1386–1407. https://doi.org/10.1002/tea.21246

Small, M. L. (2006). Neighborhood institutions as resource brokers: Childcare centers, interorganizational ties, and resource access among the poor. *Social Problems*, *53*(2), 274–292. https://doi.org/10.1525/sp.2006.53.2.274

Small, M. L., & Adler, L. (2019). The role of space in the formation of social ties. *Annual Review of Sociology*, *45*(1), 111–132. https://doi.org/10.1146/annurev-soc-073018-022707

Small, M. L., & McDermott, M. (2006). The presence of organizational resources in poor urban neighborhoods: an analysis of average and contextual effects. *Social Forces*, *84*(3), 1697–1724. https://doi.org/10.1353/sof.2006.0067

Snijders, T. A. B., & Bosker, R. J. (2012). *Multilevel analysis: An introduction to basic and advanced multilevel modeling* (2nd ed.). SAGE Publications Inc.

Society for Research in Child Development. (2018). *How the threat of deportation affects children in Latino immigrant families* (Vol. 31, Issue 3). www.srcd.org/publications/ social-policy-report

Spencer, B. (2016). The book and the rocket: The symbiotic relationship between american public libraries and the space program, 1950–2015. *Information & Culture*, *51*(4), 550–582. https://doi.org/10.7560/ic51405

Spencer, M. B., Dupree, D., & Hartmann, T. (1997). A phenomenological variant of ecological systems theory (PVEST): A self-organization perspective in context. *Development and Psychopathology*, *9*(4), 817–833. https://doi.org/10.1017/s0954579497001454

Stanton-Salazar, R. D. (1997). A social capital framework for understanding the socialization of racial minority children and youths. *Harvard Educational Review*, *67*(1), 1–39. https://doi.org/10.17763/haer.67.1.140676g74018u73k

Stanton-Salazar, R. D. (2001). *Manufacturing hope and despair: The school and kin support networks of U.S.-Mexican youth*. Teachers College Press.

Stanton-Salazar, R. D. (2011). A social capital framework for the study of institutional agents and their role in the empowerment of low-status students and youth. *Youth and Society*, *43*(3), 1066–1109. https://doi.org/10.1177/0044118X10382877

Stanton-Salazar, R. D., & Dornbusch, S. M. (1995). Social capital and the reproduction of inequality: Information networks among Mexican-origin high school students. *Sociology of Education*, *68*(2), 116–135. https://doi.org/10.2307/2112778

Stanton-Salazar, R. D., & Spina, S. U. (2003). Informal mentors and role models in the lives of urban Mexican-origin adolescents. *Anthropology & Education, 34(3),231-254* https://doi.org/10.1525/aeq.2003.34.3.231

STEM Funders Network. (2021). *STEM learning ecosystems overview*. STEM Ecosystems. https://stemecosystems.org/about/

Stewart, S., & Haynes, C. (2016). An Alternative Approach to Standardized Testing: A Model That Promotes Racial Equity and College Access. *Journal of Critical Scholarship on Higher Education and Student Affairs Volume*, *2*(1). https://ecommons.luc.edu/jcshesa/vol2/iss1/9

Stone, S., & Han, M. (2005). Perceived school environments, perceived discrimination, and school performance among children of Mexican immigrants. *Children and Youth Services Review*, *27*(1), 51–66. https://doi.org/10.1016/j.childyouth.2004.08.011

Suárez-Orozco, C., Motti-Stefanidi, F., Marks, A., & Katsiaficas, D. (2018). An integrative risk and resilience model for understanding the adaptation of immigrant-origin children and youth. *American Psychologist*, *73*(6), 781–796. https://doi.org/10.1037/amp0000265

Suárez-Orozco, C., Yoshikawa, H., Teranishi, R. T., & Suárez-Orozco, M. M. (2011). Growing up in the shadows: The developmental implications of unauthorized status. *Harvard Educational Review, 81*(3), 438–472. https://doi.org/10.17763/haer.81.3.g23x203763783m75

Talusan, L. A. (2022). The identity-conscious educator: Building habits and skills for a more inclusive school. Solution Tree Press.

Taylor, E. V. (2013). The mathematics of tithing: A study of religious giving and mathematical development. *Mind, Culture, and Activity*, *20*(2), 132–149. https://doi.org/10.1080/10749039.2012.691595

TEDx Talks. (2012, September 18). *Bringing cultural context and self-identity into education: Brian Lozenski at TEDxUMN* [Video]. YouTube. https://www.youtube.com/watch?v=bX9vgD7iTqw

The Combahee River Collective. (n.d.). *The Combahee River Collective statement*. https://doi.org/10.4324/9780429494277-3

The United States Department of Education. (2016). *STEM 2026: A vision for innovation in STEM education.* U.S. Department of Education Office of Innovation and Improvement.

TIES/STEM Learning Ecosystem Community of Practice. (2021). *Restoring America's position as a world leader by investing in STEM.* https://1va22l4dun7a16k87y2j3tfx-wpengine.netdna-ssl.com/wp-content/uploads/2021/02/FinalSLECOPfederalreport.pdf

Tourangeau, K., Nord, C., Lê, T., Sorongon, A. G., & Najarian, and M. (2009). *Early Childhood Longitudinal Study, Kindergarten Class of 1998–99 (ECLS-K), combined user's manual for the ECLS-K eighth-grade and K–8 full sample data files and electronic codebooks (NCES 2009–004)*. National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education.

Tourangeau, K., Vaden-kiernan, N., Zill, N., Pollack, J., Arbor, A., Atkins-burnett, S., & Walston, J. (2001). *ECLS-K Base Year Public-Use Data Files And Electronic Codebook.* National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education.

Umaña-Taylor, A. J., Quintana, S. M., Lee, R. M., Cross, W. E., Rivas-Drake, D., Schwartz, S. J., Syed, M., Yip, T., Seaton, E., French, S., Knight, G. P., Markstrom, C., & Sellers, R. M. (2014). Ethnic and racial identity during adolescence and into young adulthood: An integrated conceptualization. *Child Development*, *85*(1), 21–39. https://doi.org/10.1111/cdev.12196

Valenzuela, A., Garcia, E., Romo, H., & Perez, B. (2012). Institutional and structural barriers to Latino/a achievement. *Association of Mexican-American Educators Journal*, *6*(3), 22–29.

Valla, J. M., & Williams, W. M. (2012). Increasing achievement and higher-education representation of under-represented groups in science, technology, engineering, and mathematics fields: A review of current K-12 intervention programs. *Journal of Women and Minorities in Science and Engineering*, *18*(1), 21–53. https://doi.org/10.1615/JWomenMinorScienEng.2012002908

Vallejo, J. A. (2012). *Barrios to burbs: The making of the Mexican American middle class*. Stanford University Press.

van Buuren, S. (2015). *Package "MICE."* https://doi.org/10.18637/jss.v045.i03

Vega, W. A., Ang, A., Rodriguez, M. a., & Finch, B. K. (2011). Neighborhood protective effects on depression in Latinos. *American Journal of Community Psychology*, *47*(1), 114–126. https://doi.org/10.1007/s10464-010-9370-5

Wenger, E. (1998). *Community of practice: Learning, meaning, and identity*. Cambridge University Press.

Wooldridge, J. M. (2014). *Introduction to econometrics*. Cengage Learning EMEA.

Xie, Y., Fang, M., & Shauman, K. (2015). STEM Education. *Annual Review of Sociology*, *41*(1), 331–357. https://doi.org/10.1146/annurev-soc-071312-145659

Xie, Y., & Killewald, A. (2012). Does science appeal to students? In *Is American Science in Decline?* Harvard University Press.

Yahirun, J. J., Perreira, K. M., & Fuligni, A. J. (2015). Family obligation across contexts: Hispanic youth in North Carolina and Southern California. *Journal of Family Issues*, *36*(10), 1296–1323. https://doi.org/10.1177/0192513X13501664

Yoshikawa, H. (2011). Documentation status and social ties: Households, networks, and organizations in the lives of undocumented parents and their children. In *Immigrants raising citizens*. Russel SAGE Foundation. https://www.jstor.org/stable/10.7758/9781610447072.8

Yoshikawa, H., & Kalil, A. (2011). The effects of parental undocumented status on the developmental contexts of young children in immigrant families. *Child Development Perspectives*, *5*(4), 291–297. https://doi.org/10.1111/j.1750-8606.2011.00204.x

Yosso, T. J. (2005). Whose culture has capital? A critical race theory discussion of community cultural wealth. *Race Ethnicity and Education*, *8*(1), 69–91. https://doi.org/10.1080/1361332052000341006

Table 1

Percent Missing Data

	Imputation sample		Analytic sample	
	Cases with Mexican youth any generation panel weight not missing		Cases with Mexican youth immigrant gen 1-2 panel weight non-zero	
Characteristics	*n* (rounded)	%Missing	*n* (rounded)	%Missing
Total	~900		~670	
Child and family				
Age	120	13.6	100	14.9
Exceptionality	120	13.5	100	14.9
Mother's age at birth	160	17.2	120	17.8
Two-parent household	30	3.2	30	3.9
Siblings	30	3.2	30	3.9
Parental education WK[1]	30	3.2	30	3.9
Parental employment WK[1]	120	13.5	100	14.9
Dad in STEM	290	31.8	220	32.4
Mom in STEM	460	50.8	390	57.8
Public assistance WK	30	3.3	30	4.0
Income-to-need ratio WK	30	3.2	30	3.9
Spanish-English exposure scale WK	220	24.4	170	25.5
Places lived (4mo+) by end of grade 1	50	5.6	50	7.5
School				
%Children in school eligible for free or reduced lunch	440	48.2	340	50.4

See notes at end of table

Table 1

Percent Missing Data –Continued

	Imputation sample		Analytic sample	
	Cases with Mexican youth (any generation) panel weight not missing		Cases with Mexican youth from immigrant families (generation 1-2) panel weight non-zero	
	n (rounded)	%Missing	*n* (rounded)	%Missing
%Students in school identify as Hispanic	270	29.9	210	30.7
% Multilingual children in school designated LEP[2]	270	29.8	220	32.5
%Teachers identifying as Hispanic	260	28.2	210	31.0
Number of teachers/aides for ESL[3] classes FT[4] & PT[5]	†	†	180	27.5
Number of aides for ESL[3] classes FT[4] & PT[5]	210	23.7	†	†
Number of teachers for ESL[3] classes FT[4]	220	24.4	†	†
Library quality index, interviewer SSO[6]	280	30.7	220	32.4
Computer lab quality index, interviewer SSO[6]	360	39.9	280	41.5
Neighborhood				
Average # science museums	#	#	#	#

See notes at end of table

Table 1

Percent Missing Data –Continued

	Imputation sample		Analytic sample	
	Cases with Mexican youth (any generation) panel weight not missing		Cases with Mexican youth from immigrant families (generation 1-2) panel weight non-zero	
	n (rounded)	%Missing	*n* (rounded)	%Missing
Average # libraries	#	#	#	#
Average # education orgs.	#	#	#	#
Average # youth orgs., centers, clubs	#	#	#	#
Average # orgs. serving cultural, ethnic, and minoritized groups	#	#	#	#
Average # religious orgs.	#	#	#	#
Average # STEM orgs.	#	#	#	#
Outcomes				
Grade 8 math T-score	10	0.7	#	#
Grade 8 science T-score	#	#	#	#
Grade 8 math or science teacher ARS[7] score	90	10	80	11.8
Grade 8 Child SDQ[8] math subscale score	10	0.6	#	#

Rounds to zero † Not applicable
[1] WK = Kindergarten wave (fall and/or spring); [2] LEP = Limited English-proficient; [3] ESL =English-as-Second language; [4] FT = Full-time; [5]PT = Part-time; [6]SSO = Systematic Social Observation; [7]ARS = Academic Rating Scale ; [8]SDQ = Self-Description Questionnaire
NOTE: Counts rounded to nearest 10 per NCES/IES reporting standards
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Cohort 1998-1999 (ECLS-K) Restricted-Use Data File, previously unpublished tabulation; U.S. Census Bureau, Summary File 3, 2000, Public-Use Data File, previously unpublished tabulation; National Center for Charitable Statistics, Business Master Files, 1998-2000, Public-Use Data Files, previously unpublished tabulation.

Table 2

Descriptive Statistics for Analytic Sample: Child- Level

Characteristic	*n* pooled (rounded)	%	*M*(SE) *Unclustered*	*M*(SE) *Clustered*	Range
Child					
Age (years)			5.36 (0.015)	5.36(0.017)	3.1 – 6.8
Male	340	50.7			
Exceptionality	60	8.2			
Immigrant generation					
1st generation	60	9.6			
2nd generation	590	87.9			
1-2 generation	20	2.5			
Family					
Mom age at 1st birth (years)			21.74 (0.206)	21.74 (0.252)	13.0-38.0
Two-parent household	570	85.8			
Siblings	590	87.6			
Parents' highest schooling					
Less than HS[1]	290	42.8			
HS[1]/GED (omitted referent)	210	30.9			
More than HS[1]	180	26.3			
Employment					
FT[2] working parent	560	84.0			
Dad in STEM field[3]	40	5.3			
Mom in STEM field[3]	50	6.8			
At least 1 parent in STEM	80	11.4			
No parents in STEM[3]	590	88.6			
Public assistance	90	14.1			
Income-to-need ratio			1.44 (0.057)	1.44 (0.066)	0-20.6
Moved 2+ times by end grade 1	120	17.8			
Spanish-English index scale (0 = Spanish, 4 = English)			1.78 (0.047)	1.78 (0.051)	0-4
Urbanicity					
City (omitted referent)	450	67.3			
Suburb + rural	220	32.7			
Suburb[3]	180	27.5			
Rural[3]	30	5.2			
Region					
West (omitted referent)	410	60.9			
South	200	29.6			
Northeast + Midwest	60	9.6			

See notes at end of table

Table 2

Descriptive Statistics for Analytic Sample –*Continued*

Characteristic	*n* pooled (rounded)	%	*M*(SE) *Unclustered*	*M*(SE) *Clustered*	Range
Indicators					
Same school ID, waves 1-5	530	79.6			
Same neighborhood ID, waves 1-5	580	86.2			
School: Public (omitted referent)	620	92.1			
Outcomes (Grade 8)					
Math achievement			46.76 (0.353)	46.76 (0.433)	25.9 - 74.8
Science achievement			45.23 (0.346)	45.23 (0.421)	23.1 - 74.3
Math or science ARS[4] score			2.66 (0.039)	2.66 (0.044)	1.04 - 4.96
ARS[4] math[3]			2.74 (0.054)	2.74 (0.054)	1.04 - 4.94
ARS[4] science[3]			2.57 (0.057)	2.57 (0.064)	1.04 - 4.96
%Students math teacher ARS[4]	340	50.3			
%Students science teacher ARS[4]	330	49.6			
SDQ[5] math score			2.51 (0.035)	2.51(0.037)	1.0 - 4.0

[1]HS = High school; [2]FT = Full-time; [3]Not in analysis (descriptive only); [4]ARS = Academic Rating Scale; [5]SDQ = Self-Description Questionnaire;

NOTE: SE clustered by unique combination of school and neighborhood (*n* ~ 280 combinations); Counts rounded to nearest 10 per NCES reporting standards

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Cohort 1998-1999 (ECLS-K) Restricted-Use Data File, previously unpublished tabulation.

Table 3

Descriptive Statistics for Analytic Sample: Context-Level

Characteristics Per School or Neighborhood	*n* pooled (rounded)	%	*M*(SE)	Range
School	220			
Sector: Public (omitted referent)		89		
Peer composition				
%Students eligible free/reduced lunch			58.06 (2.364)	0-100.0
%Students identify as Hispanic			41.40 (2.203)	0-99.2
% Multilingual children LEP[1]			22.83 (1.852)	0-99.0
Teacher composition				
%Teachers identify as Hispanic			17.60 (1.719)	0-100.0
#teachers/aides ESL[2] (winsorized)			7.68 (1.126)	0-78.0
School resources, interviewer SSO[3]				
Library quality index			7.27 (0.126)	0-8.0
Computer lab quality index			5.88 (0.222)	0-8.0
Neighborhood	250			
Concentrated advantage (STD[4]; covariate)			0.48 (0.076)	-1.3 – 5.3
Co-ethnic concentration (STD[4]; predictor)			-0.41 (0.063)	-1.8-3.2
Institutional resources				
Average Science museums				
No science museum across years	220	87		
At least 1 science museum across years	30	13		
Average # libraries				
No library across years	170	68		
At least 1 library across years	60	25		
More than 1 library across years	20	7		
Average # education orgs. (winsorized)			4.97 (0.235)	0 - 18
Average youth orgs., centers, clubs factor (STD[4])			0.08 (0.065)	-1.5 - 3.5
Average # orgs. serving cultural, immigrant, minoritized groups (winsorized)			2.17 (0.151)	0 - 10.3
Average # religious orgs. (winsorized)			12.48 (0.60)	0 - 44.0
Average # STEM orgs. factor (STD[4],winsorized)			0.09 (0.065)	-0.9 - 3.8

[1]LEP = Limited English-proficient; [2]ESL =English-as-Second language; [3]SSO = Systematic Social Observation; [4]STD = standardized.

NOTE: Context-level (not individual-level) data

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Cohort 1998-1999 (ECLS-K) Restricted-Use Data File, previously unpublished tabulation; U.S. Census Bureau, Summary File 3, 2000, Public-Use Data File, previously unpublished tabulation; National Center for Charitable Statistics, Business Master Files, 1998-2000, Public-Use Data Files, previously unpublished tabulation

Table 4

Correlation Across Years of Neighborhood Resources

Neighborhood Institutional Resource		Years			
		1998	1999	2000	Average
Science Museums	# Science museums 1998	1			
	# Science museums 1999	.86	1		
	# Science museums 2000	.72	.79	1	
	Average across years	.93	.95	.91	1
		Years			
		1998 1999		2000	Average
Libraries	# Libraries 1998	1			
	# Libraries 1999	.91	1		
	# Libraries 2000	.80	.83	1	
	Average across years	.95	.96	.94	1
		Years			
		1998	1999	2000	Average
Education organizations	# Edu orgs. 1998	1			
	# Edu orgs. 1999	.96	1		
	# Edu orgs. 2000	.86	.89	1	
	Average across years	.97	.98	.95	1
		Years			
		1998	1999	2000	Average
Youth organizations, centers, clubs, (factor scored)	#Youth orgs., centers, & clubs 1998	1			
	# Youth orgs., centers, & clubs 1999	.95	1		
	# Youth orgs., centers, & clubs 2000	.84	.88	1	
	Average across years	.97	.98	0.95	1

See notes at end of table

Table 4

Correlation Across Years for Neighborhood Resources—*Continued*

Neighborhood Institutional Resource		Years 1998	1999	2000	Average
Organizations serving cultural, immigrant, & minoritized groups	# Orgs. serving cultural, immigrant, & minoritized groups 1998	1			
	# Orgs. serving cultural, immigrant, & minoritized groups 1999	.94	1		
	# Orgs. serving cultural, immigrant, & minoritized groups 2000	.88	.92	1	
	Average across years	.97	.98	.97	1
		Years 1998	1999	2000	Average
Religious and faith-based organizations	# Religious orgs. 1998	1			
	# Religious orgs. 1999	.98	1		
	# Religious orgs. 2000	.91	.93	1	
	Average across years	.98	.99	.97	1
		Years 1998	1999	2000	Average
STEM organizations (factor scored)	# STEM orgs 1998	1			
	# STEM orgs 1999	.94	1		
	# STEM orgs 2000	.80	.88	1	
	Average across years	.95	.98	.94	1

NOTE: Correlations during variable construction using pre-imputation sample (N ~ 1,090)
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Cohort 1998-1999 (ECLS-K) Restricted-Use Data File; National Center for Charitable Statistics, IRS Business Master Files, 1998-2000, Public-Use Data Files, Previously unpublished tabulation.

Table 5

Univariate Associations Between Neighborhood and School Social Structure and Resources with Children's Grade 8 Math Achievement Scores

	Parameters					Effect Sizes			
Variable	γ00 (SE)	γ01 (SE)	U_{school}	$U_{neighborhood}$	$U_{individual}$	R^2_{global}	f^2 %	R^2_{school} %	R^2_{neigh} %
Intercept	2.67*** (0.044)	†	6.86	1.73	74.14	†	†	†	†
Co-ethnic Concentration	46.88*** (0.414)	-0.82 (0.408)	7.49	0.47	74.16	0.01	0.75	9.10	72.86
Science museum	47.04*** (0.442)	-0.34 (1.201)	6.54	2.04	74.12	#	0.03	4.65	17.94
# Libraries	47.70*** (0.474)	-1.84** (0.623)	5.45	1.55	74.29	0.02	1.77	20.51	10.68
# Education orgs.	46.98*** (0.678)	#	6.88	1.73	74.13	#	-0.01	0.33	0.43
# Youth orgs, centers, clubs	47.00*** (0.416)	-0.14 (0.397)	6.48	1.96	74.23	#	0.08	5.63	13.05
# Orgs serving cultural, immigrant minoritized groups	47.01*** (0.56)	-0.01 (0.178)	6.86	1.75	74.13	#	#	0.11	0.92
# Religious orgs.	47.86*** (0.694)	-0.07 (0.042)	5.59	2.24	74.39	0.01	0.63	18.58	29.29
# STEM Orgs.	46.99*** (0.417)	0.21 (0.399)	7.32	1.31	74.09	#	0.01	6.72	24.23

See notes at end of table

Table 5

Univariate Associations Between Neighborhood and School Social Structure and Resources with Children's Grade 8 Math Achievement Scores –Continued

	Parameters					Effect Sizes			
Variable	γ00 (SE)	γ01 (SE)	U_{school}	$U_{neighborhood}$	$U_{individual}$	R^2_{global}	f^2 %	R^2_{school} %	R^2_{neigh} %
% teachers Hispanic	47.65*** (0.594)	-0.02 (0.016)	7.17	1.26	73.92	0.01	0.46	4.49	27.14
# Teachers/ aides ESL classes	47.34*** (0.531)	-0.03 (0.03)	6.60	1.89	74.01	#	0.29	3.84	8.89
Library quality index	43.47*** (1.97)	0.48 (0.262)	6.36	1.98	73.85	0.01	0.66	7.37	14.38
Computer lab quality index	46.13*** (0.872)	0.15 (0.13)	6.99	1.24	74.24	#	0.31	1.90	28.16

Rounds to zero; † Not applicable
<.05 **<.01 *<.001* unadjusted
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Cohort 1998-1999 (ECLS-K) Restricted-Use Data File, previously unpublished tabulation; U.S. Census Bureau, Summary File 3, 2000, Public-Use Data File, previously unpublished tabulation; National Center for Charitable Statistics, Business Master Files, 1998-2000, Public-Use Data Files, previously unpublished tabulation.

Table 6

Univariate Associations Between Neighborhood and School Social Structure and Resources with Children's Grade 8 Science Achievement Scores

	Parameters					Effect Sizes			
Variable	γ00 (SE)	γ01 (SE)	U_{school}	$U_{neighborhood}$	$U_{individual}$	R^2_{global}	f^2 %	R^2_{school} %	R^2_{neigh} %
Intercept	45.61*** (0.416)	†	9.51	0.14	70.35	†	†	†	†
Co-ethnic Concentration	45.39*** (0.412)	-1.35** (0.405)	8.40	0.32	69.72	0.02	1.99	11.67	132.71
Science Museum	45.7*** (0.44)	-0.69 (1.179)	8.98	0.68	70.27	#	0.08	5.54	395.57
# Libraries	46.04*** (0.479)	-1.13 (0.619)	8.87	#	70.51	0.01	0.78	6.73	100.00
# Education orgs.	45.82*** (0.671)	-0.05 (0.114)	9.30	0.15	70.46	#	0.11	2.18	7.68
# Youth orgs, centers, clubs	45.61*** (0.418)	0.20 (0.392)	9.86	#	70.19	#	-0.07	3.70	99.97
# Orgs serving cultural, immigrant minoritized groups	45.69*** (0.557)	-0.04 (0.176)	9.38	0.32	70.30	#	#	1.38	131.66
# Religious orgs.	46.49*** (0.693)	-0.07 (0.041)	8.00	0.94	70.49	0.01	0.71	15.85	580.29
# STEM Orgs.	45.6*** (0.417)	0.32 (0.396)	9.73	#	70.24	#	0.05	2.26	100.00

See notes at end of table

Table 6

Univariate Associations Between Neighborhood and School Social Structure and Resources with Children's Grade 8 Science Achievement Scores –Continued

	Parameters					Effect Sizes			
Variable	γ00 (SE)	γ01 (SE)	U_{school}	$U_{neighborhood}$	$U_{individual}$	R^2_{global}	f^2 %	R^2_{school} %	R^2_{neigh} %
% Hispanic teachers	46.43*** (0.587)	-0.03* (0.016)	9.44	#	69.98	0.01	0.72	0.75	100.00
Teachers/ aides ESL classes	46.12*** (0.521)	-0.05 (0.03)	8.41	0.27	70.35	0.01	1.22	11.57	95.30
Library quality index	45.19*** (1.965)	0.06 (0.262)	9.55	0.13	70.28	#	0.04	0.43	4.55
Computer lab quality index	44.22*** (0.869)	0.23 (0.13)	9.11	#	70.33	0.01	0.71	4.27	100.00

Rounds to zero; † Not applicable
<.05 **<.01 *<.001* unadjusted
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Cohort 1998-1999 (ECLS-K) Restricted-Use Data File, previously unpublished tabulation; U.S. Census Bureau, Summary File 3, 2000, Public-Use Data File, previously unpublished tabulation; National Center for Charitable Statistics, Business Master Files, 1998-2000, Public-Use Data Files, previously unpublished tabulation.

Table 7

Univariate Associations Between Neighborhood and School Social Structure and Resources with Children's Grade 8 Teacher-reported ARS Scores

Variable	Parameters				Effect Sizes			
	γ00 (SE)	γ01 (SE)	U_{school}	$U_{individual}$	R^2_{global}	f^2 %	R^2_{school} %	$R^2_{indiv.}$ %
Intercept	2.67*** (0.044)	†	0.06	0.94	†	†	†	†
Co-ethnic Concentration	2.67*** (0.044)	2.67 (0.044)	0.06	0.94	0.01	0.47	3.99	0.24
Science Museum	2.67*** (0.046)	#	0.06	0.94	#	#	0.02	#
# Libraries	2.72*** (0.051)	-0.11 (0.066)	0.05	0.94	0.01	0.61	15.80	0.34
# Education orgs.	2.73*** (0.071)	-0.01 (0.012)	0.05	0.94	#	0.24	8.06	0.25
# Youth orgs, centers, clubs	2.67*** (0.044)	-0.01 (0.042)	0.06	0.94	#	0.03	1.13	0.04
# Orgs serving cultural, immigrant minoritized groups	2.71*** (0.059)	-0.02 (0.019)	0.06	0.94	#	0.12	0.41	0.11
# Religious orgs.	2.69*** (0.074)	#	0.06	0.94	#	0.03	1.56	0.07
# STEM Orgs.	2.67*** (0.044)	-0.01 (0.042)	0.06	0.94	#	0.01	0.23	0.25
% Hispanic teachers	2.74*** (0.063)	#	0.06	0.94	#	0.36	0.47	0.36
Teachers/ aides ESL classes	2.72*** (0.056)	#	0.05	0.94	#	0.42	8.08	0.06
Library quality index	2.76*** (0.210)	-0.01 (0.028)	0.06	0.94	#	0.08	2.66	0.08

See notes at end of table

Variable	Parameters				Effect Sizes			
	γ00 (SE)	γ01 (SE)	U_{school}	$U_{individual}$	R^2_{global}	f^2 %	R^2_{school} %	$R^2_{indiv.}$ %
Computer lab quality index	2.88*** (0.094)	-0.03 (0.014)	0.06	0.93	0.01	1.12	4.71	0.88

Rounds to zero; † Not applicable
*<.05 **<.01 ***<.001* unadjusted
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Cohort 1998-1999 (ECLS-K) Restricted-Use Data File, previously unpublished tabulation; U.S. Census Bureau, Summary File 3, 2000, Public-Use Data File, previously unpublished tabulation; National Center for Charitable Statistics, Business Master Files, 1998-2000, Public-Use Data Files, previously unpublished tabulation.

Table 8

Univariate Associations Between Neighborhood and School Social Structure and Resources with Children's Grade 8 SDQ Math Scores

	Parameters				Effect Sizes			
Variable	γ00 (SE)	γ01 (SE)	$U_{neighborhood}$	$U_{individual}$	R^2_{global}	f^2 %	R^2_{neigh} %	R^2_{neigh} %
Intercept	2.510*** (0.039)	†	0.04	0.81	†	†	†	†
Co-ethnic Concentration	2.51*** (0.039)	0.03 (0.039)	0.03	0.81	#	0.11	4.14	0.07
Science Museum	2.51*** (0.041)	0.02 (0.117)	0.04	0.81	#	0.02	1.21	0.04
# Libraries	2.56*** (0.045)	-0.12 (0.06)	0.03	0.81	0.01	0.73	20.44	0.14
# Education orgs.	2.50*** (0.064)	#	0.04	0.81	#	#	1.47	0.07
# Youth orgs, centers, clubs	2.51*** (0.039)	0.01 (0.038)	0.04	0.81	#	-0.01	1.93	0.08
# Orgs serving cultural, immigrant minoritized groups	2.51*** (0.053)	#	0.04	0.81	#	#	0.03	#
# Religious orgs.	2.62*** (0.064)	-0.01 (0.004)	0.02	0.81	0.01	0.89	37.6	0.74
# STEM Orgs.	2.51*** (0.039)	-0.01 (0.038)	0.04	0.81	#	0.01	0.93	0.03
% Hispanic teachers	2.49*** (0.057)	#	0.03	0.81	#	0.09	4.91	0.12
Teachers/ aides ESL classes	2.47*** (0.051)	#	0.03	0.81	#	0.29	6.36	0.02

See notes at end of table

Table 8

Univariate Associations Between Neighborhood and School Social Structure and Resources with Children's Grade 8 SDQ Math Scores –Continued

	Parameters				Effect Sizes			
Variable	*γ00 (SE)*	*γ01 (SE)*	$U_{neighborhood}$	$U_{individual}$	R^2_{global}	f^2 %	R^2_{neigh} %	R^2_{neigh} %
Library quality index	2.39*** (0.186)	0.02 (0.025)	0.04	0.80	#	0.07	2.02	0.16
Computer lab quality index	2.49*** (0.083)	#	0.04	0.81	#	0.02	0.55	0.04

Rounds to zero; † Not applicable
<.05 **<.01 *<.001* unadjusted
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Cohort 1998-1999 (ECLS-K) Restricted-Use Data File, previously unpublished tabulation; U.S. Census Bureau, Summary File 3, 2000, Public-Use Data File, previously unpublished tabulation; National Center for Charitable Statistics, Business Master Files, 1998-2000, Public-Use Data Files, previously unpublished tabulation.

Table 9

Simultaneous Model Regressions for Children's Grade 8 Math and Science Outcomes

Variables	Math and Science Outcome Models			
	Math Achievement	Science Achievement	ARS Scores	SDQ math Scores
	Coef (SE)	Coef (SE)	Coef (SE)	Coef (SE)
Intercept	48.33***	46.94***	2.75***	2.70***
	(0.95)	(0.978)	(0.107)	(0.091)
Co-ethnic Concentration	†	-1.23**	-0.07	0.07
		(0.438)	(0.048)	(0.041)
Science Museum	-0.15	-0.81	0.05	0.02
	(1.216)	(1.189)	(0.131)	(0.116)
Libraries	-2.04	-0.98	-0.09	-0.17
	(0.648)	(0.645)	(0.071)	(0.062)
Education Orgs.	0.08	-0.10	-0.01	0.01
	(0.149)	(0.146)	(0.016)	(0.014)
Youth Orgs	0.06	0.33	0.01	0.09
	(0.568)	(0.581)	(0.064)	(0.055)
Cultural Orgs	0.15	0.25	-0.01	0.01
	(0.222)	(0.229)	(0.025)	(0.022)
Religious Orgs.	-0.09	-0.09	#	-0.01
	(0.049)	(0.049)		(0.005)
STEM Orgs.	0.37	0.14	0.01	-0.01
	(0.47)	(0.47)	(0.051)	(0.045)
Random Effects				
U_{school}	4.63	6.86	0.04	†
$U_{neighborhood}$	1.42	#	†	0.01
$U_{individual}$	74.41	70.28	0.94	0.81

See notes at end of table

Table 9

Simultaneous Model Regressions for Children's Grade 8 Math and Science Outcomes –Continued

	Math and Science Outcome Models			
	Math Achievement	Science Achievement	ARS Scores	SDQ math Scores
Variables	Coef (SE)	Coef (SE)	Coef (SE)	Coef (SE)
Effect Sizes				
R^2_{global}	0.028	0.04	0.01	0.03
f^2 %	2.83	3.71	1.24	2.85
R^2_{school} %	32.59	27.83	23.87	†
R^2_{neigh}%	17.87	100.00	†	74.11
R^2_{indiv}%	0.36	0.11	0.18	0.39

Rounds to zero; † Not applicable
<.05 **<.01 *<.001* unadjusted
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Cohort 1998-1999 (ECLS-K) Restricted-Use Data File, previously unpublished tabulation; U.S. Census Bureau, Summary File 3, 2000, Public-Use Data File, previously unpublished tabulation; National Center for Charitable Statistics, Business Master Files, 1998-2000, Public-Use Data Files, previously unpublished tabulation.

Table 10

Main Effects Models with Covariates: Associations Between Neighborhood and School Social Structure and Resources and Children's Grade 8 Math Achievement Scores

	Model							
	Co-Ethnic Conc.	Science Museum	Libraries	Education Orgs.	Youth Orgs.	Cultural Orgs.	Religious Orgs.	STEM Orgs.
Variable	Coef (SE)	Coef (SE)	Coef (SE)	Coef (SE)	Coef (SE)	Coef (SE)	Coef (SE)	Coef (SE)
Intercept	37.31*** (3.174)	36.40*** (3.08)	37.48*** (3.08)	36.56*** (3.10)	36.61*** (3.077)	36.09*** (3.087)	37.19*** (3.14)	36.42*** (3.086)
Co-ethnic Conc	1.05 (0.723)	†	†	†	†	†	†	†
Science Museum	†	-0.30 (1.12)	†	†	†	†	†	†
Libraries	†	†	-1.53 (0.58)	†	†	†	†	†
Education Orgs.	†	†	†	-0.06 (0.12)	†	†	†	†
Youth Orgs	†	†	†	†	-0.56 (0.405)	†	†	†
Cultural Orgs	†	†	†	†	†	0.16 (0.175)	†	†
Religious Orgs.	†	†	†	†	†	†	-0.05 (0.039)	†
STEM Orgs.	†	†	†	†	†	†	†	-0.03 (0.39)
% Hispanic teachers	#	#	#	#	#	#	-0.01 (0.026)	#
Teachers/ aides ESL	0.01 (0.031)	0.01 (0.03)	0.01 (0.03)	0.01 (0.03)	0.02 (0.031)	0.01 (0.031)	0.01 (0.031)	0.01 (0.031)

See notes at end of table

Table 10

Main Effects Models with Covariates: Associations Between Neighborhood and School Social Structure and Resources and Children's Grade 8 Math Achievement Scores –Continued

	Model							
	Co-Ethnic Conc.	Science Museum	Libraries	Education Orgs.	Youth Orgss	Cultural Orgss	Religious Orgss	STEM Orgs.
Variable	Coef (SE)	Coef (SE)	Coef (SE)	Coef (SE)	Coef (SE)	Coef (SE)	Coef (SE)	Coef (SE)
Library quality index	0.70** (0.263)	0.69 ** (0.260)	0.64* (0.260)	0.69** (0.260)	0.64* (0.265)	0.68** (0.263)	0.67* (0.262)	0.69* (0.264)
Computer lab quality index	-0.05 (0.125)	-0.05 (0.13)	-0.05 (0.12)	-0.05 (0.13)	-0.07 (0.126)	-0.05 (0.126)	-0.05 (0.125)	-0.05 (0.127)
Random effects								
U_{school}	1.49	1.89	1.23	1.77	1.29	1.64	1.39	1.92
$U_{neighborhood}$	#	#	#	#	#	#	#	#
$U_{individual}$	68.52	68.46	68.30	68.56	68.79	68.59	68.72	68.45

Rounds to zero; † Not applicable
<.05 **<.01 *<.001* unadjusted
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Cohort 1998-1999 (ECLS-K) Restricted-Use Data File, previously unpublished tabulation; U.S. Census Bureau, Summary File 3, 2000, Public-Use Data File, previously unpublished tabulation; National Center for Charitable Statistics, Business Master Files, 1998-2000, Public-Use Data Files, previously unpublished tabulation.

Table 11

Main Effects Models with Covariates: Associations Between Neighborhood and School Social Structure and Resources and Children's Grade 8 Science Achievement Scores

	Model							
	Co-Ethnic Conc.	Science Museum	Libraries	Education Orgs.	Youth Orgs.	Cultural Orgs.	Religious Orgs.	STEM Orgs.
Variable	Coef (SE)	Coef (SE)	Coef (SE)	Coef (SE)	Coef (SE)	Coef (SE)	Coef (SE)	Coef (SE)
Intercept	39.54*** (3.11)	39.03*** (3.04)	39.81*** (3.07)	39.45*** (3.06)	39.20*** (3.05)	38.91*** (3.06)	39.52*** (3.10)	39.06*** (3.05)
Co-Ethnic Conc.	0.57 (0.70)	†	†	†	†	†	†	†
Science Museum	†	-1.19 (1.08)	†	†	†	†	†	†
Libraries	†	†	-1.04 (0.56)	†	†	†	†	†
Education Orgs.	†	†	†	-0.14 (0.12)	†	†	†	†
Youth Orgs	†	†	†	†	-0.35 (0.40)	†	†	†
Cultural Orgs.	†	†	†	†	†	0.07 (0.17)	†	†
Religious Orgs.	†	†	†	†	†	†	-0.03 (0.040)	†
STEM Orgs.	†	†	†	†	†	†	†	-0.05 (0.38)

See notes at end of table

Table 11

Main Effects Models with Covariates: Associations Between Neighborhood and School Social Structure and Resources and Children's Grade 8 Science Achievement Scores –Continued

	Model							
	Co-Ethnic Conc.	Science Museum	Libraries	Education Orgs	Youth Orgs	Cultural Orgs	Religious Orgs	STEM Orgs
Variable	Coef (SE)	Coef (SE)	Coef (SE)	Coef (SE)	Coef (SE)	Coef (SE)	Coef (SE)	Coef (SE)
% Hispanic teachers	0.01 (0.025)	0.01 (0.02)	#	#	#	#	#	#
Teachers/ aides ESL	-0.01 (0.03)	-0.01 (0.03)	-0.01 (0.03)	#	#	-0.01 (0.031)	-0.01 (0.031)	-0.01 (0.03)
Library quality index	0.23 (0.25)	0.23 (0.25)	0.20 (0.25)	0.24 (0.25)	0.20 (0.26)	0.23 (0.25)	0.22 (0.25)	0.23 (0.26)
Computer lab quality index	0.12 (0.12)	0.12 (0.12)	0.12 (0.12)	0.11 (0.12)	0.11 (0.13)	0.12 (0.12)	0.12 (0.12)	0.12 (0.13)
Random effects								
U_{school}	1.70	1.74	1.65	1.65	1.60	1.88	1.72	1.94
$U_{neighborhood}$	#	#	#	#	#	#	#	#
$U_{individual}$	64.62	64.56	64.42	64.63	64.72	64.53	64.63	64.50

Rounds to zero; † Not applicable
<.05 **<.01 *<.001* unadjusted
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Cohort 1998-1999 (ECLS-K) Restricted-Use Data File, previously unpublished tabulation; U.S. Census Bureau, Summary File 3, 2000, Public-Use Data File, previously unpublished tabulation; National Center for Charitable Statistics, Business Master Files, 1998-2000, Public-Use Data Files, previously unpublished tabulation.

Table 12

Main Effects Models with Covariates: Associations Between Neighborhood and School Social Structure and Resources and Children's Grade 8 Teacher-reported ARS Scores

	Model								
	Co-Ethnic Conc	Science Museum	Libraries	Education Orgs	Youth Orgs	Cultural Orgs	Religious Orgs	STEM Orgs	All
Variable	Coef (SE)	Coef (SE)	Coef (SE)	Coef (SE)	Coef (SE)	Coef (SE)	Coef (SE)	Coef (SE)	Coef (SE)
Intercept	2.93*** (0.349)	2.95*** (0.341)	3.04*** (0.344)	3.06*** (0.339)	3.00*** (0.34)	2.98*** (0.341)	2.98*** (0.349)	2.97*** (0.341)	3.07*** (0.359)
Co-Ethnic Conc.	-0.03 (0.08)	†	†	†	†	†	†	†	#
Science Museum	†	0.02 (0.125)	†	†	†	†	†	†	0.12 (0.128)
Libraries	†	†	-0.11 (0.066)	†	†	†	†	†	-0.09 (0.07)
Education Orgs.	†	†	†	-0.03*[a] (0.014)	†	†	†	†	-0.03 (0.017)
Youth Orgs	†	†	†	†	-0.08 (0.047)	†	†	†	-0.03 (0.064)
Cultural Orgs.	†	†	†	†	†	-0.02 (0.02)	†	†	-0.01 (0.025)
Religious Orgs.	†	†	†	†	†	†	#	†	#
STEM Orgs.	†	†	†	†	†	†	†	-0.05 (0.044)	-0.01 (0.05)
Science indicator	-0.22** (0.076)	-0.22** (0.076)	-0.22** (0.076)	-0.22** (0.076)	-0.22** (0.076)	-0.22** (0.076)	-0.22** (0.076)	-0.21** (0.076)	-0.22** (0.076)

See notes at end of table

Table 12

Main Effects Models with Covariates: Associations Between Neighborhood and School Social Structure and Resources and Children's Grade 8 Teacher-reported ARS Scores –Continued

	Model								
	Co-Ethnic Conc	Science Museum	Libraries	Edu Orgs.	Youth Orgs	Cultural Orgs.	Religious Orgs.	STEM Orgs.	All
Variable	Coef (SE)	Coef (SE)	Coef (SE)	Coef (SE)	Coef (SE)	Coef (SE)	Coef (SE)	Coef (SE)	Coef (SE)
% Hispanic teachers	#	#	#	#	#	#	#	#	#
Teachers/ aides ESL classes	#	#	#	#	#	#	#	#	#
Library quality index	#	#	-0.01 (0.029)	#	-0.01 (0.029)	#	#	#	-0.01 (0.029)
Computer lab quality index	-0.04* (0.014)	-0.04* (0.014)	-0.04* (0.014)	-0.04** (0.014)	-0.04** (0.015)	-0.04* (0.014)	-0.04* (0.014)	-0.04* (0.014)	-0.04** (0.014)
Random effects									
U_{school}	0.02	0.02	0.01	#	0.02	0.02	0.02	0.02	#
$U_{individual}$	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86

Rounds to zero; † Not applicable
<.05 **<.01 *<.001* unadjusted
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Cohort 1998-1999 (ECLS-K) Restricted-Use Data File, previously unpublished tabulation; U.S. Census Bureau, Summary File 3, 2000, Public-Use Data File, previously unpublished tabulation; National Center for Charitable Statistics, Business Master Files, 1998-2000, Public-Use Data Files, previously unpublished tabulation.

Table 13

Main Effects Models with Covariates: Associations Between Neighborhood and School Social Structure and Resources and Children's Grade 8 SDQ Math Scores

	Model								
	Co-Ethnic Conc	Science Museum	Libraries	Edu Orgs.	Youth Orgs	Cultural Orgs.	Religious Orgs.	STEM Orgs.	All
Variable	Coef (SE)	Coef (SE)	Coef (SE)	Coef (SE)	Coef (SE)	Coef (SE)	Coef (SE)	Coef (SE)	Coef (SE)
Intercept	1.78*** (0.32)	1.74*** (0.32)	1.84*** (0.32)	1.73*** (0.32)	1.73*** (0.32)	1.74*** (0.32)	1.85*** (0.32)	1.74*** (0.32)	2.06*** (0.33)
Co-Ethnic Conc.	0.04 (0.08)	†	†	†	†	†	†	†	0.09 (0.08)
Science Museum	†	0.02 (0.12)	†	†	†	†	†	†	0.02 (0.12)
Libraries	†	†	-0.12 (0.06)	†	†	†	†	†	-0.17* (0.06)
Education Orgs.	†	†	†	0.005 (0.013)	†	†	†	†	0.01 (0.02)
Youth Orgs	†	†	†	†	0.02 (0.04)	†	†	†	0.08 0.06)
Cultural Orgs	†	†	†	†	†	0.01 (0.02)	†	†	#
Religious Orgs.	†	†	†	†	†	†	-0.01 (0.004)	†	-0.01 (0.005)
STEM Orgs.	†	†	†	†	†	†	†	0.01 (0.04)	#

See notes at end of table

Table 13

Main Effects Models with Covariates: Associations Between Neighborhood and School Social Structure and Resources and Children's Grade 8 SDQ Math Scores –Continued

	Model								
	Co-Ethnic Conc	Science Museum	Libraries	Education Orgs	Youth Orgs	Cultural Orgs	Religious Orgs	STEM Orgs	All
Variable	Coef (SE)	Coef (SE)	Coef (SE)	Coef (SE)	Coef (SE)	Coef (SE)	Coef (SE)	Coef (SE)	Coef (SE)
% Hispanic teachers	#	#	#	#	#	#	#	#	#
Teachers/ aides ESL classes	#	#	#	#	#	#	#	#	#
Library quality index	0.02 (0.03)	0.02 (0.03)	0.02 (0.03)	0.02 (0.03)	0.03 (0.03)	0.02 (0.03)	0.02 (0.03)	0.02 (0.03)	0.02 (0.03)
Computer lab quality index	#	#	#	#	#	#	#	#	#
Random effects									
$U_{neighborhood}$	0.01	0.01	0.01	0.02	0.02	0.02	0.01	0.02	#
$U_{individual}$	0.78	0.78	0.77	0.78	0.77	0.78	0.78	0.77	0.77
Effect sizes									
R^2_{global}	0.06	0.06	0.07	0.06	0.06	0.06	0.06	0.06	0.08
$f^2\ \%_{global}$	6.50	6.42	7.13	6.42	6.41	6.41	6.88	6.41	9.11

Rounds to zero; † Not applicable
<.05 **<.01 *<.001* unadjusted
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Cohort 1998-1999 (ECLS-K) Restricted-Use Data File, previously unpublished tabulation; U.S. Census Bureau, Summary File 3, 2000, Public-Use Data File, previously unpublished tabulation; National Center for Charitable Statistics, Business Master Files, 1998-2000, Public-Use Data Files, previously unpublished tabulation.

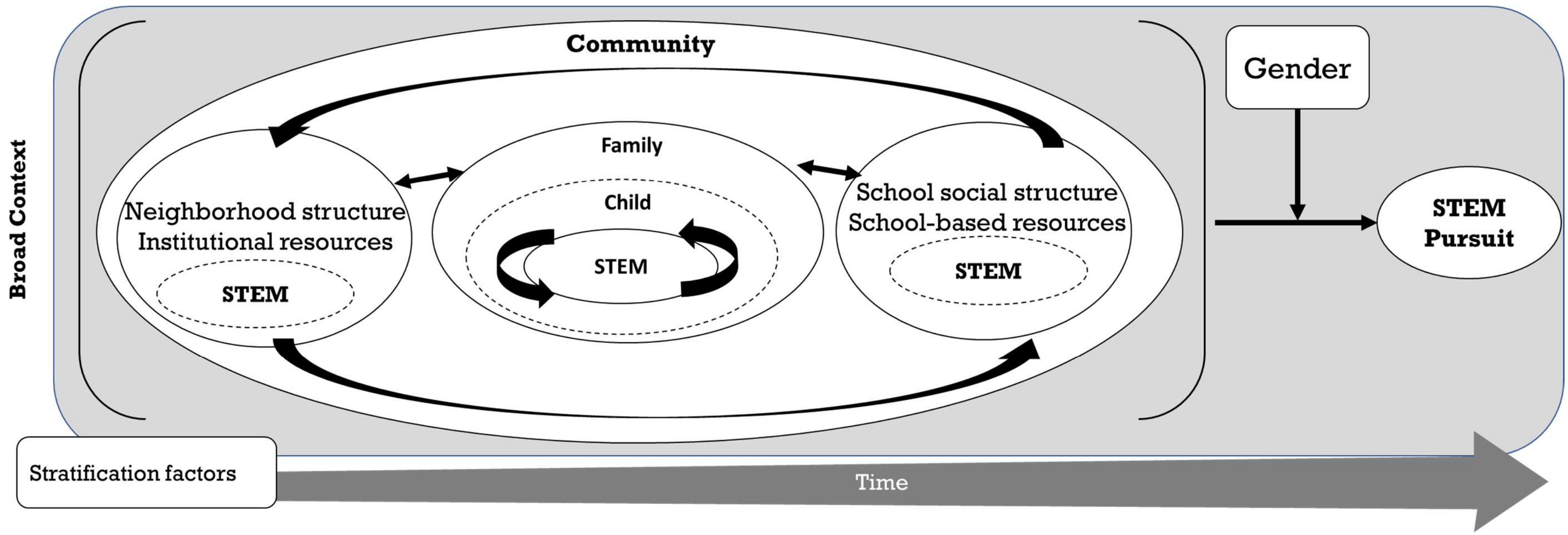

Figure 1. STEM Pursuit Model for Mexican American Youth from Immigrant Families

Appendix A

Math and Science Outcome Scales

Teacher-reported Math/Science proficiency: Teacher questionnaire Academic Rating Scale (ARS)

Math scale: 7 items

Ability to apply mathematical concepts to "real world" problems
Ability to complete or conduct proofs or demonstrations of his/her mathematical reasoning
Ability to talk about his/her reasoning or thinking in solving a problem
Ability to explain his/her reasoning in solving a problem in writing
Ability to use representations to model mathematical ideas
Ability to use a calculator to solve problems
Ability to use a computer to complete mathematics assignments

Science scale: 6 items

Ability to organize data in tables or charts
Ability to write up results or prepare a presentation from a laboratory activity, investigation, experiment or a research project
Ability to talk about ways to solve science problems, such as investigations
Ability to make a presentation to the class on science data, analysis, or interpretation
Ability to design his/her own investigation or experiment to solve a scientific question
Ability to apply science concepts to "real world" problems

Self-efficacy in STEM: Self-Description Questionnaire

Math sub-scale: 4 items

Math is one of my best subjects
I like math
I enjoy doing work in math
I get good grades in math