UNIVERSITY OF CALIFORNIA,
IRVINE

Developmentally Appropriate Educational Environments: Exploring the Impact of Student Autonomy and Interpersonal Relationships on Diverse Young Adolescents

DISSERTATION

submitted in partial satisfaction of the requirements for the degree of

DOCTOR OF PHILOSOPHY

in Education

by

Jennifer Renick

Dissertation Committee Members:
Professor Stephanie M. Reich (Chair)
Professor Sandra Simpkins
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DEDICATION

To the educators and students

working on the ground everyday

to build a better future.

"Another world is not only possible, she is on her way. On a quiet day, I can hear her breathing."

Arundhati Roy

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

ACKNOWLEDGEMENTS

First, I would like to thank my advisor, Dr. Stephanie Reich, for her ceaseless support. How lucky was I to sit next to you by chance at the 2015 SCRA Biennial! I am deeply appreciative of how much you have invested into me as your student – you have truly gone above and beyond in the time you have spent guiding me through this program. I cannot overstate how your consistent and constructive feedback has shaped me as a thinker and how your assistance and advocacy for me allowed me to accomplish my goals. I am eternally grateful to have you as my advisor.

I also feel immense gratitude to the other members of my dissertation committee, Dr. Sandra Simpkins and Dr. David Schaefer. Dr. Simpkins, thank you for offering your insight and guidance throughout my time at UCI – from the many classes of yours I was fortunate to take to your role on my dissertation committee. Dr. Schaefer, thank you for the extensive amount of time you have spent supporting my learning and research since I first took one of your classes – you have been tremendously patient and helpful, always answering my many questions. Additionally, I want to thank the two additional members of my dissertation proposal committee – Dr. Emily Ozer and Dr. Adriana Villavicencio. Both of your guidance and expertise greatly strengthened my dissertation proposal and helped me to further develop my ideas in meaningful ways.

My dissertation would not have been possible without my two partnership sites, which I won't name for anonymity reasons, but to which I owe a huge debt of gratitude. The generosity of time and resources the educators and students at each of these settings offered, during a pandemic no less, is nothing short of breathtaking. These studies could not have happened without the work and contributions of these collaborators, for which I extend my deepest appreciation. Thank you also to Dr. June Ahn, for his leadership of OCEAN, which made these partnerships possible, as well as the donor who funded that work. I am also very grateful for my excellent team of undergraduate research assistants on this project – Giesi Lopez, Nancy Mendez, and Brianna Urrutia – for their contributions to my dissertation. I would additionally like to thank the Society for Community Research and Action for the Student Research Grant that helped financially support this work.

I would not have made it to graduate school without the previous academic support I received as an undergraduate student. Thank you to my advisors at Pitzer College, Dr. Azamat Junisbai, Dr. Norma Rodriguez, and Dr. Tessa Hicks Peterson – all of who provided such substantial support to me as a student. I'd also like to thank the dedicated individuals I got to work alongside at Promesa Boyle Heights and the El Monte City School District, who highly influenced how I conduct research today. I need to thank my comrades at Alliance for White Antiracists Everywhere and White People for Black Lives as well. Getting to learn from all of you over the past seven years has forever informed my view of the world and approach to research, for which I am so thankful.

I would not have made it to or through these past five years without additional members of my wonderful support system. Thank you to my past and present lab mates, Dr. Joanna Yau, Dr. Wendy Ochoa, Dr. Melissa Dahlin, Jennifer Cabrera, Allison Starks, and Vanessa Bermudez, for all your encouragement, feedback, and friendship. I'd also like to thank other UCI friends, Dr. Taffeta Wood, Kayla Puente, and Maricela Bañuelos, who offered such kindness and support. I owe a huge thank you to my best friend, Vivi, an amazing educator and incredible human, without whom I would not be the person I am today. Finally, I extend my endless gratitude to my amazing parents, who could not be more loving, supportive, or caring and who made any of this possible.

VITA

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Renick, J., Abad, M. N., van Es, E. A., & Mendoza, E. (2021). "It's all connected": Critical bifocality and the liminal practice of youth work. *Child & Youth Services*, 1-25. https://doi.org/10.1080/0145935X.2021.1901571

Wegemer, C. M., & **Renick, J**. (2021). Boundary spanning roles and power in educational partnerships. *AERA Open*. https://doi.org/10.1177/23328584211016868

Fellowships

- OCEAN Community Research Fellowship — July 2018 – Present
  Awarded by University of California Irvine, Orange County Educational Advancement Network
  - This fellowship provides a graduate student researcher position and training through coursework and workshops in community-based, partnership research with educational practitioners.

- Public Impact Fellowship — November, 2020
  Awarded by University of California, Irvine Graduate Division
  - This fellowship provides $1000 of funding to graduate students whose research has the potential for substantial impact in the public sphere.

- Newkirk Fellowship in Community Based Research — September 2019 – September 2020
  Awarded by the Newkirk Center for Science and Society
  - This fellowship provides $5,000 of funding to doctoral students with a commitment to community based research, as well as training in community based research methods, through mentorship, placement with a community organization, and participation in research justice workshops.

Grants

- Youth Beverage Consumer Education and Research Fund Grant — November, 2021
  Awarded by the California Department of Justice

- This $14,500 grant was a joint application with funding awarded to the participating school district to support the second year of a Youth Participatory Action Research project conducted in partnership with a middle school.

- Student Research Dissertation Grant April, 2021
  Awarded by the Society for Community Research and Action
  - This $1,000 grant provides funding to support the dissertation of three student members of the Society of Community Research and Action, based on the quality and relevance of their dissertation to community psychology values and methods.

- Targeted Youth Activist Grant April 2012 – November 2015
  Awarded by the Rosenberg Fund for Children for three consecutive years
  - This grant provides targeted activist youth with development grants of up to $1,000 per year to further their education, support their emotional needs or develop their organizing skills.

Awards

- Pomona Unified School District Community Service Award April, 2015
  Awarded by the Pomona Unified School District
  - This award is given to those providing significant voluntary support to a school in PUSD.

- Kallick Community Service Award April 2013 and April 2015
  Awarded by Pitzer College's Center for Community Engagement
  - This monetary award is given to students who have completed over 100 hours of meaningful community service, and are recommended by their service sites. Award was received twice.

- Katie Lawson Memorial Award April 2014
  Awarded by Pitzer College's Research and Awards Ad Hoc Committee
  - This award provides $1,500 of funding for projects "dedicated to helping others".

Presentations (* denotes undergraduate student)**:**

Renick, J. (2022, April 23). Youth Participatory Action Research as a Window Into Student Experiences of School Climate During the COVID-19 Pandemic, In Lisa Romero (Chair) *Student and Educator School Climate Perceptions: Dynamics and Correlates*. Symposium at the American Educational Research Association Annual Meeting in San Diego, California.

Lopez, G.* & **Renick, J.** (2022, March 5). *A Teacher I Can Relate to: Representation and Voice of Non-White and Low-income Students.* Virtual poster presentation at the Society for Research on Adolescence Biennial Meeting.

Renick, J. (2022, March 4). *When School Environment and Home Environment are the Same: Adolescents' Experiences of Remote Access to School.* Virtual poster presentation at the Society for Research on Adolescence Biennial Meeting.

Wegemer, C.M. & **Renick, J.** (2021, July 21). *Boundary Spanners: Exploring a unique role for RPPs***.** Invited presentation at the virtual National Network for Research Practice Partnerships Annual Forum.

Renick, J. (2021, June 23). Equitable Participation in a Virtual Context: Potentials and Pitfalls for Including Diverse Voices in a Digital YPAR Project. In **Jennifer Renick** (Chair) *Youth Participatory Action Research in a Changing and Challenging World: Leveraging Lessons*

Learned From 2020 and Beyond. Symposium at the virtual Society for Community Research and Action Biennial Meeting.

Renick, J. & Mendez, N.* (2021, June 23). Using YPAR to Understand and Improve School Climate When Learning from Home. In Rahamim McCarter-Ribakoff (Chair) *What Matters Right Now: Topics & Process of Participatory Action Research in Educational Settings Through Pandemic and Protest.* Symposium at the virtual Society for Community Research and Action Biennial Meeting.

Bailey, C., DaViera, A., Kivell, N., Lakind, D., LoCurto, J., **Renick, J.,** Renner, M., Siegal, R., & Stacy, S. (2021, June 17). *Identifying and Unlinking Carcerality from Community Psychology: An Abolition Teach-In.* Pre-conference session at the virtual Society for Community Research and Action Biennial Meeting.

Wegemer, C.M. **& Renick, J.** (2021, June 10). *Boundary Spanning Roles and Power in Educational Partnerships.* Poster presentation at the virtual International Society for the Learning Sciences Annual Meeting.

Renick, J. & Belgrave, A. (2021, April 12). Supporting the Mental Health of Students, Families, and Teachers. In *Community Organizing During the Pandemic: Partnerships With Leaders, Teachers, and Families.* Symposium at the virtual American Educational Research Association Annual Meeting.

Renick, J. & Reich, S.M. (2021, April 12). Understanding Teacher and Peer-to-Peer Relationships in the Context of Distance Learning. In *Engaging the Microsystem: Teacher Practices and Supports for School Climate, Culture, and Community.* Symposium at the virtual American Educational Research Association Annual Meeting.

Renick, J. & Reich, S.M. (2021, April 9). *The Mismatch Between Distance Learning and Early Adolescents' Developing Needs.* Poster presentation at the virtual Society for Research on Child Development Biennial Meeting.

Renick, J. & Reich, S.M. (2021, April 8). *How Perceptions of School Climate Relate to Early Adolescents' Feelings of Belonging.* Poster presentation at the virtual Society for Research on Child Development Biennial Meeting.

Renick, J., van Steenis, E., Wegemer, C.M., Lee, J., (2020, October 15). *Understanding Histories of Harm Caused by Research.* In virtual OCEAN Community Based Research Seminar Series at University of California, Irvine School of Education.

Renick, J. & Reich, S.M. (2019, June 27). *Lost in Translation: An Example of Educational Theory Applied in a School Context.* Poster presented at the Society for Community Research and Action's Biennial Conference in Chicago, Illinois.

Renick, J. & Abad, M. (2019, April 9) "...[I]t's all connected" Noticing and Positioning within Community-Based Youth Work. In Beth van Es (Chair), *Critical Participatory and Multisensory Approaches in Mathematics Teacher Noticing*. Symposium conducted at the American Educational Research Association Annual Meeting in Toronto, Canada.

Renick, J. (2015, June 26). *Evaluating and Improving In School Suspension in High Need Schools.* Poster presented at the Society for Community Research and Action's Biennial Conference in Lowell, Massachusetts.

ABSTRACT OF THE DISSERTATION

Developmentally Appropriate Educational Environments: Exploring the Impact of Student Autonomy and Interpersonal Relationships on Diverse Young Adolescents

By

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Doctor of Philosophy in Education

University of California, Irvine, 2022

Professor Stephanie M. Reich, Chair

School climate, broadly considered to be an individual's experience of school life, is especially important in early adolescence, when there is a known mismatch between the structure of middle schools and adolescents' developing needs. Despite certain components of school climate being particularly developmentally salient in middle school, such as student autonomy and interpersonal relationships with peers and adults, not enough is known about the particular aspects of importance in these two areas, in order to better leverage them for school climate improvement. Further, historically marginalized students, such as students of color and those from lower socioeconomic backgrounds, often experience a school's climate more negatively, making school climate an important educational equity issue. Additionally, research is limited on how climate functions in out-of-school spaces, such as extracurricular programs, where many adolescents spend significant time.

Through three studies, this dissertations seeks to help address these gaps by expanding understanding of the impact of autonomy and interpersonal relationships on student outcomes, using approaches that are well suited to such research, but often underutilized: youth participatory action research (YPAR) and social network analysis (SNA), and including samples of majority

low-income, Latine young adolescents. Designed in collaboration with a Title 1 middle school, Study One examines how students conceptualized school climate during the COVID-19 pandemic and how participating in a YPAR project impacted students' feelings of belonging, mattering, and empowerment, as well as perceptions of school climate. Findings revealed that despite school climate including both at-home and in-person components during the spring of 2021, students felt the shared aspects of the school environment were the most salient and malleable to change through action research. Additionally, students had significant increases in their feelings of empowerment and mattering throughout their participation in the project.

Using social network analysis, Study Two and Three explored how the peer and teacher-student relationships within a summer enrichment program relate to students' feelings of belonging, mattering, connection, as well as perceptions of program climate. Both studies were conducted in collaboration with an out-of-school program focused on supporting would-be first generation college students. Results from Study Two revealed that higher amounts of close outgoing ties to peers were associated with higher feelings of mattering and connection, as well as more positive perceptions of program climate, and that students' peer ties increased significantly over the summer. The findings from Study Three showed that ties to teachers also significantly increased over the course of the summer program and that higher amounts of outgoing ties to teachers were associated with stronger feelings of connection and more positive perceptions of program climate. Collectively, these three studies explore how young adolescents experience developmentally important areas of school climate – student autonomy and interpersonal relationships – using a sample of students who are often underrepresented in such research and including the less explored setting of out-of-school programs, offering directions for future research to improve school climate.

CHAPTER 1

Introduction

Much attention has been focused on how to improve the educational experience for students, with a wealth of research attending to the pedagogical aspects of schools and how to enhance instruction. However, this is just one piece of the puzzle for educational improvement, as schools and other educational contexts are also unique social and relational environments, which in turn impact their inhabitants' wellbeing (Wentzel, 1998). One way this manifests is through school climate, which is broadly considered to be individuals' experiences of school life, as well as the values and norms of a school (Thapa et al., 2013). School climate is associated with a number of student outcomes ranging from academic success and engagement to behavioral problems and absenteeism (Daily et al., 2019; Haynes et al., 1997; Marshall, 2004; Wang & Holcombe, 2010).

School climate also influences feelings of school belonging, which are the attachment to school and the feelings of being valued and accepted by others in the school community (Slaten et al., 2016). Like school climate, school belonging is related to student outcomes including motivation, academic self-efficacy, and mental health (Goodenow & Grady, 1993; Osterman, 2000; Sanchez et al., 2005). School climate also impacts mattering – the extent to which individuals feel valued by and add value to their surroundings (Prilleltensky, 2019). Mattering has been found to be highly influential to adolescents' wellbeing (Rayle & Myer, 2004). Belonging and mattering are also of importance in other educational settings, such as after school activities and other forms of out-of-school time programming (Eccles & Gootman, 2002).

While environmental factors are important at any age, they take on increased importance in early adolescence, as stage-environment fit posits that some of the psychological challenges

faced by adolescents may result from a mismatch between their developing needs and the opportunities afforded to them in their social environments (Eccles et al., 1993a). In particular, there are notable differences between elementary schools and middle schools that may alter students' feelings of connection as they develop (Eccles et al., 1993a). Unsurprisingly, sense of belonging tends to lower from early adolescence to late adolescence, typically dropping as students continue in middle school (Anderman, 2003; Gillen-O'Neel & Fuligni, 2013; Sanchez et al., 2005).

In order to leverage school climate for school improvement, research is needed to understand the factors that influence school climate, feelings of belonging, and sense of mattering. Four components of the school environment considered to be of importance to school climate are safety, relationships, teaching and learning, and the institutional environment (Thapa et al., 2013). Additionally, as sense of belonging is related to feelings of acceptance from peers and adults, aspects of the school related to feelings of school belonging include positive interpersonal relationships with staff and peers, classroom cohesion, and participation in extracurricular activities that offer opportunities for positive interpersonal relationships (Anderman, 2003; Hamm & Faircloth, 2005; Kiefer et al., 2015; Martinez et al., 2016; McMahon et al., 2008).

Middle school is a unique time when interpersonal relationships and opportunities for autonomy are especially important (Eccles, et. al, 1993a). Despite knowledge that relationships and autonomy matter in middle school and are essential to school climate, the way they have been studied is lacking in some of the nuance necessary to give meaningful advice to schools or out-of-school settings about how to improve them. For example, student voice and involvement in school decision-making is widely regarded as an important component of school climate. Yet,

most research examining topics that impact young people, like school climate, is done in a top-down approach, viewing youth as subjects of research rather than giving them a voice in the process (Langhout & Thomas, 2010). Youth participatory action research (YPAR) can counteract this, by situating youth as co-researchers, giving them an opportunity to use their voice to enact change in the settings they reside (Ozer 2016; 2017). However, YPAR has not been widely leveraged as an approach to study and improve school climate, despite the few extant studies demonstrating its promise for both participants and the school setting (Voight, 2015; Schlehofer et al., 2018).

Additionally, many studies that focus on interpersonal relationships use analytical approaches at the individual level such as interviews or surveys (Mischel & Kitsantas, 2020; Sointu et al., 2017). Such methods capture certain aspects of interpersonal relationships, but are not able to capture individuals' number and strength of connections bi-laterally or overall interpersonal network structures within a school or other educational context (Neal & Neal, 2017). Full network data about the interpersonal relationships within schools and similar settings can offer a nuanced picture of relationships in these settings and unique insight into which aspects of relationships contribute to feelings of belonging and mattering. For instance, is it the amount of peers to whom a student feels close to that increases feelings of belonging or is it how generally known they are by their peers? Further, is it enough for a student to feel close to their teacher to increase feelings of mattering, or must those feelings be reciprocated by the teacher in order to influence outcomes? Full network data could help schools and out-of-school programs to design targeted interventions to build a more positive climate, moving beyond the existing advice to improve interpersonal relationships on campus, without illuminating greater specifics (Moen et al., 2019).

Despite the noted impact of student voice and interpersonal relationships on school climate and their heightened salience in early adolescence, gaps remain in understanding how to improve these important aspects of school climate in middle school. Further, research approaches well suited for exploring these topics, such as youth participatory action research and social network analysis, remain underutilized in school climate research. Therefore, novel research is needed that examines how student voice and interpersonal relationships impact school climate, using methods like YPAR and social network analysis, which can both offer new insight into these established topics of importance.

Importance of School Climate

Broadly, school climate refers to the social context of school and individuals' experience of school life (Thapa et al., 2013; Voight et al., 2015), though there are a number of definitions used for this concept. The National School Climate Council defines it as "the quality and character of school life" (NSCC, "What is School Climate and Why is it Important?"). Earlier definitions focused solely on the relational aspects of a school, defining school climate as the quality and frequency of interactions among and between adults and students (Kuperminc et al., 1997). Modern definitions, however, are more expansive, including a variety of school components, such as safety, relationships, teaching and learning, and the institutional environment (Thapa et al., 2013; Wang et al., 2013). Some conceptualizations are even broader, stating that school climate encompasses "virtually every aspect of the school experience" (Wang & Degol, 2016 p. 315).

Regardless of how it is defined, the concept of school climate is an important one, as it encourages moving beyond thinking of schools solely as contexts for academic learning, but also as complex social environments where students can build relationships, explore their identity,

and develop emotionally (Wang & Degol, 2016). This is aligned with what bio-ecological theorists have noted for decades: that developmental behaviors are shaped by the environments within which one is embedded (Bronfenbrenner, 1989). As such, schools teach students much more than just academics, but also how to grow, behave, and develop.

Climate is not just relevant in schools, but in other settings where youth spend time and develop as well, such as out-of-school programming. Structured out-of-school activities too can serve as a positive developmental space for students, with participation in them being related to a number of desirable outcomes, from the development of agency and initiative to increased academic achievement (Hansen et al., 2003 & Vandell et al., 2018). While some of these outcomes may be linked to the content taught in such spaces, others are a result of the climate of afterschool activities and enrichment programs, such as their fostering of positive relationships and feelings of belonging (Eccles & Gootman, 2002; Jones & Deutsch, 2011). Therefore, climate is also relevant to success and positive outcomes in educational settings similar to schools where youth spend their time.

Informed by this knowledge, many researchers argue that one of the most effective ways to support healthy adolescent development is to create educational environments that meet the needs of adolescents, rather than trying to change the individual (Wang et al., 2010). This has led to much research examining how social settings, like schools and out-of-school activities in particular, can promote positive youth development (Kim et al., 2014; Eccles & Gootman, 2002). As such, there is a wealth of research outlining the impact of school climate, finding it to be associated with a variety of student outcomes, ranging from wellbeing to behavior to academic achievement (Daily et al., 2019; Haynes et al., 1997). However, a gap still remains on how best

to improve school and out-of-school programming climate to support adolescent development, despite climate's noted importance.

Outcomes Associated with School Climate

In regard to academics, a positive school climate is associated with higher rates of student engagement, participation, and satisfaction (Marshall, 2004; Voight, 2015; Wang & Holcome, 2010) as well as higher GPA and standardized test scores (Daily et al., 2019; Jia et al., 2009; Wang & Degol, 2016). School climate is also related to a number of behavioral outcomes. A positive school climate acts as a protective factor against dropping out of school and engaging in relational aggression (Acosta et al., 2019; Elsaesser et al., 2013; Martinez et al., 2016). Similarly, positive school climate is associated with lower rates of behavior problems such as delinquency, substance abuse, out of school suspension, and expulsion (Huang & Cornell, 2018; Wang et al., 2010; Way et al., 2007). Students who are more connected to their schools even show decreased rates of conduct problems years into the future (Loukas et al., 2006). A positive school climate is also an effective tool to prevent bullying and racial discrimination (Acosta et al., 2019; Loukas et al., 2006; Voight et al., 2015; Wang et al., 2013;), as a positive school climate has also been found to promote prosocial behavior (Voight, 2015).

School climate can also impact students' psychological outcomes. A positive school climate is related to increased self-esteem and better emotional adjustment (Jia et al., 2009; Kim et al., 2014; Voight, 2015; Way et al., 2007), decreased rates of depressive symptoms, anxiety and psychopathology, along with other mental health concerns (Kuperminc et al., 1997; Way et al., 2007), and less stress and self-criticism (Jia et al., 2009; Kim et al., 2014; Kuperminc et al., 2001). Lastly, a positive school climate is associated with increased feelings of social

responsibility and trust (Voight, 2015), even acting as a protective factor for students against externalizing problems (Kuperminc et al., 2001).

School Climate and Equity

Despite the noted impact of school climate, not all students experience schools the same way, even when in the same school, often due to differences in their identities (Kuperminc et al., 1997). While school climate has been shown to impact outcomes for students across demographics, certain students tend to report lower ratings of school climate (Wang et al., 2010). In particular, students of color and those from lower socioeconomic backgrounds tend to have lower perceptions of school climate when compared with their higher socioeconomic status and white peers (Jia et al., 2009; Wang et al., 2010). Additionally, students in racially homogenous schools (where one ethnic group is the majority) tend to have lower perceptions of school climate, especially in regard to cultural acceptance and support for diversity, regardless of their own ethnicity (Gage et al., 2020). This may be because schools tend to reify the norms of the society within which they are placed, and as such, can replicate patterns of oppression and discrimination for certain students (Ferguson, 2000; Gray et al., 2018). For example, students of color face harsher discipline than their white peers, which can further reinforce a negative feeling of school climate (Ferguson, 2000; Huang & Cornell, 2018).

Additionally, school policies can operate from a deficit view of students of color, not offering culturally grounded ideas of education and enacting policies that force students to assimilate and move away from their culture (Valenzuela, 1999; Rios, 2017), further damaging the perception of school climate for students of color. Additionally, a political climate that is biased against people of color can lead to a social environment in schools towards such students that is unwelcoming and even punitive (Chavez, 2017). Similar patterns exist in out-of-school

settings. Some programs focused on supporting the needs of students of color, offer a unique space for building a community with similar peers, which may be of particular importance for students of color who may feel excluded at school and lack a sense of belonging in that setting (Ngo, 2017; Ventura, 2017). However, in other out-of-school programs where cultural responsiveness is not a focus, participants of color may experience ethnic teasing and racial microaggressions from peers and even program staff, leading to negative perceptions of the program's climate (Gutiérrez et al., 2017; Lin et al., 2016).

Clearly, within the same school or program, climate may be experienced differently by students of color (Gage et al., 2020; Voight et al., 2015). Ethnicity has been found to impact the way students experience the school environment, with students of color often reporting less positive perceptions of the school climate than their white peers (Koth et al., 2008; Voight et al., 2015). This has led some to suggest the existence of racial "micro climates" for students of color within a school or other educational setting (Voight et al., 2015). However, this is not the case for all schools, as respect for diversity is considered by many to be an important component of the school climate (Gage et al., 2020; Thapa et. al., 2013). As such, schools or programs that do more to support diversity, may have students of color who feel a more positive sense of school climate (Ngo, 2017; Simpkins et al., 2017; Ventura, 2017) and interventions to improve a school's respect for diversity could lead to improved perceptions of school climate by students of color (Gray et al., 2018; Voight et al., 2015). This shows that a school or program climate with attention to diversity and equity could help bridge the gap between students of color and their white peers in feelings of school connection, which in turn could help address the achievement gap between students of color and their white peers (Voight et al., 2015). As such, school climate is an important area to consider for improving equity and more equitable schools may also have

more positive school climates. However, in order to better understand diverse experiences of school climate amongst students, researchers must not just look at school climate as universal amongst all students, but instead as influenced by student identity and differing by subgroups (Loukas, 2007; Voight et al., 2015), which, currently, is a less common approach in school climate research.

Importance of School Climate in Early Adolescence

Bioecological Theory

School climate is important at any age, but it has particular importance in adolescence. Adolescence is a time of crucial development for individuals, due to a multitude of changes occurring physically and emotionally (Eccles et al., 1993b; Kuperminc et al., 2001; Mischel & Kitsantas, 2020; Steinberg, 2017). Bioecological theory states that in order to examine the development of children one must look to the systems in which individuals are located (Bronfenbrenner, 1979; 1989). Of particular importance is the *microsystem*, the immediate people and settings in which individuals are situated and participating (Bronfenbrenner, 1979; 1989). Similarly, *proximal processes* are defined as the interactions between an individual and the settings in which they are placed, suggesting a bidirectional relationship between individuals and their environments (Bronfenbrenner, 1979).

For adolescents, schools and out-of-school time activities represent microsystems where they spend a number of hours, highlighting their importance for development (Elsaesser et al., 2013; Martinez et al., 2016). Schools, in particular, are where students spend the most time outside of their homes, making them a major setting for development (Eccles & Roeser, 2009). While school climate outlines that the school environment influences individual outcomes, bioecological theory highlights the complex nature of the settings where individuals are rooted,

their influence on development, and their importance for outcomes (Kuperminc et al., 1997; Wang & Degol, 2016).

Stage-Environment Fit Theory

Building on the importance of social contexts for development as established by bioecological theory, stage-environment fit theory further expands on the importance of setting, but brings a targeted attention to developmental stage. As mentioned earlier, stage-environment fit theory suggests that some of the psychological challenges faced by adolescents may be due to a mismatch between their developmental needs and the opportunities afforded to them in their social environments (Eccles et al., 1993a). This is of particular importance in middle school, as there are key differences between elementary schools and middle schools that may alter students' feelings of connection as they develop (Eccles & Roeser, 2009). In middle school, teachers tend to exert higher levels of control and discipline, due to the increased focus on classroom management, which can lead to decreases in student autonomy, something adolescents have an increased desire for as they develop (Eccles et al., 1993a, 1993b). There are also often fewer opportunities for student decision-making in middle school, which coincides with a developmental desire for increased agency (Kuperminc et al., 2001).

Similarly, social acceptance and close relationships with peers are of particular importance in adolescence, due to a developmental desire for relatedness (Eccles et al., 1993a). Unfortunately, the organizational structures of middle schools, such as their increased size, often disrupt the building of peer networks among students (Eccles et al., 1993a, 1993b; Kuperminc et al., 2001). Additionally, unlike most elementary schools, middle schools have displays of differential achievement among students, through practices like public honor rolls, different courses and activities based on ability levels, and assemblies for high achieving students, which

can increase social comparison and competition among students, damaging peer relationships (Eccles & Roeser, 2009). Bullying is also found to be most prevalent in the middle school years and students at this age are less likely to engage in helpful bystander behaviors (Acosta et al., 2019; Mischel & Kitsantas, 2020; Schlehofer et al., 2018).

There is also a decrease in positive and high quality teacher-student relationships in middle school – possibly due to the increase in class size and switching of teachers throughout the day– at a time when relationships with non-parent adults take on increased importance (Eccles et al., 1993a, 1993b; Mischel & Kitsantas, 2020; Steinberg, 2017). In moving from elementary to middle school, adolescents often report decreases in their perception of emotional support from teachers and sense of belonging in their classrooms (Eccles & Roeser, 2009). Interpersonal relationships are a crucial aspect of the *microsystem* in supporting development and without positively developing these relationships, adolescents may feel a disconnect between their developmental needs and what is offered in their school (Bronfenbrenner, 1979; Geller et al., 2013). In total, adolescents' developing needs for autonomy and positive peer and non-parent adult relationships are often not met by the opportunities afforded to them in middle school, which has the potential to lessen positive student outcomes (Eccles et al., 1993a).

Overall, the school climate of middle school tends to challenge, rather than support, young adolescents' needs, and as a result, may account for some of the difficulties that arise during this crucial developmental stage (Eccles et al., 1993a; Way et al., 2007). However, research suggests that if the middle school transition was into more developmentally supportive environments, the outcomes could be more positive, even during this vulnerable developmental time (Eccles et. al., 1993b). This implies that the negative outcomes commonly associated with middle school could be prevented or reduced by adopting appropriate school climate reforms to

ensure these schools are developmentally appropriate environments (Eccles & Roeser, 2009). As such, school climate is of particular importance during early adolescence, due to it being a crucial developmental period, the school setting being one of major developmental importance, and the current climate of middle schools often not supporting the needs of young adolescents. Ultimately, there is a clear need for increased research on appropriate interventions to improve school climate in middle school.

Novel Methods to Address Gaps in Current Research

With clear gaps in the current understanding of how to improve school climate for middle school students, and given the salience of interpersonal relationships and autonomy in school climate for young adolescents, research using novel methods is needed to better understand effective approaches to increasing students' autonomy and what aspects of relationships with peers and staff are of greatest importance to student outcomes. Youth participatory action research (YPAR) offers unique affordances for studying school climate, for participants, schools, and the research community as a whole. YPAR can act as an intervention to improve students' feelings of agency and empowerment, by offering them opportunities for autonomy and voice (Morales et al., 2017; Sulieman et al., 2019), which can be especially important for middle school students lacking such opportunities in their school site (Eccles et al., 1993a). Additionally, students hold untapped expertise about school climate, which can be leveraged for school improvement (Bertrand, 2018). Lastly, engaging youth as co-researchers can lead to more accurate data, as students may be more equipped to study sensitive topics like school climate (Fine 2008; Ozer, 2016). As such, more school climate research is needed using YPAR approaches to both improve the lives of students and advance understandings of school climate.

Similarly, despite knowledge that school climate and feelings of belonging are highly influenced by interpersonal relationships, much research studying these phenomena and their relational components has relied upon methods that only use individual level variables, such as self-report questions about whether or not an individual has a best friend or in general, how connected they feel (Gifford-Smith & Brownell, 2003; Vaquera, 2009). To support schools in improving interpersonal relationships, research is needed on the aspects of relationships with peers and teachers that are of greatest impact for students, such as reciprocation of friendship, number and strength of connections, overall network positioning, and total network cohesion. One such method that can address this gap is social network analysis. Social network analysis (SNA) is unique because rather than using individual level variables, relationships are the unit of analysis, facilitating a structural view of relationships amongst an entire community of actors (Kornbluh & Neal, 2016; Wasserman & Faust, 1994). As such, social network analysis can offer a more nuanced view of interpersonal relationships by both documenting the nature of relationships at the individual level and the patterns of relationships across an entire setting (Kornbluh & Neal, 2016; Neal & Neal, 2017). Specifically, utilizing social network analysis to study the impact of interpersonal relationships on outcomes like belonging and mattering for middle school students can help bridge the gap between school climate research and school climate improvement, by offering greater specificity in results. Rather than reiterating generally that positive relationships between teachers and students matter, such research can identify the level and nature of relationships that hold the greatest impact on outcomes (Capella & Neal, 2012). Therefore, increased research is needed that examines the role of interpersonal relationships using a social network approach.

Dissertation Overview

In this dissertation, I leverage the methodologies of youth participatory action research and social network analysis to better understand the factors of importance to school climate, feelings of belonging, and sense of mattering. Study One uses youth participatory action research to understand how middle school students' view school climate during the COVID-19 pandemic and how participation in a YPAR study can influence students' feelings of belonging, mattering, and empowerment, as well as perceptions of school climate. Study Two uses social network analysis to analyze how aspects of a peer network relate to feelings of belonging, mattering, and connection, as well as perceptions of program climate. Study Three also uses social network analysis, this time to analyze how characteristics of a teacher-student network relate to students' feelings of belonging, mattering, and connection, as well as perceptions of program climate.

Study One was conducted in collaboration with a group of middle school students at a Title 1 middle school in California with a student population that is predominantly low-income and Latine. Data for Studies 2 and 3 come from middle school students participating in a summer school and enrichment program offered through a college access program in California that serves predominantly low-income, Latine middle school students, who would be the first in their families to go to college. The youth from the summer program also attend the middle school where the YPAR project was done.

Study One

For my first study, I conducted a youth participatory action research study as an intervention to improve school climate for those students who are a part of the YPAR team (Ozer, 2017) and for the rest of campus. This project involved working collaboratively with a diverse group of middle school students to identify aspects of the school that they would like to improve, helping them design and implement a plan to study these aspects, and then generating

an action plan for sharing their findings with school staff, so that their suggestions could be enacted. There were two levels to this study – the school level data the students collected to improve the entire campus and the team-level processes and changes that occurred for participants within the YPAR program, specifically focusing on belonging, mattering, and empowerment, as well as perceptions of school climate. The topic the students focused on offered insight into students' view of school climate and the study they chose to take on further illuminated this. As such, the results from this study help advance understanding of school climate from a youth perspective and the benefits of participation in YPAR to improve school climate.

Study Two

In my second study, I used social network analysis (SNA) to examine how different types of relationships between peers (specifically levels of closeness) relate to feelings of belonging, mattering, and connection, as well as perceptions of program climate. I also looked at how patterns in the overall network related to overall feelings of belonging, mattering, connection and perceived climate. This study was conducted in the context of the peer network in a summer school and enrichment program, with data collected at two time points: the start and the end of the summer program. By examining how individual and overall network ties relate to students' feelings of belonging, mattering, and connection, and perceptions of program climate, results are able to help address the current gap in research on how various components of peer relationships relate to student outcomes, and offer new directions for future research on school climate improvement.

Study Three

In my third study, I explore how different types of relationships between students and teachers (specifically levels of closeness) relate to students' feelings of belonging, sense of mattering, perceived connection, and perceptions of program climate. I also looked at how patterns in the larger network relate to overall feelings of belonging, mattering, connection, and perceived climate. This study was conducted in the same summer school and enrichment program as Study Two, with data collected at two time points: the start and the end of the summer program. By looking at the connection of teacher to student relationships (and student to teacher relationships) to student outcomes using an SNA approach, results are able to offer new insight into how characteristics of teacher-student relationships are relate to student outcomes. Collectively, these two network studies offer a more nuanced understanding of how interpersonal relationships with peers and adults relate to student outcomes, by moving beyond their general importance, which has already been well established, to uncovering the specific components of these relationships that may impact students.

Additional Contributions of the Dissertation

In addition to enhancing understanding of school climate through the use of novel methods, these studies help to bridge the current gap of research on Latine students' experiences of school climate. As previously stated, school climate is often experienced differently by students of color (Rios, 2011; Valenzuela, 1999; Voight, 2015), but this does not have to be the case, as spaces designed to attend to the needs of students of color can create positive communities of belonging for them (Ngo, 2017; Ventura, 2017). There is a need for better understanding of the unique experiences of Latine students in regard to school climate, in both school and out-of-school educational settings, in order to better design educational environments that meet their needs. Despite Latine students being the largest growing demographic group in

the country, such research is still limited (Morales et al., 2017). Therefore, these studies help bridge these gaps, as all involve samples of predominately Latine students.

Conclusion

Together, these three studies help to enhance current understandings of school climate in early adolescence, focusing on areas of particular importance during this developmental state – autonomy and interpersonal relationships– and using methodologies uniquely equipped for such research – youth participatory action research and social network analysis. These studies span two settings in which youth spend a majority of their time out of the home and that have been found to be important developmental spaces: schools and out-of-school settings. Lastly, these studies utilize an understudied but growing population in school climate research, Latine students, to help further illustrate the nuance of experiences of school climate by students of color.

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CHAPTER 2

Elevating Student Voices and Addressing Their Needs: Using Youth Participatory Action Research to Improve School Climate During the COVID-19 Pandemic

Adolescents' educational experiences encompass more than just what they are taught in classrooms, as schools are social environments with significant influence on young people's development (Eccles & Roeser, 2011). Individuals' experiences of school life, known as school climate, include physical space and interactions, such as feelings of physical and emotional safety, interpersonal relationship quality, perception of adequate resources, and opportunities for learning (Thapa et al., 2013). A positive school climate is associated with a variety of beneficial outcomes, from academic achievement (e.g., Wang & Holcombe, 2010) to reduced bullying (e.g., Acosta et al., 2019). However, the COVID-19 pandemic and subsequent shift to virtual or hybrid learning drastically changed school environments, partially due to the switch from shared physical spaces to individual homes. These changes posed challenges for students generally (Phillips, 2020) and exacerbated existing issues of educational inequity, with Latine and low-income students being less active in their online classes compared with their white and higher-income peers (Esquivel & Blume, 2020).

Presently, little is known about how adolescents have perceived school climate during the COVID-19 pandemic and researchers have argued for the need to involve young people in decisions that impact their day-to-day lives during this time of upheaval (Efuribe et al., 2020). One strategy to both learn about young people's perspectives and engage them in decision-making is through youth participatory action research (YPAR), which situates youth as co-researchers, exploring topics of relevance to their lives and advocating for change in their communities (Ozer, 2017). To understand how students were experiencing and wanting to

improve their school's climate during the COVID-19 pandemic, we conducted a YPAR project in partnership with an ethnically and socioeconomically diverse middle school. Drawing upon qualitative and quantitative data, we explore how YPAR impacted both the individual participants and their school overall.

Importance of School Climate

The National School Climate Council defines school climate as "the quality and character of school life" (NSCC, 2007, para. 3). A positive school climate is associated with desirable academic and behavioral outcomes (Huang & Cornell, 2018; Wang et al., 2013; Daily et al., 2019), while negative school climates are related to low self-esteem and depression (Way et al., 2007). Though school climate is important at any age, it takes on particular importance during early adolescence, a unique developmental period in which, as stage-environment fit theory suggests, there can be a mismatch between developmental needs and the opportunities afforded by social environments (Eccles, et. al, 1993).

School climate is also an educational equity issue, as not all students, even in the same school, experience a school's environment the same way (Voight et al., 2015). Notably, students of color and those from lower socioeconomic backgrounds tend to have more negative perceptions of school climate when compared with their higher socioeconomic status and white peers (Jia et al., 2009; Voight et al., 2015; Wang et. al., 2010). One possible explanation for this discrepancy may be the fact that schools typically replicate the norms of the society within which they are placed, reifying patterns of oppression for certain students (Gray et al., 2018), such as students of color being more harshly disciplined than their white peers (Huang & Cornell, 2018). Additionally, there is reason to believe that the COVID-19 pandemic amplified these demographic differences in experiences of school climate, as research has documented how

marginalized students had less access to a computer or internet and experienced greater learning loss during this time (Donnelly & Patrinos, 2021; Friedman et al, 2021).

Benefits of a YPAR Approach

In middle school, opportunities for student voice and autonomy are important aspects of school climate (Way et al., 2007). Autonomy is crucial for adolescent identity development and can support the development of students' agency (Cook-Sather, 2020; Steinberg, 2017). Incorporating students' voices into schools and increasing opportunities for autonomy can also help students feel empowered, valued, and recognized, which can increase their sense of mattering (Cook-Sather, 2020; Lac & Mansfield, 2018). Further, increasing opportunities for student engagement and decision-making can help improve school climate (Voight & Nation, 2016).

YPAR offers a mechanism to increase students' autonomy by collaborating with them to identify and conduct research on problems in their schools, and then use their findings to influence policy and decision-making to improve their lives (Ozer, 2016; 2017). Rather than relying on researcher-determined problems and methods, YPAR allows youth to articulate issues informed by their own lived experience, utilize methods that address their particular perspective, and facilitate the collection of data (Langhout & Thomas, 2010; Ozer, 2016). Additionally, YPAR can be a unique tool for school climate improvement, by offering an opportunity for students to have a voice in school decisions (Ozer et al., 2010; Voight, 2015).

YPAR can benefit both individuals (e.g., increasing their feelings of empowerment; Mathikithela & Wood, 2019; Ozer, 2017) and settings, by addressing pressing community problems (Cohen et al., 2019; Schlehofer et al., 2018). Participating in school-based YPAR can also help students build their social connections on campus (Voight, 2015), which can increase

their sense of school belonging, generally considered to be their feelings of attachment to school and acceptance by others in the school community (Allen & Bowles, 2012; Slaten et al., 2016). School belonging is also associated with a number of positive outcomes, including academic achievement, motivation, and engagement (Korpershoek et al., 2020). Further, YPAR is well suited to support the needs of students who are traditionally marginalized in schools, as YPAR projects with students of color can challenge deficit perspectives adults may hold about such students (Bertrand, 2018; Morales et al., 2017).

Current Study

To better understand diverse adolescents' perspectives on school climate during the COVID-19 pandemic and expand limited research on YPAR as a tool for school climate improvement, we conducted a YPAR project with 14 ethnically and socioeconomically diverse middle school students during the spring of 2021. Participating students attended two meetings a week for three months to learn about school climate, select a focal school climate issue, and conduct their own action research project. Quantitative and qualitative data were collected to assess how YPAR impacted both the setting and the individual participants. Specifically, we asked: 1) How do middle school students perceive and seek to improve their school's climate during the COVID-19 pandemic? 2) How does participating in a YPAR project impact middle school students' sense of belonging, mattering, empowerment, and perceptions of school climate?

Method

Participants

This YPAR project was conducted in partnership with a Title 1 middle school in California where most students (69%) are Latine and qualify for free or reduced lunch (66%).

School staff co-designed the participant recruitment process to ensure a diverse and representative group of students were involved. Teachers in a range of classes, programs (e.g., Dual Immersion), electives (e.g., ASB), and after-school programs (e.g., AVID) shared study information. Parents of 22 students completed interest forms with 18 students attending an initial meeting and 16 students completing all consenting processes to participate. Once started, two students discontinued due to conflicts with extracurricular activities resuming as some COVID-19 restrictions lifted, leaving 14 students. The group was half male and half female, and was majority Latine (43%), followed by white (29%) and Multiracial (21%). Most students were 7th graders (64%), followed by 8th (22%) and 6th (14%). See Table 2.1 for more information.

Procedures

Parental/guardian consent was first obtained, followed by assent when students participated in an introductory meeting. Three 45-minutes meetings were held via Zoom every week for 12 weeks (March to June 2021). This included one all group meeting at the start of the week followed by two small group meetings at the end of the week, wherein students would attend just one session, based on their schedule. Meetings were facilitated by the first author, as well as a team of three undergraduate research assistants, two of whom had attended the participating middle school previously. During these meetings, students got to know one another through community-building activities, learned about the research process, picked a school climate topic on which to focus, designed and implemented a study, and shared their results. All meetings were recorded and transcribed, and Zoom chat logs were saved as well. Supplemental activities, such as the students' presentation of their results to school staff, were documented in field notes. Students also completed pre and post surveys electronically via Qualtrics. A

university Institutional Review Board approved all study procedures, and approval was also obtained from the partnering district's Department of Assessment, Research, and Accountability.

Measures

At the start and end of the project, students were surveyed about their feelings of belonging, mattering, empowerment, and perceptions of school climate. Baseline surveys additionally collected information on students' gender (male, female, or prefer not to say), grade (6^{th}, 7^{th}, and 8^{th}), and ethnicity (Latine or Hispanic, White/Caucasian, African or African-American, American Indian or Alaska Native, Asian or Asian-American, and "Another ethnicity not listed above" with a text field to specify). Anyone who selected two or more ethnicities (e.g., "Latine or Hispanic" and "Asian or Asian-American") was re-coded as Multiracial. Anyone who only selected "Another ethnicity not listed above" and did not write anything in the textbox was coded as other.

Post-surveys asked again about feelings of belonging, mattering, empowerment, and perceptions of school climate as well as four open-ended questions: 1) Why did you decide to participate in the [redacted] YPAR Team? 2) What was your favorite part of participating in the [redacted] YPAR Team? 3) What do you wish you could have changed about the [redacted] YPAR Team? 4) What did you learn from participating in the [redacted] YPAR Team?

Sense of Belonging

Sense of belonging was assessed using the Psychological Sense of School Membership Scale (PSSM), an 18-item survey rated agreement on a five-point Likert scale (0 = "Not at all true" to 4 = "Completely true") (Goodenow, 1993). The PSSM has been used effectively with ethnically diverse middle school students (Morrison et al., 2003). Sample items include "I feel

like a part of my school" and I can really be myself at (school name)." A full measure can be found in the Appendix.

Sense of Mattering

Two scales assessed mattering. The 5-item General Mattering Scale (GMS; Marcus & Rosenburg, 1987) asks respondents to rate their agreement on a four-point Likert scale (0=Not at all to 3 = Very much) and has high reliability when used with middle school students and ethnically diverse adolescents (Dixon et al., 2009; Watson, 2018). Sample items include "How important do you feel you are to other people?" Additionally, four items from the Adolescent Sense of Community Scale (Abdelkader & Bouslama, 2014), which also uses a four-point Likert scale (0=Strongly disagree to 3 = Strongly agree), were included after being modified to focus on school, rather than larger community context. Items assess needs fulfillment and influence, which are components of mattering's focus on adding value and receiving value (Prilleltensky, 2019). Sample items include "I influence how (school name) functions." The combined measures can be found in the Appendix.

Empowerment

Empowerment was assessed with an adapted version of the Psychological Empowerment Instrument (Ozer & Schotland, 2011), which measures skills that are often targeted in YPAR. Scored on a four-point Likert scale (0=Strongly disagree to 3 = Strongly agree), it has been used successfully with ethnically diverse adolescents (Ozer & Schotland, 2011; Batista et al., 2018). The measure was modified to include only school contexts, rather than empowerment in both city and school settings. This included rewording two items that included city context and dropping seven items that asked about the city setting and were already analogous to school context items. The final measure included 19 items and modifications were discussed with one of

the scale's creators. Sample items include "Students have a say in what happens at this school" and "If issues come up that affect students at my school, we do something about it." The full measure can be found in the Appendix.

Perceptions of School Climate

Because this project took place while students were either attending school exclusively online or a hybrid of online and on-campus a few days a week, a new measure was created to assess school climate with an online component. Informed by existing school climate measures, as well as the four main areas of school climate – safety, relationships, teaching and learning, and institutional environment (Thapa et al., 2013) – a 30-item measure was created. The scale asked about agreement on a five-point Likert scale of items related to both the in-person environment (e.g., "My classrooms have all the resources they need, like textbooks and computers") and virtual environment (e.g., "I feel comfortable turning on my video during meetings for my classes") of their school. The first half of the measure uses response options from "Never" (0) to "Always" (4) and the second half uses options from "Strongly disagree" (0) to "Strongly agree" (4). The whole measure included ten items about safety, nine about relationships, seven about the institutional environment, and four about teaching and learning. A copy of the full measure can be found in the Appendix.

Analytic Plan

This study utilized a convergent triangulation mixed methods design, wherein qualitative and quantitative data were collected simultaneously to then be merged together for the generation of metainferences (Creswell & Plano Clark, 2006), allowing for a more holistic view of the impact of YPAR. Due to the small sample size of students, analyses primarily centered on qualitative data, with surveys to probe deeper into specific constructs that might change. As

such, a variety of analytic strategies were used, once all data were de-identified and students assigned pseudonyms.

Quantitative Analysis

Close-ended baseline and post survey data were imported into STATA, (Version IC 15.1, Statacorp, 2017), cleaned, and descriptive statistics were calculated. Additionally, paired sample t-tests were run to determine if there were significant differences in students' feelings of belonging, mattering, empowerment, and perceptions of school climate from the start to the end of the project. Given the small sample size, these analyses are underpowered and mainly illuminate patterns rather than generalizable findings.

Qualitative Analysis

Qualitative analyses included reviewing meeting transcripts, chat logs, and field notes for themes inductively, with themes being emergent and grounded in the data (Saldaña, 2013). Student responses to open-ended questions were additionally coded inductively. In these first rounds of coding, major codes and sub-codes were created using MAXQDA (Version 20.4, Maxqda Analytic Pro, 2020). To ensure trustworthiness of the identified themes, the authors, as well as a group of doctoral students, reviewed the preliminary analysis, which was followed by revisions to the identified themes. Once the themes were finalized, manual theme mapping was then used to see how they related to the previously identified constructs (belonging, mattering, empowerment, and perceptions of school climate). This mapping was again reviewed and revised accordingly.

Integrated Analysis

Once separate analyses of qualitative and quantitative data were completed, the datasets were merged to see how the findings complemented or contradicted one another (Creswell &

Plano Clark, 2006). The primary focus of this merging was to answer the second research question that focused on how participating in the YPAR project impacted students' sense of belonging, mattering, empowerment, and perceptions of school climate. This involved reviewing themes from students' open-ended survey question responses, as well as themes from meeting transcriptions and Zoom chat logs, alongside results from paired sample t-tests assessing change in these four construct areas. Qualitative and quantitative findings were integrated with a focus on enhancing findings, to increase interpretability and meaningfulness of results (Fetters, 2019). This integration process led to the creation of metainferences, high-level findings generated from the integration of the two datasets (Fetters & Guetterman, 2021), to more fully answer the second research question.

Missing Data

Three students did not complete post-surveys due to scheduling conflicts. These students did not notably differ from the overall sample in gender, ethnicity, or grade. Because these data were assumed to be missing at random, these students were not included in quantitative analysis of the four constructs of interest. Additionally, student attendance varied in the YPAR meetings over the 12 weeks. On average, 83% of student participants were present in each whole group meeting and 66% of students were in each small group meeting. Therefore, qualitative data (e.g., transcripts and chat logs) from group meetings reflect different configurations of students, with every student present at least eight times.

Results

Youth Perceptions of School Climate

Issues Considered

To start, students were introduced to the concept of school climate through researcher presentations and videos followed by guided discussions. Once students understood the concept of school climate, they then discussed their school environment prior to the pandemic, drawing upon their own personal experiences (for 7th and 8th graders). Findings from a school-wide school climate survey in 2018 were shared as well. Some students shared that they felt the pandemic limited their understanding of the school's climate, as Catherine, said "…I'm in seventh grade now, and all seventh grade has been online for me, and then sixth grade, I was only there from, like, August to March, to, like, the end of February/early March, so that's honestly not enough time to get, like, the overall view of the school."

Students were then invited to share how climate is similar or different during a pandemic and what they would like to change. After spending a few meetings discussing school climate, students brainstormed and eventually shared one school climate issue that they felt was important during the current school year. Once every student had shared their perspective, the group reviewed all the issues to identify possible patterns, noting some common school climate aspects. One recurring issue was school lunches, with Maria observing "I saw, including myself, a lot of people said the lunch area, and then a lot of other people said the lunch, like, the food that they serve at lunch, so I think those could be combined together." Another issue identified focused on student engagement, as Chloe shared "A lot of people think that there needs to be better communication…between teachers and students who are online. Because there's online engagement and… teachers forgetting to unmute themselves…"

Students continued categorizing each issue identified through group discussions, with students weighing in vocally or via the chat, to build consensus. Surprisingly, all issues fit into one of two topics: school lunch and student engagement. See Table 2.2 for more information.

Students then discussed, as a group, why they felt these issues were important and worthy of researching. Catherine felt school lunch was an important topic, stating, "We need more variety for gluten free, vegetarians, vegans and also for preference. It would be a lot less food waste…if there were more options, [and] people could pick what they wanted. And for health reasons and allergies too." Another student, Hayden, advocated for the issue of student engagement, noting "Students online mainly, but also sometimes in person can get left out…we thought that it was an important thing to research because it affects the lives of the students and it affects their grades, which are very important."

Following this meeting, students were tasked to gather additional feedback from their peers outside of the group. The students created a list of questions to ask peers (e.g., "Do you think this is an issue at our school?", "Why or why not", "Has this issue impacted you or anyone you know?" "If yes, how?"). All students agreed to complete this task, though some found it challenging, as the pandemic had impacted their ability to build connections with their peers. The majority of students did gather peer input via phone or during in-person school days. Upon gathering feedback from her friends, Maria shared, "I asked my friends and they said that it [school lunch] is a problem because kids should not be eating on the floor and it does affect them and people we know." Similarly, Catherine shared that "All the people that I talked to said the food was really bad and unhealthy" and another student, Corbin, found the students he talked to "...said that they also recognized it [food waste] and see it as kind of a problem in our school." The students then had a discussion about how these additional perspectives aligned, or did not align, with their own opinions about which issues were important to research at their school, further informing their decision-making.

Issue Selection

Because the group was divided between two topics, the team discussed whether to focus on two research topics or just one. Students considered various aspects of the decision, with a student, Diego, sharing "I think that it would be better to do two topics because it may help students want to share their opinion, but it would be more difficult, so I am fine with one topic." Conversely, Maria advocated for focusing on one topic, saying, "It will give us more time to go more in depth about the topic and really focus on fixing it." Since there was a range of opinions, the students decided to conduct a Zoom poll to democratically determine if the group would focus on one research topic or two. Ultimately, 83% of students voted for working on one topic and all agreed with this decision.

To select which topic, students, as a group, discussed various aspects of the two topics, including possible structural barriers to improvement of these issues. For example, about student engagement, Chloe shared "I think that a big factor into…not being able to pay attention online, is the WiFi because I know in a bunch of my classes, people are always getting kicked off because of their WiFi and then they don't know what's happening, so I think a better thing to do [than research] would be to give everyone WiFi or something, but I don't know how we would do that." Such comments demonstrated how students considered the feasibility of their research to make improvement in these two issues, and how certain systemic factors may be harder to change. Students also talked about the relevance of the proposed issues in future years, with a student Danny saying, "I think, lunch would be better because it can carry on into the future, like bring it into eighth grade… having us talk to students and figure out like, online [engagement] …everyone's probably going to be back to normal, maybe, next year…in two years we're going to be way back to normal, and we won't really have to worry about this…" Ultimately, a major factor in the students' decision-making process was how they imagined they could improve the

given issue, both considering the immediate and the long-term impacts of their research, as well as the aspects of the issue that were outside of their control.

After discussing various considerations for each issue, the students worked together to design a selection process. They opted to divide into groups based on their preferred issue and prepare a statement of why they believed their issue was the most important. Each group then presented their case and responded to questions. Following the presentations and discussion, a Zoom poll vote was used to decide the selected issue. The process, as described by Catherine, was "like a presidential campaign but instead of presidents we are arguing for topics." The students favoring the "school lunch" issue felt that it could improve students' health, help students focus, and reduce food waste. In support of the "student engagement" issue, students argued that it would improve the quality of students' education, help students pay attention in class, and make learning environments more welcoming. Ultimately, the school lunch topic was selected, winning 69% of the vote. While the vote was not unanimous, the selection process had full student buy-in, so all participants accepted the decision. Some of the rationale students gave for their school lunch vote was its perceived relevance once distance learning ended, a belief that this issue had greater possibility for improvement, and the potential for this topic to also impact issues of student engagement, as Catherine noted, "Usually, when you do have a good lunch… you can learn and concentrate better…"

Action Taken

Having selected school lunch, the group felt that a partnership with both school- and district-level food services staff was important. Thus, the head of the school's cafeteria and a Nutrition Specialist from the district were contacted and invited to meet with the YPAR group. Joining a Zoom meeting, these two gave a presentation to the group about school lunch policy

and practices so that students could understand what aspects of the school lunch were changeable and which were government mandated. Additionally, students who were in the school's hybrid program were able to tour the campus cafeteria, to learn more about how the food was prepared. This connection with food services enabled the students to design a study that was informed by school lunch policy and focused on aspects of the school lunch that were most malleable.

The students selected three main focus areas for their research: improving the quality of school lunch food, reducing food waste on campus, and improving lunchtime seating options for students. To tackle these issues, the students wanted to better understand what items were being thrown away on campus, students' perceptions of the school lunch food and seating, and students' lunchtime behavior (e.g., how often cafeteria food was eaten) and needs (e.g., did students have any allergies/food restrictions). Therefore, the students utilized two methods to study these areas. The first was completing food waste observations. Students created an observation protocol, wherein they observed one trashcan at lunch and noted which and how often cafeteria items were thrown. Students in the school's hybrid program completed seventeen observations over a one-week period. The students also created a survey with open- and close-ended questions about students' opinions about cafeteria food, activities during lunch, and thoughts on the seating options. The YPAR team wrote the survey questions and the first author built the survey in Qualtrics, which the students then pilot tested amongst their friends. A link was then shared with the school and 282 students (21% of the school) completed the survey.

The students analyzed their observational data collaboratively, reviewing all the observations collected and noting patterns. The first author did preliminary analyses on the close-ended survey questions, which were then shared with the group. The students also discussed a selection of responses to open-ended survey questions. These mixed-methods provided evidence

for how frequently the fruit was being thrown away from school lunches, often entirely uneaten, and that nearly a third of students surveyed (31%) perceived the school lunch food as unhealthy. These findings, and others, were then collectively integrated into a PowerPoint presentation that the students presented to a team of school decision-makers, including counselors, administrators, and teachers. They also created a results document that was shared with both school- and district-level Food and Nutrition Services staff. The goal of sharing these results was that the cafeteria could utilize this new insight on students' cafeteria eating behaviors and preferences, in order to adjust some menu items, with the hopes of reducing food waste and improving students' enjoyment of the food.

Larger School Impacts

Though only a 12-week YPAR project, there was evidence of benefit to the school. First, the students generated data that the school staff, especially Food and Nutrition Services, could use. Second, the team built partnerships with the cafeteria and nutrition staff which played a role in this school being the only one in the entire district that did not have their number of cafeteria staff reduced (as reported by the school's principal). Third, the research team was able to use the preliminary data and resulting intervention ideas to apply for and receive a $14,500 grant to fund the continuation of the YPAR project into the subsequent year to continue to tackle food and nutrition issues.

Impact on the Students

Though impacts on the school's climate are hard to assess but promising, there are numerous sources of evidence as to how the YPAR project influenced the student participants.

Empowerment

When asked about their experiences participating in the YPAR project, students expressed noteworthy feelings of empowerment. For example, Diego said that his favorite part of the project was "…when we got to actually do something way more productive and get to observe all the waste of the food that was happening because it made me want to see what we could do to at least help the problem resolve." Another student, Gabriela shared, "My favorite part was learning about something that had an impact on the school." Similarly, Eduardo said what he learned from participating in the project was "that if you work hard you might be able to change something" and Riley noted, "I learned how to gather information and use the data to help."

Field notes, transcripts, and recordings of meetings also demonstrate increasing levels of student agency. This was most notable in how the students assumed leadership roles in creating decision-making processes as meetings went on, with students eventually entirely designing these systems without adult intervention. For example, Danny was instrumental in creating the decision-making process for selecting the final research topic. In a meeting, he said, "What we could do is…send people into breakout rooms, ask them…what topic they want to be in and then send them over to the breakout room and then …make up, like a few good points…and then you come back and you share them and then whichever one sounds the best and would help the community and make more of a difference at [school name] would be the one we picked."

Additionally, the students' development of advocacy was evident in their presentation of their research results to school staff. During the question and answer portion of their presentation, one teacher posed a critical question, noting that their number of survey responses was low and that it was difficult to change school food, due to some inflexible government policies. The students responded quite confidently to this critique, with Catherine speaking first,

acknowledging the small sample size of "just 1/5 of the student body" and how additional students would provide a more "generalizable" sample, but that their data were a valuable first step. Hayden also spoke about what the group had learned about government restrictions on school lunch food and what can be served in cafeterias, with Corbin then chiming in about what they learned about the process of adding a new item to the school menu. Lastly, Danny added information that the students had learned about required calorie counts for school meals. Together, the students thoroughly responded to the teacher's concerns in a manner that showcased their increased expertise in the topic and confidence in their research. Finally, though a small sample, there were sizable differences on pre-post surveys, with students' significantly increasing in feelings of empowerment from the start to the end of the project, ($t=1.96$, $p<0.05$; effect size=0.59). Ultimately, qualitative and quantitative findings confirmed one another, showing the same results (Fetters & Guetterman, 2021), that students had increased feelings of empowerment throughout the course of the project. See Table 2.3 for more information.

Mattering

Mattering involves both feeling valued by a community and perceptions of adding value to that community (Prilitensky, 2019). In their open-ended responses and meeting transcripts, students clearly demonstrated increased feelings of mattering. Students described how they felt their work was valued, with Danny sharing that his favorite part of the project was that "…you [research team] took our ideas into consideration and were open to all ideas." Similarly, students also learned how to value others, another important part of mattering (Prilitensky, 2019), as Mia shared that she learned "how to collect important data and to value everyone's opinion" and Diego noted "I learned many thing(s) but what I find to be important was how I learned how to get the best information and to listen to everyone else's opinions."

In meetings, students vocalized how their peers' thoughts and feelings mattered too. While trying to determine if they should focus on one topic or two, Mia said, “Two topics would be better because I feel like more students will voice their opinion.” When discussing the potential impacts of selecting just one topic, Benjamin said, “I think having a unanimous decision is better.” This mattering of others was also evident in students’ advocacy for democratic processes in decision-making, like voting, and also suggestions they gave in meetings about how to encourage other students to participate. For example, Catherine suggested during a check-in about group norms a few weeks into the project “…to make it so more people can participate …if [a student] answers your question, then maybe you could wait for two more people to answer as well, until you ask something else… so that more people get the chance to say what they think.” Students also expressed feeling that they were able to add value to their school through the project (Prilitensky, 2019). Eduardo noted that his favorite part of the project was “being able to help the school” and Mia said that she enjoyed getting to “change the school for the better.” Students also had a statistically significant increase in mattering surveys ($t = 2.2$, $p < 0.05$), with an effect size of 0.66. Together, qualitative and quantitative results expanded one another, offering broader, but overlapping findings (Fetters & Guetterman, 2021), showing the variety of ways in which students’ mattering increased over the course of the project. See Table 2.3 for more information.

Belonging

Belonging entails feeling accepted and included by others (Osterman, 2000), which was reflected in qualitative data collected. In their responses to open-ended questions, some students shared what they liked best was being a part of a group and working together, with Riley saying, “I loved just going to it [YPAR group] and being part of it and coming up and agreeing on ideas

or thoughts." Additionally, there was evidence from meeting transcripts that students felt a shared sense of identity to the group and the school - talking about their membership in "our research team" and their impact at "our school." Students were also observed vocalizing agreement with one another and offering affirmation for the ideas they shared. However, there was not a statistically significant difference in belonging surveys over the 12 weeks, with average belonging scores starting at 3.02 (out of 4) and ending at 2.98 (out of 4). Thus, the qualitative and quantitative findings were discordant, or did not align with one another (Fetters & Guetterman, 2021), as qualitative results showed increased sense of belonging to the YPAR group itself, but quantitative results did not identify a change in sense of belonging overall. See Table 2.3 for more information.

Perceptions of School Climate

Students learned about school climate as a construct and identified climate issues in their school. However, evidence of changes in how students perceived their school's climate were limited. Some felt that they understood more about their school's environment, particularly in what they learned through their partnership with Food and Nutrition Services staff. For instance, Hayden said in response to an open-ended survey question, "I loved learning about the cafeteria and how we can implement new cafeteria items." In sharing reflections from the Food and Nutrition Services presentation, Chloe noted "I thought it was interesting that there are guidelines for what food they can give to us" and Catherine added "It was interesting how they kind of adjust the food, depending on what the students are liking." Through this partnership, students seemed to gain more nuance in how they understood their school environment. Similarly, students shared how they also liked getting to see more of their school, as both Chloe and Corbin shared how much they enjoyed touring the cafeteria. However, on the surveys,

students did not report significant changes in their perceptions of school climate, as average scores started at 2.97 (out of 4) and ended at 2.9 (out of 4). Overall, these qualitative and quantitative findings expanded one another (Fetters & Guetterman, 2021), with both affirming students did not have a notable change in their perceptions of school climate, but qualitative results revealing students' shifts in understanding of their school's climate. See Table 2.3 for more information.

Discussion

School Climate During COVID-19

These results offer insight into how students conceptualized and experienced school climate during the COVID-19 pandemic, something that is understudied as most research has focused on student learning loss (Donnelly & Patrinos, 2021) or adult experiences, like those of parents (Carpenter & Dunn, 2021) and teachers (Phillips, 2020). As noted in the issues they felt were important, students conceptualized school climate during the pandemic as including both the in-person and online environment. They also were conscious of what school climate issues were evergreen and which were a function of the switch to virtual learning due to the COVID-19 pandemic.

These students adopted a critical perspective of school climate - understanding that it may vary based on individual circumstances and structural factors. As such, they felt there was greater possibility for school climate change with issues housed on campus, rather than ones in individual homes. This aligns with previous research on how YPAR can support students' development of critical awareness (Morales et al., 2017) and shift from individualistic views of problems (Anderson et al., 2021). Further, the identification of issues housed in students' homes, such as some students' lack of access to WiFi, helped students appreciate the heterogeneity of

school experiences during a pandemic. Existing research has identified how students may experience school climate differently, based on their ethnicity or socioeconomic background (Jia et al., 2009; Jones et al., 2020; Voight et al., 2015) and our findings add insight into how students may come to understand the different experiences of their peers, especially in a context where they can see, through a computer, unequal access and participation.

The students selected school lunch as a school climate issue because they saw food as an equity and inclusion issue, which supports existing research (Whitig et al., 2022). At this school, the majority of students qualify for free or reduced lunch, but some students, as Catherine noted, may not be able to eat the school food due to dietary restrictions. The students' concerns about food waste – and how the food students throw out may be indicative of them not getting their nutritional needs met – aligns with previous research on middle school food waste, particularly of fruits and vegetables (Smith & Cunningham-Sabo, 2013), showing that this is a topic of concern for both youth and adults (Reich et al., 2015).

School food also became one of the few-shared experiences of school during the pandemic, as California schools offered free meals to all students, regardless of income, and this particular district also provided food for students to take home, beyond just traditional lunches. This expanded who was eating the school food and how often they were eating it. As universal free meals have been found to positively impact student engagement, behavior, and academic outcomes (Altidang, et al., 2019; Schwartz & Rothbart, 2020), it is important to consider additional benefits they may offer students, by providing a common experience on campus. Food was also a greater equity issue during the COVID-19 pandemic, with many families experiencing increased food insecurity, especially Latine families (Feeding America, 2021). Therefore, it is unsurprising that school meals took on such great importance during the pandemic, particularly

for Latine students. Further, for those students on campus, their experience of lunch was also influenced by the physical space where they ate and concerns about adequate seating, highlighting the importance of the physical environment to school climate (Thapa et al., 2013).

Impact of YPAR

Despite this project working on a shortened timeline due to the COVID-19 pandemic, only meeting virtually, and including just a small group of students, meaningful change did occur for these students and at the school site. The partnership built with Food and Nutrition Services allowed the students' data to be used for school meal decision-making and the principal felt strongly that the YPAR project was the reason for the high staff retention, which was unlike other schools in the district. Our preliminary data also helped to secure funding to continue this work, showing the impact YPAR projects can have even if there are structural barriers (like our limited timeline) that may impede the implementation of changes advocated for by students, as is a common occurrence in school-based YPAR (Keddie, 2019). This project facilitated some immediate change, but also planted seeds for continuous advancements on campus, highlighting YPAR as a potential intervention for improving school climate (Voight, 2015), even if there are systemic challenges (e.g., a pandemic) at play.

Importantly, the qualitative and quantitative data demonstrate clear positive impacts on the students over the course of the project. Students had significant gains in their feelings of mattering and sense of empowerment, and some meaningful changes in their feelings of belonging. Though perceptions of school climate were not improved, the students had a more critical understanding of school climate and motivation to be change agents at their school. These positive impacts highlight YPAR as a tool for supporting young adolescents' developmental needs for connection and autonomy, at a stage when such feelings take on

particular importance (Fuligini, 2019; Guillaume et al., 2015) and during a time in which such opportunities were limited due to the pandemic (Efuribe et al., 2020). Notably, researchers have advocated that key reforms in middle school should prioritize helping students feel valued and included, as well as fostering engagement in school life (Eccles et al., 1993; Juvonen, 2007), all of which YPAR can support, again even in less than ideal circumstances such as those created by the pandemic.

Our results affirm the benefits of middle school students having their voices heard by adults in their school community (Ozer et al., 2010) and showcase the positive impacts of YPAR on participating students, even when occurring exclusively online. During this pandemic, when youth's lives changed dramatically in ways outside of their control, it was especially important to offer opportunities for adolescents to be involved in decision-making (Efuribe et al., 2020). YPAR offered a way for young people to utilize their unique perspectives to create change during this challenging time, and offer opportunities for connections with adults and peers (Maciano et al., 2020; Owens et al., 2021). In total, our study illuminates some of students' experiences of school climate during the pandemic, as well as what school climate issues were of greatest importance to these students during this unique time. This study also underscores the importance of including youth voice in issues that impact their lives.

Implications for Educators and Researchers

These findings offer implications for both educators and researchers on how to structure schools to better support diverse young adolescents. Our results highlight how middle school students having a voice in their education can be beneficial for their wellbeing (Guillaume et al., 2015) and support their developmental needs for connection and autonomy (Eccles et al., 1993; Ozer et al., 2010). Additionally, engaging students in the process of school climate improvement

can help foster meaningful change at school sites (Voight, 2015). Though conducting YPAR in school settings can pose challenges (Kohfeldt et al., 2011), the benefits outlined in this small-scale YPAR project demonstrate its potential as an educational intervention despite possible barriers. As such, educators seeking to both improve outcomes for individual students and their school climate as a whole, should consider possibilities for implementing programs on campus that allow diverse groups of students to direct and undertake projects of school improvement.

Further, this study offers implications for researchers in how we consider partnerships with schools. Much research with adolescents only engages them as subjects, rather than giving them a voice in the research process (Langhout & Thomas, 2010). Particularly during a pandemic, when many decisions were made *about* youth, but not *with* them (Efuribe et al., 2020), researchers should consider the ways in which they bring young people into the research process beyond just roles as respondents. This can benefit research, by leveraging the insider expertise of youth who are directly experiencing the topics that we seek to understand and allowing researchers to more effectively study topics that may be less accessible to adult outsiders, increasing the utility of findings (Ozer, 2016; 2017). Overall, research on young people's lives can greatly benefit by shifting youth's role from subjects to co-researchers.

Limitations and Future Directions

This study is not without limitations. The sample size was small with just 14 students and participation was limited to students who could join the meetings, which were held virtually due to the COVID-19 pandemic. As such, students who lacked a working device (computer or phone) with access to WiFi or data could not attend the meetings. Further, due to the meetings being after school, students with other activities or family obligations could not attend. Also, the virtual context meant individuals joined meetings from a range of settings with a variety of

resources. Additionally, the COVID-19 pandemic necessitated a shorter timeline for this project, which did not allow time to observe how the students' data were utilized to create change in cafeteria eating habits or reduce food waste. Though our results are limited to the perspectives and experiences of the students involved and just one school site in a limited time frame, we still feel the findings offer noteworthy insight into the understudied student experiences of school climate during the COVID-19 pandemic, as well as the potential impacts of YPAR for diverse young adolescents.

Future work should be conducted with larger groups of students in various middle school settings, to further understand how YPAR can support the needs of individuals and educational institutions. While our study included only one school, future research could compare across schools, to see what institutional elements may influence YPAR impacts in a setting. Future research could also use longer time frames to study outcomes across one or multiple years.

Conclusion

A wealth of research has shown that educational environments influence adolescent development and wellbeing (Eccles & Roeser, 2011; Wang & Degol, 2016) and that not all students experience a school's climate the same way (Jia et al., 2009; Voight et al., 2015). Engaging students in efforts to improve their school through YPAR can both help adolescents' needs for autonomy and connection (Ozer, 2017) and support school climate improvement (Voight, 2015). In our study working with a group of diverse middle school students during a pandemic, we found meaningful changes occurred to the site and participants through our YPAR project. The increases in feelings of empowerment and mattering for these students showcase the importance of including youth voice in issues that are central to their lives. Ultimately, YPAR

offers great potential to help middle schools better meet the developmental needs of their students at both an individual and institutional level.

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Tables

Table 2.1

Participant demographic characteristics

Pseudonym	**Gender**	**Grade**	**Ethnicity**	**Attendance**
Arely	Female	7th	Latine	35% of meetings
Benjamin	Male	7th	Latine	52% of meetings
Catherine	Female	7th	Multiracial	100% of meetings
Chloe	Female	7th	White	96% of meetings
Corbin	Male	7th	White	96% of meetings
Danny	Male	7th	Multiracial	70% of meetings
Diego	Male	7th	Latine	91% of meetings
Eduardo	Male	6th	Latine	91% of meetings
Gabriela	Female	8th	Latine	52% of meetings
Hayden	Male	7th	White	52% of meetings
Maria	Female	6th	Multiracial	100% of meetings
Mia	Female	8th	Latine	74% of meetings
Riley	Female	7th	Other	87% of meetings
Saman	Male	8th	White	57% of meetings

Table 2.2

School climate issues brainstormed

Lunch Related	**Student Engagement Related**
Lunch seating	Student engagement
Better lunches	Communication with teachers
Lunch	Teachers forgetting to mute themselves
Food waste	Students not doing their assignments
Lunch arrangements	"Ppl" not paying attention in class and falling behind
	Online engagement

Table 2.3

Metainferences of qualitative and quantitative findings

Qualitative Findings	**Quantitative Findings**	**Mixed Methods Metainferences**
Empowerment		
Making a difference in their school In survey responses, students shared how they enjoyed and learned about changing their school for the better *Assumption of leadership roles* Students showed increased agency in decision-making as project meetings continued *Development in advocacy* Students responded confidently to critical questions from adult stakeholders	Students had a statistically significant increase in psychological empowerment from the start to the end of the project; ($p<0.05$, $t=1.96$; effect size=0.59)	*Confirmation* Across multiple metrics, students displayed considerable shifts in their empowerment, notably in their development of advocacy and leadership skills, throughout the course of the YPAR project
Mattering		
Feeling valued and valuing others In survey responses, students expressed enjoyment of having their opinions valued and growth in how they valued others' opinions *Democratic decision-making* Within meetings, students advocated for democratic processes and practices to increase other students' voices	Students had a statistically significant increase in psychological empowerment from the start to the end of the project; ($p<0.05$, $t=2.2$, effect size=0.66)	*Expansion* Qualitative results showcase students' gains in mattering by feeling value and adding value, while quantitative results highlight student growth in mattering through feelings of importance and needs fulfillment
Belonging		
Being "part of the group" In survey responses, students shared how they enjoyed being a member of the YPAR group *Shared membership language* As project meetings continued, students adopted shared membership language	Students did not have a statistically significant increase in belonging from the start to the end of the project	*Discordance* Qualitative results show students' increasing in their sense of belonging to the YPAR group, while quantitative results show no significant change in students' feelings of belonging to their school
Perceptions of School Climate		
Learning about school policy Students did not showcase clear shifts in their perceptions of school climate, but did express enjoyment of learning about school policies in both survey responses and meeting transcripts	Students did not have a statistically significant increase in perceptions of school climate from the start to the end of the project	*Expansion* Qualitative and quantitative results demonstrate a lack of change in school climate perceptions, though qualitative findings show development of new understandings of the school's climate

CHAPTER 3

Increasing Ties to Peers and Improving Social Emotional Outcomes: Insights from an Out-of-School Program Serving Latine Young Adolescents

Educational settings encompass much more than just their pedagogical aspects and instead are complex social environments that influence development, especially during adolescence (Eccles & Roeser, 2011). School climate offers a holistic lens through which to view schools and is commonly defined as individuals' experience of school life (Thapa, et. al, 2013), with particular focus on the relational context of educational environments (Kim et al., 2014). A positive school climate is related to a number of important outcomes for young people, including increased academic success (Daily et al., 2019) and decreased bullying (Acosta et al., 2019). Climate is not just relevant in schools, but also in other settings where youth spend time and develop, such as out-of-school programming. Structured out-of-school activities also serve as important developmental spaces for students, with participation in them being related to a number of desirable academic and behavioral outcomes (e.g., Hansen et al., 2003; Vandell et al., 2018). Similar to schools, an important component of these out-of-school spaces is their climate, such as the ways in which they foster positive relationships and feelings of belonging (Eccles & Gootman, 2002; Berger et al., 2020).

However, not all students experience an educational environment's climate the same way. For example, students of color and those from lower socioeconomic backgrounds often report more negative perceptions of their school climate compared to their white peers and those from higher socioeconomic status households (Jia et al., 2009; Voight et al., 2015; Wang et. al., 2010). This disparity may be due to the fact that schools tend to duplicate the standards of the society within which they are placed (Gray et al., 2018), maintaining norms of oppression and

having a deficit view of certain students (Valenzuela, 1999; Rios, 2017). Such patterns can exist in out-of-school programming as well, with participants of color sharing racially motivated negative experiences with peers or program staff (Gutiérrez et al., 2017; Lin, et. al, 2016). However, some out-of-school activities focus explicitly on supporting the needs of students of color and offering a safe space for building a community with similar peers (Ngo, 2017; Simpkins et al., 2017), which may be of particular importance for students of color who are more at risk of feeling excluded and lacking a sense of belonging at school (Ventura, 2017). Out-of-school activities can also be more inclusive spaces for students of color when they are composed of predominately non-white participants. For instance, Latine students participating in activities where they are the majority report less peer ethnic discrimination when compared with those who are the minority in out-of-school activities (Ma et al., 2020).

Role of Peer Relationships

Peer relationships are particularly important for the climate of educational contexts, with peer relationship quality, cohesion, and trust all being key components of school climate (Wang & Degol, 2016; Thapa et al., 2013). While peer relationships are important at any age, they have particular developmental importance during middle school, as emotional intimacy is of heightened importance during adolescence (Way et al., 2007; Elsaesser et al., 2013; Mischel & Kitsantas, 2020). Healthy relationships with peers in early adolescence are highly connected to wellbeing and have even been found to be more influential for some students than parental relationships (Brown & Larson, 2009; Bukowski et al., 1993; Collins & Laursen, 2004; Rubin et al., 2004). Positive peer relationships also help adolescents cultivate social capital (Larson, 2000), which is when certain relationships help individuals foster connections to others, participate in group norms, and access resources (Plagens, 2011). For example, the development

of relationships with peers who are school-focused can act as a protective factor against dropping out of school (Ream & Rumberger, 2008).

Ties with peers can be particularly important in out-of-school programming, as research has found that "high risk" youth who participated in extracurricular activities were less likely to drop out of school or be arrested, and that it was "participation of their peer social network in school activities" that was influential on these desirable outcomes (Mahoney, 2000 p.512). Further, some adolescents report their friendships in extracurricular activities promoted positive behaviors and that these settings were particularly conducive for fostering close friendships (Loder & Hirsch, 2003). Like schools, out-of-school activities are structured in ways that promote friendships, by creating spaces for consistent, sustained contact and experiences that build relationships, while also providing unique opportunities by bringing together similar individuals who otherwise may not be friends, such as those who are in different grades (Schaefer et al., 2011). Additionally, some have critiqued the ways in which the structure of middle schools may inhibit young adolescents' ability to form connections with peers, due to their increased size and introduction of activities that may promote competition amongst classmates (Eccles et al., 1993) – factors which may not be present in out-of-school activities (Patton et al., 2016).

Peer relationships can also influence school belonging (Allen & Bowles, 2012; Kornienko & Rivas-Drake, 2022; Renick & Reich, 2020), which is students' attachment to school, as well as the feeling of being valued and accepted by others in their school (Allen & Bowles, 2012; Slaten et al., 2016). High ratings of school belonging are related to a number of positive outcomes for students, including increased academic achievement and self-efficacy (Korpershoek et al., 2020) and decreased academic disengagement (Phan, 2013). While

impactful for all students, school belonging may be of particular importance for Mexican-American students, with research finding it influential on their academic success (Delgado et al., 2016). However, research has found that for Latine students, school belonging tends to decrease when they transition into school settings with fewer Latine students (Morales-Chicas & Graham, 2017), reiterating the importance of school climate. Peer relationships can also influence adolescents' feelings of mattering, commonly theorized as the psychological experiences of feeling valued by and adding value to a setting or community (Prilleltensky, 2019). Like school belonging, a sense of mattering is important for positive youth development, as it influences emotional wellbeing (Flett, 2018; Watson, 2018).

Benefits of a Social Network Approach

While there is a wealth of research looking at a variety of aspects of peer relationships (i.e., quality, aggression, victimization, popularity, etc.), historically much of this work has been done using self-report data, which, when compared with peer-reported data, seem to capture different aspects of peer relationships (Brown & Larson, 2009). Specifically, sociometric ratings can show how generally liked or disliked a student is, observations and self-report surveys can be used to capture friendship interactions, and social network analysis can identify how connected a student is within a setting (Gifford-Smith & Brownell, 2003). Since peer relationships are reciprocal processes, data collected from a bilateral perspective are optimal (Brown & Larson, 2009; Gifford-Smith & Brownell, 2003). Social network analysis, in which relationships are the unit of analysis, allow for a structural view of connections (i.e., ties) within an educational setting via the quantification of relationships amongst an entire community of individuals (Wasserman & Faust, 1994; Kornbluh & Neal, 2016). Social network analysis offers a mechanism to move beyond individual levels of analysis to examine "community level

phenomena in more holistic ways" (Neal & Christens, 2014 p. 315). By using social network analysis, one can examine both the larger network and the individuals within the network (Neal & Capella, 2012; Capella & Neal, 2012), allowing for a more nuanced view of peer relationships within an educational context at both the setting and individual level (Gifford-Smith & Brownell, 2003).

Despite the potential social network analysis offers for understanding adolescent peer relationships, and particularly how these relationships influence outcomes like perceptions of climate or feelings of belonging, this area of work is emerging, but underexplored. Previous social network analysis research has highlighted the influence proximity in educational contexts can have on adolescent friendships (Gifford-Smith & Brownell, 2003), finding that students are more likely to be friends with those with whom they have courses (Frank et al., 2013) and that co-participation in out-of-school activities is associated with current friendships, as well as forming new ones (Schaefer et al., 2011). Other research on adolescent peer networks has shown how similarity, often called homophily, influences friendship ties (Gifford-Smith & Brownell, 2003) - for example, students are more likely to have friends with the same immigration generation status, especially for first generation students (McMillan, 2019).

Some research has explored network structures and student outcomes, but work thus far has largely focused on targeted issues such as relational aggression (Neal & Capella, 2012; Capella & Neal, 2012), showcasing how students' social network position relates to outcomes like bullying (Capella & Neal, 2012; Neal & Capella, 2012; Neal, 2007). Some research has begun exploring the impact of peer networks on belonging, with one study finding that for Latine adolescents, their feelings of school belonging were predicted by being liked by peers and having friends (Delgado et al., 2016). Other work has found network indicators to be differently

impactful on school belonging for young adolescents (Faircloth & Hamm, 2011), suggesting that such processes may vary by ethnicity. Despite this growing use of social network analysis to understand developmental outcomes, there is still more work to be done in this area (Kornienko & Rivas-Drake, 2022; Neal, 2020). In particular, there is a need for more network data on young adolescent peer networks and how they influence outcomes like belonging and mattering, as well as an increased focus on out-of-school activity networks, where some youth spend a significant amount of time. Additionally, there is a need to continue to expand research on Latine students, a growing population in the United States, who are underrepresented in research and for which extant studies find differential processes and outcomes.

Current Study

In order to better understand how adolescent peer relationships in out-of-school programming influence social-emotional outcomes, this study utilized social network data from the start and the end of a summer enrichment program for low-income, Latine middle school students. Partnering with a nonprofit organization focused on increasing college access and completion for would-be first-generation college students, this study was set in the context of their five-week summer program, which ran from June through July 2021. These surveys asked students during the first and final weeks about their peer ties, as well as their perceptions of program climate, and feelings of belonging, mattering, and connection in order to answer the following research questions: 1) What is the relationship between *students' ties* in the peer network of an out-of-school summer program and feelings of belonging, mattering, connection, and perceptions of program climate? 2) What is the relationship between the *overall patterns of relationships* in the peer network of an out-of-school summer program and feelings of belonging, mattering, connection, and perceptions of program climate?

Method

Participants

This study was conducted in partnership with a nonprofit organization in California as part of an ongoing research-practice partnership (Coburn & Penuel, 2016). As such, the project was designed collaboratively, informed by conversations with program staff and previous data collected over the course of the partnership. The participating organization provides programming and supports for aspiring to-be first-generation college students from middle school through college graduation, the majority of whom are low-income, Latine students. The context for this project was their five-week summer school program, which serves participants who are entering seventh, eighth, or ninth grade and runs from June through the end of July. This summer enrichment program involves school-length days of academic enrichment, taught by current college students, and includes content on standard course areas like English and math and electives such as art. Additional program content includes activities to raise awareness about college and career opportunities, as well as community and spirit building games.

The 2021 summer program consisted of 107 actively engaged students, 66 of whom completed pre and post surveys for a response rate of 62%. The group was majority Latine (92.5%), followed by Multiracial (4.5%), Asian, (1.5%) and white (1.5%). Fifty-five percent of respondents identified as female, 43.5% as male and 1.5% preferred not to state their gender. The group was nearly evenly split between rising eighth graders (36%), ninth graders (34%), and seventh graders (30%). See Table 3.1 for more information.

Procedure

Data for this project were collected in the summer of 2021, when the summer program ran in a hybrid format, due to the ongoing COVID-19 pandemic. Students met five days a week

(Monday – Friday), with four of those days being online and one day being in-person, though students could opt to attend the in-person day virtually. Students were surveyed on their first in-person day on July 1st and again on the last Thursday of the program on 7/29, in-person. Surveys were completed in students' morning "advisory" classes, which students were either attending in-person or online via Zoom. Teachers shared a QR code to the Qualtrics survey for in-person students to take via their phones and an online link for students attending virtually to take via their devices. Devices were provided for in-person students who did not have their own phones. Upon agreeing to participate in the program, parents and students received information about the program's research-practice partnership with the university and completed a data-sharing agreement. A university Institutional Review Board also approved all study procedures.

Measures

Surveys collected information on students' ethnicity (American Indian or Alaska Native, Asian or Asian American, Black or African American, Hispanic or Latine, or Spanish Origin, Middle Eastern or North African, Native Hawaiian or Pacific Islander, White, or Another race or ethnicity not listed above, with the option to write in their own response). Anyone who selected two or more ethnicities (e.g., "Hispanic or Latine" and "American Indian or Alaska Native") was re-coded as Multiracial. Students were also asked about their gender (male, female, prefer not to stay, and prefer to self-describe, with the option to write in their own response), as well as which grade they will be entering next year (7^{th}, 8^{th}, or 9^{th}).

Belonging

Sense of belonging was assessed using the Psychological Sense of School Membership Scale (PSSM), an 18-item survey (α=0.9) rated on a five-point Likert scale (Goodenow, 1993), with response options ranging from "Not at all true" to "Completely true". This scale has been

used with ethnically diverse middle school students (Morrison et al., 2003) and sample items include “I feel like I am a part of [program name]” and “I am included in lots of activities at [program name].” The full measure can be found in the Appendix.

Mattering

Feelings of mattering were assessed using two scales. The first, the 5-item General Mattering Scale (GMS; Marcus & Rosenburg, 1987) asks respondents to rate their agreement on a four-point Likert scale (0=Not at all to 3 = Very much) and has been found to have high reliability when used with middle school students and ethnically diverse adolescents (Dixon et al., 2009; Watson, 2018). Sample items include “How important do you feel you are to other people?” Additionally, four items from the Adolescent Sense of Community Scale (Abdelkader & Bouslama, 2014), which also uses a four-point Likert scale (0=Strongly disagree to 3 = Strongly agree), were included after being modified to focus on program, rather than larger community context. Items assess needs fulfillment and influence, which are components of mattering’s adding value and receiving value (Prilleltensky, 2019). Sample items include “I influence how [program name] functions.” The combined measures included nine items (α=0.84) and can be found in the Appendix.

Connection

Connection to peers and adults in the summer program were assessed using items from the Comprehensive School Connectedness Scale (Chung-Do et al., 2015) and the School Connectedness Questionnaire (Marsh & Randolph, 2020). Two items from the Comprehensive School Connectedness Scale teacher support subscale and one item from the peer relations subscale were included, while one item from the School Connectedness Questionnaire teacher bonding subscale and three items from the peer bonding subscale were included. Three new

items were also written, modeled after wording in the current items. The final measure included ten items (α=0.93), with responses given on a four-point Likert scale (0 = "Strongly agree" to 3 = "Strongly disagree"). Sample items include "I feel connected with the students at [program name]" and "I can talk to my [teachers] at [program name] if I have a problem or need advice." A full measure can be found in the Appendix.

Perceptions of Program Climate

Because the 2021 summer program was in a hybrid format (with some programming online and some in-person), a new measure was drafted to assess program climate with an online component. A 30-item (α=0.89) measure was created, informed by existing school climate measures, as well as the four main areas of school climate – safety, relationships, teaching and learning, and institutional environment (Thapa et al., 2013). A five-point Likert scale was used to assess agreement on items related to both the in-person environment and virtual environment of the program. The first half of the measure used response options ranging from "Never" (0) to "Always" (4) and the second half utilized options from "Strongly disagree" (0) to "Strongly agree" (4). The measure included ten items about safety, nine about relationships, seven about the institutional environment, and four about teaching and learning. Sample items include "I feel comfortable turning on my video during meetings for my classes" and "Students at [program name] have a say in how things work." The full measure can be found in the Appendix.

Peer networks

In order to assess the peer networks within the summer enrichment program, students were given a roster of all students participating in the summer program, with names organized by grade and then alphabetically. This method is a typical approach for gathering whole network data (Butts, 2008; Marsden, 2014; Neal, 2020). Students then ranked their level of closeness with

each student using a four-point Likert scale. The scale options were co-created with middle school students through focus groups to identify how young adolescents conceptualize their ties to one another and the language they use. Scale options were listed as follows: 0 – I do not know them, 1– I know of them (meaning you may have seen them at [program name], but have not interacted with them), 2 – I know them (meaning you may have been classmates with them previously or interacted with them otherwise), and 3 – I am close with them (meaning you have gotten to know them personally or built a close relationship with them). Aligned with the results of the student focus groups, strength of tie for this study was conceptualized as the level of closeness felt to peers, rather than frequency of interaction, as some other network studies do (Wilson, 1998; Lee & Kim, 2011). Examples of this roster structure can be found in the Appendix.

Analytic plan

Analyses for this study were run using both STATA, (Version IC 15.1, Statacorp, 2017) and RStudio (Version 1.3.1093, RStudio, PBC, 2020). Prior to analysis, the network was dichotomized at two levels for analysis, a medium-level closeness network, where responses of not knowing or knowing of a student were coded as zero and responses of knowing or being close to a student were coded as one, and a high-level closeness network, where not knowing a student, knowing of them, or knowing them were coded as zero, and being close to a student was coded as one. The network was analyzed this way because school climate research suggests the impact of positive peer relationships at a number of levels, ranging from friendly classmates to close friendships (Vaquera, 2009; Voight & Nation, 2016). An additional low-level closeness network (where not knowing a student was coded as zero and all else as one) was run for a robustness check, but not included in analysis.

Dependent variables

For both research questions, student scores in each of the four constructs (belonging, mattering, connection, and climate) acted as dependent variables. Prior to analysis, average scores for all students in each of these areas were calculated at both the start and the end of the summer, after necessary items were reverse-coded. Change scores were also created, by subtracting students' start of summer average scores from their end of summer average scores. Changes in these four areas within individual students from the start to the end of the summer were analyzed via paired sample t-tests. Lastly, average construct scores for the entire sample were also calculated at both time points.

Network data structures

Students' individual ties in the two closeness levels of peer networks were assessed three ways – number of outgoing ties (i.e., the number of peers the student picked), the number of incoming ties, (i.e., the number of peers who picked that student), and the number of reciprocated ties (i.e., the number of the peers the student picked who also picked them) (Geven et al., 2013; Ruzzenenti et al., 2010; Wasserman & Faust, 1994). Outgoing ties included any of the 107 peers listed in the roster nominated by students in the sample of 66 students, while incoming and reciprocated ties only utilized peers in the analytic sample of 66. These measures provide a simple measure of network centrality - how tied they are to others in the network (Wasserman & Faust, 1994) - for each student, as it is solely focused on the number of ties an individual has and provides a more clearly interpretable measure to assess change, as a one-unit increase corresponds to one new tie (Wasserman & Faust, 1994). Change scores were also calculated for these three metrics (in-degrees, out-degrees, reciprocated ties), by subtracting students' start of summer ties from their end of summer ties. To assess changes in these three

attributes from the start to the end of the summer in both closeness levels, paired sample t-tests were again run. Correlations of network position indicators at both time points and each network level were run and can be found in the Appendix.

Demographic characteristics

To determine how scores in belonging, mattering, connection, or perception of climate might vary based on student demographic characteristics, gender (coded as female or non-female) and grade were used as controls. For all regression models, rising 7th grade students who did not identify as female served as the reference group. Exponential random graph models (ERGMs) were also used to identify how shared demographic characteristics were influencing tie formation. ERGMS provide a mechanism to assess the degree to which these shared traits influence tie formation, by comparing the patterns observed in these networks to what would be expected to occur by chance and thus determining if the observed patterns are statistically significant (McMillan, 2019).

RQ1: What is the relationship between students' ties in the peer network of a summer school and enrichment program and feelings of belonging, mattering, connection, and program climate?

To assess how these four constructs (belonging, mattering, connection, and perceptions of program climate) relate to students' ties within the peer network, a number of regression models were run. The first set of models analyzed the association between start of summer network indices (outgoing, incoming, and reciprocated ties) and start of summer construct scores (belonging, mattering, connection, and program climate). Each of these four areas was used in one model as the dependent variable and models were run using network indicators at both the medium and high-level closeness networks. Models were run with outgoing and incoming ties as

independent variables, with controls for gender and grade. Reciprocated ties were included as an independent variable in a separate model because of collinearity with outgoing and incoming ties (see Appendix), again with controls for gender and grade. A second set of models was run in the same style, but using construct scores and network ties from the end of the summer, rather than the start. Then, a final set of models was run using change scores in psychological constructs as the dependent variable, with change scores in network ties acting as independent variables, again controlling for gender and grade and with one model using change in outgoing and incoming ties as independent variables, and another using change in reciprocated ties.

RQ 2: What is the relationship between the <u>overall patterns</u> of relationships in the peer network of a summer school and enrichment program and feelings of belonging, mattering, connection, and program climate?

This second research question was answered by looking at trends across the networks, focusing on how connected students were over time. Density, the number of ties present in a network based on the number of possible ties in the network (Scott, 1991), was calculated for the peer network at both levels and at each time point to assess network-wide connectivity. To further assess connectivity within the network, the number of students who were completely isolated, either having no outgoing or incoming ties, in both network levels at each time point, was also calculated, as well as the number of students who had just no incoming ties. In order to assess levels of reciprocation over the summer, the dyad census was also calculated, which determines presence of mutual (reciprocated), asymmetric (one-sided), and null (non-existent) pairs within the network (Wasserman & Faust, 1994). As another metric of reciprocity, edge-wise reciprocity was also calculated for each network at both time points, which calculates the probability of a tie being reciprocated within the network (Butts, 2020). Lastly, network level

centralization was calculated, which assesses variability in individual's centrality within a network (Wasserman & Faust, 1994). For example, in networks where some students have many ties and others have very few ties, the centralization score will be higher, because there is more variability in individual centrality (Wasserman & Faust, 1994), while a centralization score will be lower in a network where individuals have more similar numbers of ties (Wasserman & Faust, 1994). Assessing these changes in network levels of ties, centrality, and reciprocity, alongside overall changes in the four constructs of interest (belonging, mattering, connection, and perceptions of program climate) was used to answer the second research question.

Missing Data

Ninety-three students completed some aspect of the first survey (87% response rate), 85 students completed some aspect of the second survey (79% response rate), and 66 students completed the entirety of both surveys (62% response rate). Students with missing data did not significantly differ in ethnicity, gender, or grade from the analytic sample. Additionally, students with missing data did not significantly differ in incoming ties at the start of the program, compared with students who completed both surveys. As such, these data are assumed to be missing due to low program attendance (e.g., being absent on survey collection days), but do not significantly differ from the full sample. Lastly, a small number of students who did complete the entirety of the survey skipped ranking a few students outside their grade level. These non-response rows were re-coded as 0's (don't know).

Results

Changes in psychological constructs

From the start to the end of the summer, students' feelings of belonging, mattering, and connection, as well as perceptions of program climate all improved. Average belonging score

increased from 3.21 to 3.46 (out of 4), mattering from 2.13 to 2.27 (out of 3), connection from 2.35 to 2.53 (out of 3), and perceptions of climate from 3.36 to 3.5 (out of 4). See Table 3.2 for further information. Additionally, paired sample t-tests showed that students in the sample had significantly higher scores on the four psychological constructs at the end of the summer, when compared to their scores at the start of the summer. The biggest increase was in feelings of belonging ($t=4.96$, $p<0.001$), followed by connection ($t=4.24$, $p<0.001$), then mattering ($t=3.47$, $p<0.001$), and lastly, perceptions of program climate ($t=3.19$, $p<0.001$).

Changes in network ties

Similarly, students' ties to their peers increased over the course of the summer. In the medium-level closeness network, students' average outgoing ties to peers rose from 15.5 to 18.18 and their incoming ties from peers increased from 13.09 to 14.54. Reciprocated ties amongst students also grew from 6.69 to 8.06. In the high-level closeness network, students' outgoing ties began at 3.04 and rose to 3.71 by the end of the summer, while their incoming ties increased from 2.8 to 3.3. Reciprocated ties increased from 1.27 to 1.30. For additional information, see 3.3. Paired sample t-tests also confirmed higher outgoing ties at the end of the summer in both the medium-level closeness network ($t = 3.12$, $p<0.01$) and the high-level closeness network ($t = 1.96$, $p<0.05$). There was also an increase in students' incoming ties from the start to the end of the summer in the medium-level closeness network ($t = 4.46$, $p<0.01$) and the high-level closeness network ($t = 2.09$, $p<0.05$). Lastly, students' number of reciprocated ties did grow significantly over the course of the summer in the medium-level closeness network ($t = 3.89$, $p<0.01$), but not the high-level closeness network ($t= 0.26$, $p<0.9$).

Both the medium and high-level closeness networks rose in density, with the medium-level network rising from 0.15 to 0.18 and the high-level network growing from 0.03 to 0.04.

Both networks also reduced in the number of isolated students. In the medium-level closeness network, there were no students who lacked incoming or outgoing ties at either time point, but two who had no outgoing ties at the start of the summer and none who had no outgoing ties at the end of the summer. Within the high-level closeness network, there were eight students who had no incoming or outgoing ties at the start of the summer, but just three at the end of the summer. Additionally, there were 10 students who had no incoming ties at the start of the summer and only five with no incoming ties at the end of the summer. The number of mutual and asymmetrical dyads increased in both the medium and high-level closeness network as well. In the medium-level closeness network, mutual dyads rose from 221 to 266, while asymmetrical dyads grew from 216 to 250. In the high-level closeness network, mutual dyads increased from 42 to 43 and asymmetrical dyads increased from 50 to 73. The medium-level also became more reciprocal, with edge-wise reciprocity, the probability of a tie being reciprocated within the network (Butts, 2020), rising from the start to the end of the summer. However, edge-wise reciprocity decreased in the high-level closeness network over the course of the summer. Lastly, the centralization score decreased at the end of the summer within the high-level closeness network, suggesting less variability in network ties amongst individuals over the course of the summer, but this score rose within the medium-level closeness network. See Table 3.3 for additional information. Network visualizations also show both the medium-level and high-level closeness networks becoming more connected over time, with new ties forming from the start to the end of the summer. See Figures 3.1 through 3.8 for more information.

Network ties predicting psychological outcomes

In regression models examining the influence of network ties in the medium-level closeness network at the start of the summer, none of the included predictors were significant.

See Table 3.4 for more information. For the high-level closeness network, a number of network variables were predictive of psychological constructs at the start of summer. More outgoing ties were associated with higher feelings of mattering (b_1= 0.05, p<0.01), connection (b_1= 0.06, p<0.01), and more positive perceptions of program climate (b_1= 0.04, p<0.05). Further, higher numbers of reciprocated ties at the start of the summer were associated with stronger feelings of connection, b_1= 0.06, p<0.05. For additional information, see Table 3.4.

In models examining the influence of network position in the medium-level closeness network at the end of the summer, the only significant predictor was grade, with rising 9th graders having a higher sense of belonging, b_5= 0.37, p<0.01. Details are provided in Table 3.5. Grade was also a significant predictor within the high-level closeness network at the end of the summer, which also found that 9th graders had a higher sense of belonging b_5= 0.36, p<0.01. Outgoing ties at the end of the summer were found to be predictive of psychological construct post-scores for mattering b_1= 0.05, p<0.05, connection b_1= 0.03, p<0.05, and positive perceptions of program climate, b_1= 0.03, p<0.01. View Table 3.5 for more information.

For regression models assessing how change scores in network connections influenced change scores in psychological constructs, only gender was predictive. Within the medium-level closeness network, female students had greater change in feelings of mattering over the course of the summer, b_3= 0.16, p<0.05. See Table 3.6 for additional information. Female students also had increased change in mattering within the high-level closeness network, b_2= 0.17, p<0.05. More information can be found in Table 3.6.

Variance in ties by demographic characteristics

Figures 3.1 through 3.8 highlight how commonality in grade and gender influence ties. ERGMs focused on grade revealed ties were more likely amongst students in the same grade at

the start of the summer within both the medium-level (b =3.21, p<0.001) and high-level closeness network (b =2.37, p<0.001). Shared grade continued to increase the likelihood of ties at the end of the summer within both the medium-level (b =3.15, p<0.001) and high-level closeness network (b =2.11, p<0.001). At both time points, shared grade was more predictive of ties within the medium-level closeness network, than the high-level closeness network.

ERGMs focused on gender revealed students that identified as the same gender were more likely to be connected at the start of the summer within both the medium-level (b =0.52, p<0.001) and high-level closeness network (b =1.78, p<0.001). Having the same gender remained influential on ties at the end of the summer within both the medium-level closeness network (b =0.62, p<0.001) and high-level closeness network (b =1.38, p<0.001). At both time points, shared gender was a stronger predictor of ties within the high-level closeness network, when compared with the medium-level closeness network.

A last round of ERGMs were run to determine if students were more likely to be tied to one another if they had similar scores in the four psychological constructs: belonging, mattering, connection, and perceptions of program climate. Differences in pre-score measures were not influential on ties at the start of the summer for either medium-level or high-level closeness networks. However, at the end of the summer, ties in the medium-level closeness network were found to be more likely amongst students with greater similarity in sense of belonging post-scores, (b =-0.32, p<0.01) and mattering post-scores, (b =-0.35, p<0.01). Interestingly, ties were more likely amongst students with greater difference in perceptions of program climate post-scores (b =0.23, p<0.05). Absolute differences in post-scores were not found to influence ties at the end of the summer within the high-level closeness network.

Discussion

Network connectivity and psychological outcomes

Over the course of the summer, the peer network became more connected at both medium and high-levels of closeness. This was detectable within overall network indicators, such as increased density, more mutual and asymmetrical ties, and fewer isolates, as well as changes in students' individual number of ties. At both the medium-level and high-level closeness network, students showed significant increases in their number of outgoing and incoming ties, with the number of reciprocated ties also increasing within the medium-level network, from the start to the end of the summer. These changes were observed alongside both network-level and individual-level increases in scores of belonging, mattering, connection, and positive perceptions of program climate, as students had statistically significant growth in all four of these areas from the start to the end of the summer.

This increase of ties is important due to research supporting the association between peer connections and adolescent happiness (Lambert et al., 2015) and showing how being positively connected with peers supports healthy development (Brown & Larson, 2009; Collins & Laursen, 2004). These peer ties may be especially beneficial within the context of this particular out-of-school program, which is focused on advancing educational attainment, as prior research has shown how academically minded peers can encourage school engagement (Ream & Rumberger, 2008). Further, the fact that these ties were built during the COVID-19 pandemic, when students were connecting remotely 80% of the program time, is noteworthy, as emerging research has documented the ways in which the pandemic negatively impacted adolescents' ability to connect with their peers, and subsequently, their mental health (Ellis et al., 2020).

Despite these significant changes in number of peer ties, the regression results make it difficult to determine how increasing network connectivity influenced psychological outcomes.

In all models using the medium-level closeness network, network ties were not predictive of the four targeted psychological constructs. However, students' selection of peers at the highest level of closeness was associated with a variety of psychological constructs. Outgoing ties were positively predictive of start and end of summer scores of mattering, connection and perceptions of program climate. This aligns with previous research that outlines the importance of adolescents' positive perceptions of peer relationships on school climate and associated mental health outcomes (Long et al., 2021). Interestingly, the number of incoming ties (being picked by peers) was never a significant predictor and number of reciprocated ties was only predictive of pre-scores of connection, but not post-scores. While much research has outlined the importance of mutual friendships (Gifford-Smith & Brownell, 2003), adolescents' self-perceptions of peer networks are often unreliable (Brown & Larson, 2009), meaning they may not accurately perceive their peers' feelings towards them, which may limit the impact of these ties on outcomes.

Taken together, our results indicate that adolescents' own perceptions of closeness to peers may be more influential on outcomes than how students are viewed by others. However, it is important to note that outgoing ties included every peer in the program (107) while incoming and reciprocated ties were constrained to just those who completed pre and post surveys (66), making outgoing ties a more robust measure of network connections. Further, the number of outgoing ties was a useful predictor in the high-level closeness networks, but not the medium-level closeness network, providing additional insight into adolescent peer relationships. Previous research has found that close friendships are important for adolescents' development of intimacy (Gifford-Smith & Brownell, 2003), support adolescents' wellbeing (Moore et al., 2018) and can even act as a protective factor against adverse experiences (Yearwood et al., 2019), especially

during the COVID-19 pandemic (Bernasco et al., 2021). Further, intimacy in friendships is connected to emotional closeness and self-disclosure (Shuhnan et al., 1997). While the relational aspect of school climate includes general acceptance by peers, as well as close ties within a setting (Thapa et al., 2013), these findings suggest that it is the close relationships within an educational environment, and this development of intimacy with peers, that are the most influential on perceptions of program climate and associated constructs like connection and mattering.

Influence of demographic characteristics

Students' gender and grade level offer further understanding of young adolescent peer networks. Scores of belonging at the end of summer were higher amongst rising 9th grade students compared to rising 7th and 8th graders in models using both medium-level and high-level closeness network indicators. While this makes sense given that these students were more likely to have engaged with the program in previous years or know peers from school contexts, previous research has found that sense of belonging in middle school tends to decrease as students advance in grade (e.g., Anderman, 2003; Renick & Reich, 2020), which suggests something unique about out-of-school program environments compared to traditional school settings. It is notable, though, that grade was not a predictor of changes in belonging scores, showing that while rising 9th graders may have higher belonging scores at the end of the summer, all students were experiencing similar rates of growth in belonging over the course of the summer.

Gender was a significant predictor of changes in some psychological constructs. Though female students did not have higher scores in mattering than non-female students at the start or end of summer, they did have higher change scores in mattering over the course of the summer,

meaning their sense of mattering increased more than that of non-female students. Research with high school students has found that girls tend to have higher scores of mattering than boys (Rayle, 2005), but work on differences in mattering by gender in early adolescence is limited. Related research has found that girls tend to have lower scores of belonging than their male peers in middle school (Renick & Reich, 2020) and that girls' self-esteem tends to drop in middle school, while boys does not (Wigfield & Eccles, 1994). As such, the finding that girls within this out-of-school program had higher change scores in mattering compared with their non-female peers is notable. Previous research has found that female-only out-of-school programs can be positive spaces for young adolescent girls to form connections with peers (Patton et al., 2016), but this finding within a mixed-gender program is novel. It is important to note that this particular program uses gender-inclusive language, has non-binary staff, and focuses on gender equity in staff training and practices. Thus, it could be that the structure of this program creates an environment where female students feel particularly valued and able to add value, which are core components of mattering (Prilleltensky, 2019).

Because the majority of students within this program are Latine (over 90%), differences by ethnicity were not examined. However, it is worthwhile to consider the implications of these results, being that they come from a largely Latine student population. The cultural context of after-school programs, specifically their attention to cultural responsiveness (Simpkins et al., 2017), and its influence on positive youth development outcomes are an important emerging area of research (Williams & Deutsch, 2016). The majority of teachers in this program were Latine, with cultural responsiveness being a major focus of staff training and culturally relevant activities a feature of program practices. The findings that Latine students increased in their positive perceptions of program climate, and associated constructs like belonging, mattering, and

connection, over the course of the program provide insights into possible ways to remedy some of the negative climate experiences students may experience in traditional school spaces (Voight et al., 2015) and out-of-school activities where Latine students are not the majority (Ma et al., 2020). This showcases the impact of representation amongst peers and staff, as well as cultural responsiveness in educational settings.

Context of COVID-19 Pandemic

When interpreting these results, it is important to consider that this study took place in the summer of 2021, during the COVID-19 pandemic. The students participating in the program attended a middle school that had shifted to virtual instruction in the spring of 2020 and then resumed a voluntary hybrid program in the second half of the 2020-2021 school year, wherein students could attend school virtually only or attend in-person a few days a week. Similarly, this program had shifted to a virtual-only summer program in 2020, with all programming during the 2020-2021 school year taking place virtually as well. As such, students' contact with peers in the program had been limited over the previous year and a half. Further, the majority of this program took place online – with just one day a week occurring in person, with the option to attend on-campus or virtually. Despite all these factors potentially inhibiting students' abilities to connect and form ties with peers, as well as the program only lasting five weeks, notable increases in connections were observed. These limited interactions over a short period of time were related to young adolescents' increased feelings of closeness to peers, which is especially noteworthy given previous research that has shown how the structure of middle schools may inhibit students' ability to connect with peers (Eccles et al., 1993). Further, studies examining adolescent experiences during the COVID-19 pandemic have noted the difficulty students had connecting with their peers (Ellis et al., 2020), making these increases in ties especially significant given the

program's mainly virtual context.

Implications for Educators

Despite early adolescence being a period in which students may experience difficulty forming peer connections (Eccles et al., 1993), certain settings, like this out-of-school program, can foster peer relationships. These ties are often connected with other desirable outcomes (Gifford-Smith & Brownell, 2003), including more positive perceptions of school climate (Long et al., 2021). Previous research has affirmed that out-of-school activities can be uniquely supportive spaces for fostering friendships during adolescence, as they allow students to make friends with shared interests and offer a broader sense of community (Berger et al., 2020). Our results affirm that, showing how students increased their connections to peers within such a program, despite limited in-person interactions. As such, traditional schools should consider practices such as those adopted in this out-of-school program, including a specific focus on inclusion and community building, that can intentionally foster peer connections. Further, other out-of-school programs should consider approaches that can foster ties amongst diverse adolescents, such as focusing on bringing together peers from similar backgrounds, which may support these feelings of closeness, as our study sample was predominantly Latine. Despite the challenges of forming positive peer connections during early adolescence, our results highlight that it is possible for educational environments to promote the development of such ties, when structured with this intent in mind.

Limitations and Future Directions

This study is not without limitations, the greatest of which is missing data. In order to calculate in-degrees and reciprocation, the network was truncated to those with data at the start and end of summer. As such, important incoming or reciprocated ties may have been missed due

to those students' non-responses, which requires consideration as previous research has found peer nomination to impact feelings of belonging (Delgado et al., 2016). Further, data were not collected under ideal conditions, with some students completing surveys in-person and others at home, as well as students needing to complete the survey on their phones, as a result of the program not being able to provide computers to all students. This method of survey completion was more time-consuming and tedious due to the smaller screen size of phones.

Additionally, the COVID-19 pandemic changed the context of the program, shortening the program by one week, limiting students' amount of contact with one another, and causing fewer in-person interactions. Thus, data were collected in a unique hybrid context, which likely influenced our results but may offer insights into partially remote out-of-school activities. This also led to differences in students' experience of the program, as rising 9th graders within this organization could have experienced in-person programming during their first year of the program that rising 7th and 8th graders did not due to the COVID-19 pandemic pausing in-person activities, which could influence their experience of the program. Though our results are limited to the perspectives of the students in the analytic sample and the experiences of the program within the context of the COVID-19 pandemic, the findings still offer insight into the understudied peer networks of young adolescents within out-of-school programs and how those ties relate to perceptions of program climate and associated constructs, like mattering and belonging.

Future work should continue to explore peer networks within out-of-school programs, especially collecting whole network data to view these relationships holistically, ideally with higher response rates than achieved in this study. Such research could explore young adolescent peer networks in other out-of-school programs, including different content areas, different

timeframes or different times of year (after school versus summer) and serving different student populations. Additionally, future research could examine peer networks over greater lengths of time, to continue to see how students' connections in these networks grow and change over one or multiple years. It would also be valuable to continue to try to assess if changes in network indicators are related to changes in program climate and associated constructs. This would help inform how peer relationships might be harnessed as a school climate improvement intervention. Lastly, future work should continue to explore these topics after the COVID-19 pandemic, when out-of-school programming is fully in-person again, to see how peer relationships differ when contact is increased.

Conclusion

Peer relationships are highly influential in early adolescence (Bukowski et al., 1993; Rubin et al., 2004) and related to a number of desirable outcomes for young people (Brown & Larson, 2009). Out-of-school activities can be particularly fertile grounds for fostering these peer connections (Berger et al., 2020; Knifsend et al., 2018; Schaefer et al., 2011), as well as offering a number of positive impacts for participants (Mahoney et al., 2009). In order to better understand the peer networks within out-of-school activities and how network ties are related to psychological constructs like perceptions of program climate, analytic techniques must be used that go beyond the individual level, such as social network analysis (Kornienko & Rivas-Drake, 2022). This study demonstrated how adolescent peer networks within an out-of-school program change over time at multiple levels of connection. Higher amounts of network connectivity at both an individual and network level were found alongside higher scores in positive perceptions of program climate, as well as feelings of belonging, mattering, and connection. Further, higher numbers of close outgoing ties were associated with greater feelings of mattering and more

positive perceptions of program climate. Ultimately, peer relationships remain influential components of both in- and out-of-school educational environments that are clearly connected to other aspects of positive youth development, affirming their importance for young adolescents and the need for educational settings to support the development of these ties.

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Tables

Table 3.1

Student participant demographics

Demographic characteristic	**Frequency**
Gender	
Female	55%
Male	45%
Prefer not to say	1.5%
Ethnicity	
Latine	92.5%
Multiracial	4.5%
Asian	1.5%
White	1.5%
Grade	
Seventh	30%
Eighth	36%
Ninth	34%

Table 3.2

Average psychological construct scores at the start and the end of the summer program

	Start of Summer			**End of Summer**		
Belonging	**Mean**	**SD**	**Range**	**Mean**	**SD**	**Range**
	3.21 (out of 4)	0.45	2.06 – 4	3.46 (out of 4)	0.45	2.17 – 4
Mattering	**Mean**	**SD**	**Range**	**Mean**	**SD**	**Range**
	2.13 (out of 3)	0.41	1.22 – 3	2.27 (out of 3)	0.41	1.22 – 3
Connection	**Mean**	**SD**	**Range**	**Mean**	**SD**	**Range**
	2.35 (out of 3)	0.4	1.5 – 3	2.53 (out of 3)	0.41	1.8 – 3
Perceptions of Program Climate	**Mean**	**SD**	**Range**	**Mean**	**SD**	**Range**
	3.36 (out of 4)	0.36	2.63 – 3.97	3.5 (out of 4)	0.39	2.8 – 3.93

Table 3.3

Medium-level and high-level closeness network characteristics at start and end of summer

Medium-level Closeness Network		
	Start of Summer	**End of Summer**
Average outgoing ties	15.5 (SD = 11.37) Range = 0 – 48	18.18 (SD = 12.11) Range = 1 – 52
Average incoming ties	13.09 (SD = 4.57) Range = 3 – 21	14.54 (SD = 5.18) Range = 4 – 24
Average reciprocated ties	6.69 (SD =4.12) Range = 0 – 16	8.06 (SD = 4.76) Range = 0 – 19
Density	0.15	0.18
Number of students with no incoming or outgoing ties	0	0
Number of students with no outgoing ties	2	0
Number of mutual dyads	221	266
Number of asymmetrical dyads	216	250
Number of null dyads	1,708	1,629
Reciprocity of ties	0.67	0.68
Centralization	0.18	0.22
High-level Closeness Network		
	Start of Summer	**End of Summer**
Average outgoing ties	3.04 (SD = 2.77) Range = 0 – 11	3.71 (SD = 3.2) Range = 0 – 13
Average incoming ties	2.08 (SD = 1.61) Range = 0 – 8	3.3 (SD = 1.95) Range = 0 – 10
Average reciprocated ties	1.27 (SD = 1.34) Range = 0 – 6	1.3 (SD = 1.5) Range = 0 – 4
Density	0.03	0.04
Number of students with no incoming or outgoing ties	8	3
Number of students with no incoming ties	10	5
Number of mutual dyads	42	43
Number of asymmetrical dyads	50	73
Number of null dyads	2,053	2,029
Reciprocity of ties	0.63	0.54
Centralization	0.08	0.07

Table 3.4

Start of summer network variables predicting psychological construct pre-scores in OLS regression

	Medium-level Closeness Network							
	Belonging β (SE)	**Belonging β (SE)**	**Mattering β (SE)**	**Mattering β (SE)**	**Connection β (SE)**	**Connection β (SE)**	**Climate β (SE)**	**Climate β (SE)**
Outgoing	-0.001 (0.006)		0.007(0.005)		0.005(0.006)		0.006(0.005)	
Incoming	0.03 (0.02)		-0.002(0.02)		-0.007(0.02)		-0.02(0.02)	
Reciprocated		0.02(0.01)		0.01(0.01)		0.01(0.01)		0.01(0.01)
Female	0.2 (0.11)	0.16(0.11)	-0.04(0.11)	-0.05(0.1)	0.03(0.11)	0.03(0.1)	0.09(0.09)	0.1(0.09)
Eighth	0.1(0.14)	0.13(0.14)	-0.07(0.14)	-0.09(0.13)	0.03(0.14)	-0.01(0.13)	0.13(0.12)	0.06(0.12)
Ninth	0.05(0.19)	0.17(0.15)	-0.007(0.18)	0.02(0.14)	0.05(0.18)	0.02(0.14)	0.03(0.15)	-0.06(0.12)
	High-level Closeness Network							
	Belonging β (SE)	**Belonging β (SE)**	**Mattering β (SE)**	**Mattering β (SE)**	**Connection β (SE)**	**Connection β (SE)**	**Climate β (SE)**	**Climate β (SE)**
Outgoing	0.03 (0.02)		**0.05*(0.02)**		**0.06**(0.02)**		**0.04**(0.02)**	
Incoming	-0.001 (0.04)		-0.003(0.0.3)		0.007(0.03)		-0.03(0.03)	
Reciprocated		0.04(0.04)		0.03(0.04)		**0.08*(0.02)**		0.05(0.03)
Female	0.17 (0.11)	0.18(0.11)	-0.05(0.1)	-0.04(0.1)	0.02(0.1)	0.03(0.1)	0.08(0.08)	0.1(0.09)
Eighth	0.17(0.14)	0.19(0.14)	-0.08(0.12)	-0.06(0.13)	-0.01(0.12)	0.02(0.12)	0.08(0.1)	0.09(0.11)
Ninth	0.19 (0.15)	0.25(0.14)	-0.04(0.14)	0.06(0.13)	-0.06(0.13)	0.04(0.12)	-0.08(0.12)	-0.03(0.11)

Note: Coefficients (betas) listed and standard errors in parentheses. Reference category: rising seventh grade non-female (male or prefer not to say) students

* p<0.05 ** p<0.01 ***p<0.001

Table 3.5

End of summer network variables predicting psychological construct post-scores in OLS regression

	Medium-level Closeness Network							
	Belonging β (SE)	**Belonging β (SE)**	**Mattering β (SE)**	**Mattering β (SE)**	**Connection β (SE)**	**Connection β (SE)**	**Climate β (SE)**	**Climate β (SE)**
Outgoing	0.002(0.006)		0.008(0.005)		-0.001(0.005)		-0.02(0.005)	
Incoming	0.04(0.02)		0.01(0.01)		0.01(0.02)		0.12(0.01)	
Reciprocated		-0.03(0.01)		0.02(0.01)		-0.001(0.01)		-0.001(0.01)
Female	0.11 (0.11)	0.11(0.11)	0.13(0.1)	0.13(0.1)	0.13(0.1)	0.11(0.1)	0.11(0.1)	0.09(0.1)
Eighth	0.2(0.14)	0.21(0.14)	0.0005(0.13)	0.004(0.13)	0.13(0.13)	0.15(0.13)	0.08(0.12)	0.09(0.12)
Ninth	0.30(0.19)	**0.37**(0.15)**	-0.14(0.17)	-0.009(0.14)	0.05(0.17)	0.15(0.14)	0.06(0.17)	0.16(0.13)
	High-level Closeness Network							
	Belonging β (SE)	**Belonging β (SE)**	**Mattering β (SE)**	**Mattering β (SE)**	**Connection β (SE)**	**Connection β (SE)**	**Climate β (SE)**	**Climate β (SE)**
Outgoing	0.02 (0.02)		**0.05**(0.16)**		**0.03*(0.02)**		**0.03*(0.02)**	
Incoming	-0.005(0.03)		-0.01(0.0.3)		0.004(0.03)		0.02(0.03)	
Reciprocated		0.006(0.05)		0.07(0.05)		0.09(0.05)		0.04(0.05)
Female	0.11 (0.11)	0.11(0.11)	0.12(0.1)	0.12(0.1)	0.01(0.1)	0.1(0.1)	0.09(0.1)	0.09(0.1)
Eighth	0.23(0.14)	0.21(0.14)	0.07(0.13)	0.09(0.13)	0.2(0.13)	0.23(0.13)	0.16(0.13)	0.12(0.13)
Ninth	**0.36**(0.14)**	**0.36**(0.14)**	0.06(0.12)	0.09(0.13)	0.13(0.12)	0.18(0.13)	0.13(0.12)	0.16(0.12)

Note: Coefficients (betas) listed and standard errors in parentheses. Reference category: rising seventh grade non-female (male or prefer not to say) students

* p<0.05 ** p<0.01 ***p<0.001

Table 3.6

Change scores in network variables predicting psychological construct change-scores in OLS regression

	Medium-level Closeness Network							
	Belonging β (SE)	**Belonging β (SE)**	**Mattering β (SE)**	**Mattering β (SE)**	**Connection β (SE)**	**Connection β (SE)**	**Climate β (SE)**	**Climate β (SE)**
Outgoing	-0.002 (0.007)		-0.003(0.005)		0.006(0.006)		-0.01(0.005)	
Incoming	-0.003 (0.02)		-0.009(0.01)		0.004(0.02)		-0.01(0.01)	
Reciprocated		-0.002(0.02)		-0.006(0.01)		0.0003(0.02)		-0.02(0.02)
Female	-0.05 (0.1)	-0.07(0.1)	**0.16*(0.08)**	0.16(0.08)	0.07(0.09)	0.08(0.09)	-0.004(0.09)	-0.3(0.09)
Eighth	-0.01(0.13)	0.02(0.13)	0.05(0.1)	0.08(0.09)	0.12(0.11)	0.13(0.11)	-0.04(0.12)	-0.03(0.12)
Ninth	0.01(0.12)	0.09(0.13)	0.004(0.09)	0.001(0.09)	0.07(0.11)	0.07(0.11)	0.18(0.09)	0.17(0.12)
	High-level Closeness Network							
	Belonging β (SE)	**Belonging β (SE)**	**Mattering β (SE)**	**Mattering β (SE)**	**Connection β (SE)**	**Connection β (SE)**	**Climate β (SE)**	**Climate β (SE)**
Outgoing	0.006 (0.02)		0.01(0.02)		0.01(0.02)		0.002(0.02)	
Incoming	0.03 (0.03)		-0.02(0.02)		0.02(0.02)		0.008(0.02)	
Reciprocated		0.08(0.06)		-0.006(0.05)		0.05(0.05)		0.01(0.05)
Female	-0.06 (0.1)	-0.07(0.1)	**0.16*(0.08)**	**0.17*(0.08)**	0.06(0.09)	0.07(0.09)	-0.009(0.09)	-0.006(0.09)
Eighth	0.05(0.13)	0.1(0.14)	0.07(0.1)	0.08(0.12)	0.16(0.12)	0.18(0.12)	0.01(0.12)	0.009(0.12)
Ninth	0.13(0.13)	0.15(0.13)	0.008(0.1)	-0.006(0.1)	0.12(0.12)	0.11(0.11)	0.17(0.11)	0.17(0.11)

Note: Coefficients (betas) listed and standard errors in parentheses. Reference category: rising seventh grade non-female (male or prefer not to say) students

* p<0.05 ** p<0.01 ***p<0.001

Figures

Figure 3.1

Start of summer medium-level closeness network with nodes colored by grade

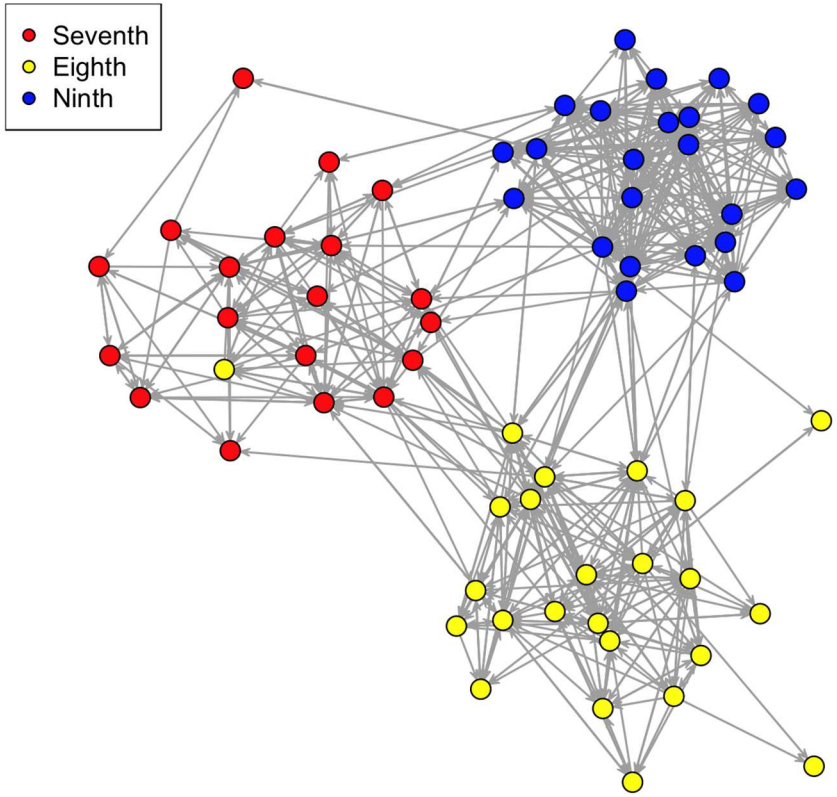


Figure 3.2

End of summer medium-level closeness network with nodes colored by grade and placement retained from start of summer network

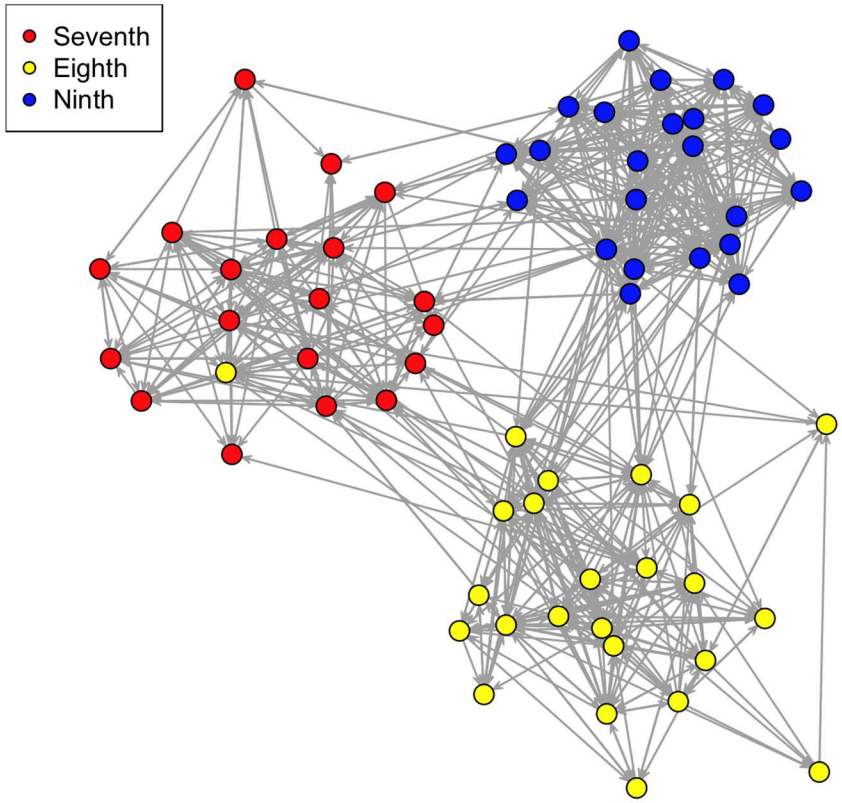


Figure 3.3

Start of summer medium-level closeness network with nodes colored by gender

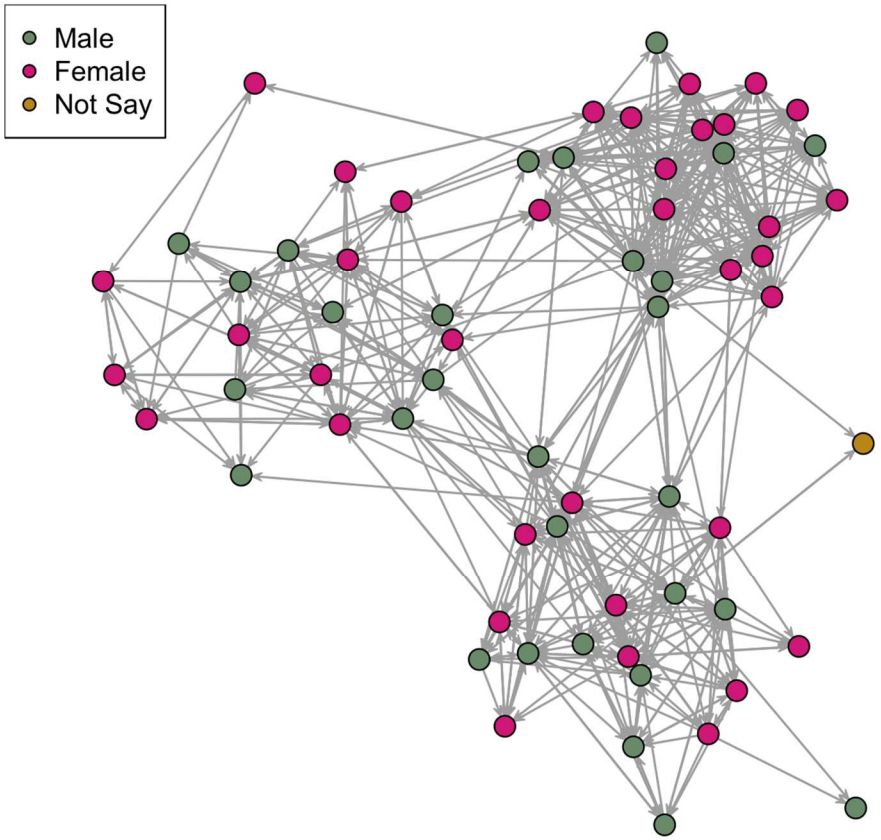


Figure 3.4

End of summer medium-level closeness network with nodes colored by gender and placement retained from start of summer network

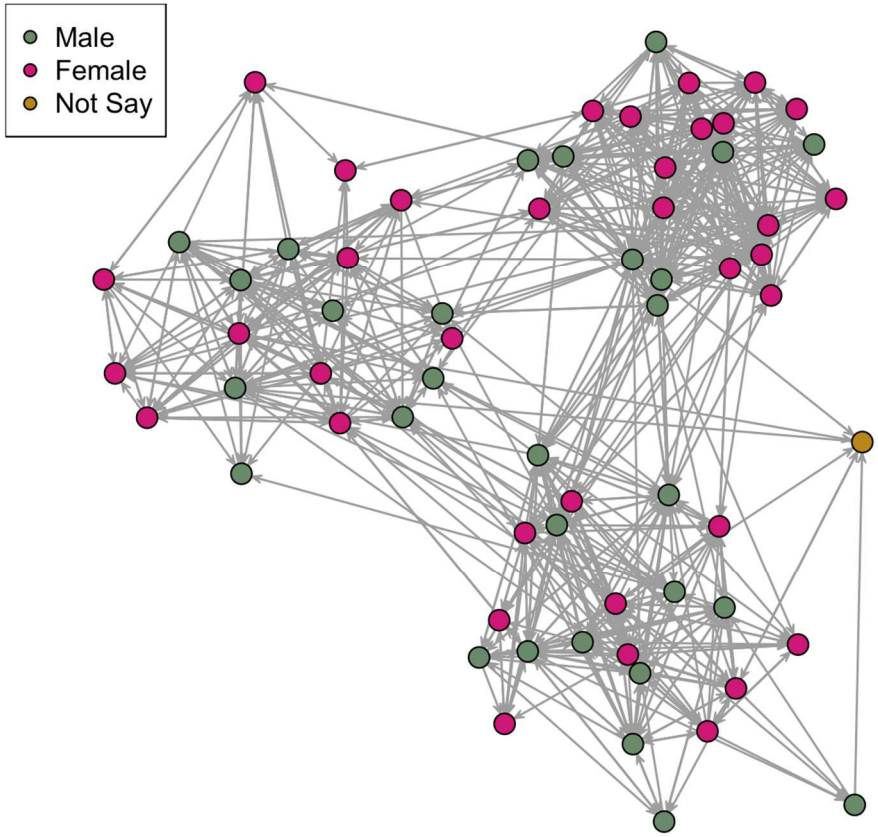


Figure 3.5

Start of summer high-level closeness network with nodes colored by grade

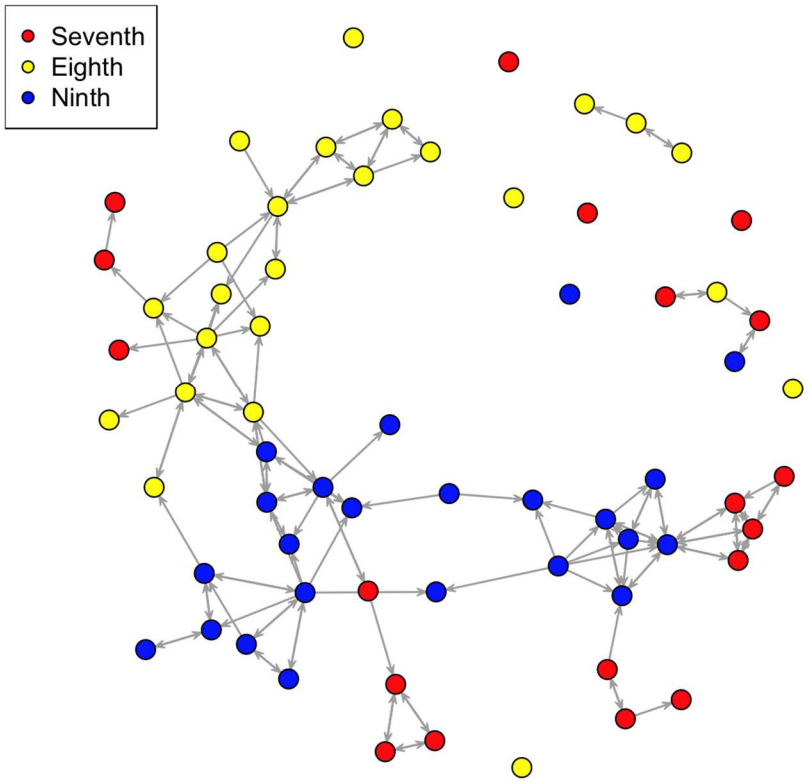


Figure 3.6

End of summer high-level closeness network with nodes colored by grade and placement retained from start of summer network

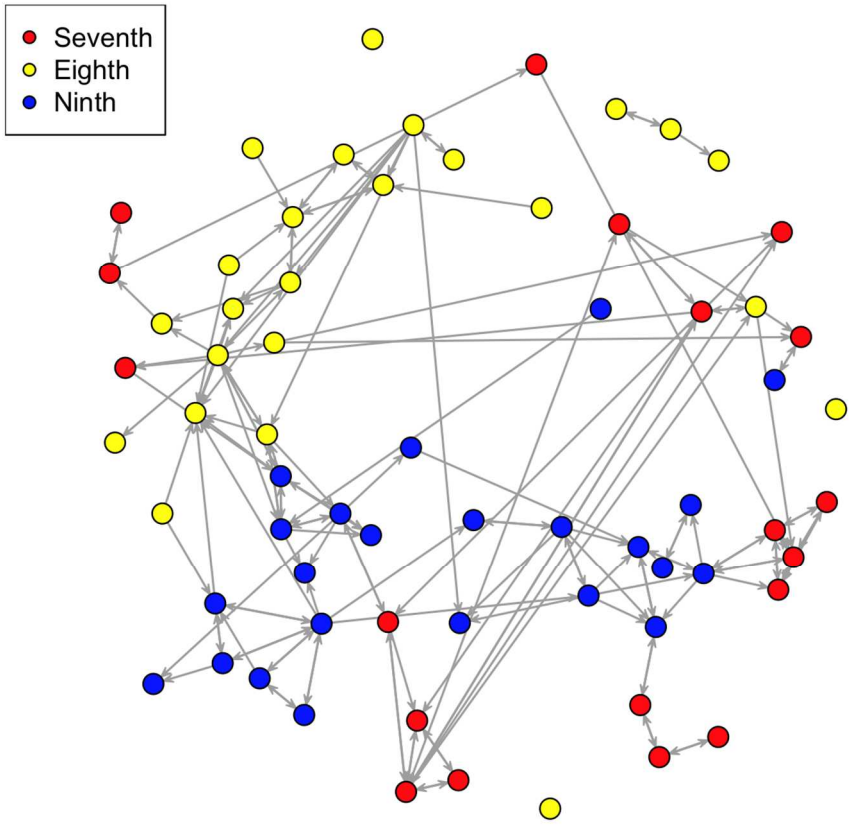


Figure 3.7

Start of summer high-level closeness network with nodes colored by gender

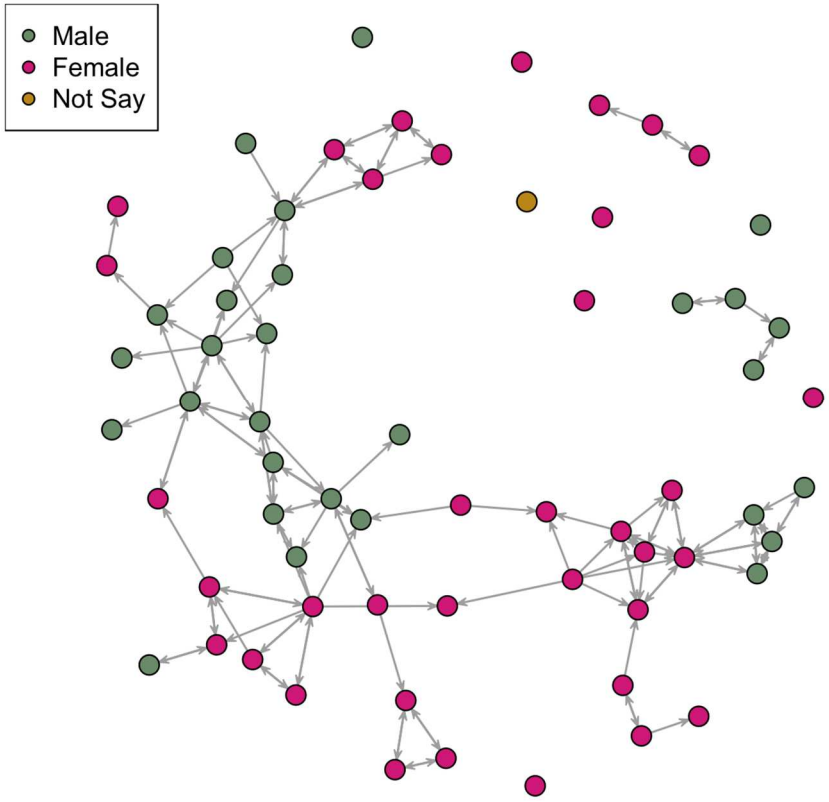
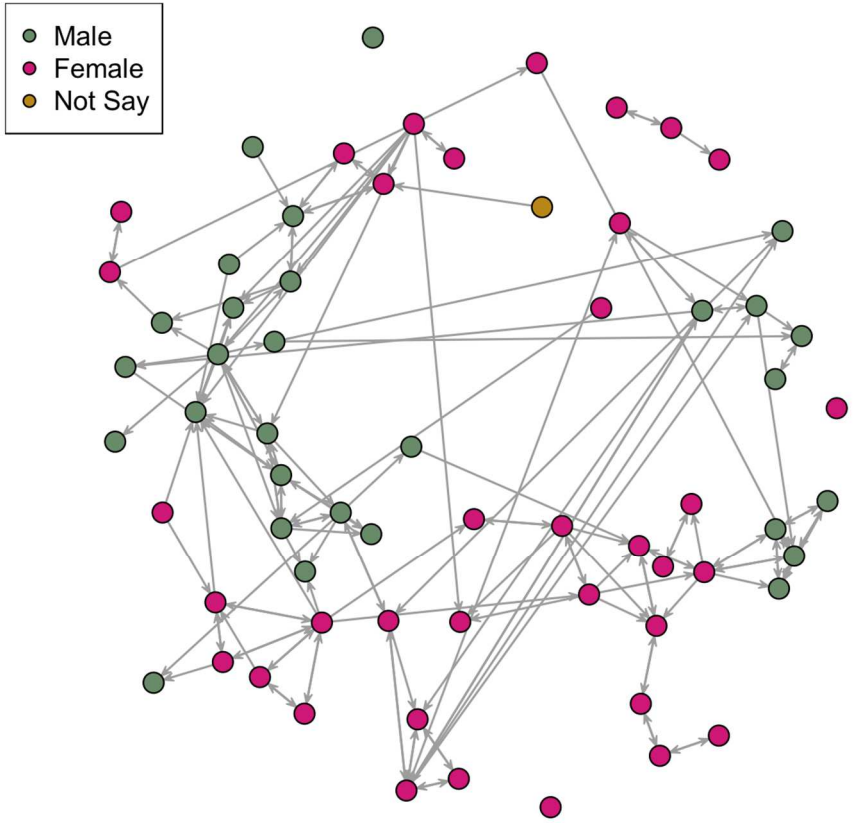


Figure 3.8

End of summer high-level closeness network with nodes colored by gender and placement retained from start of summer network



CHAPTER 4

Examining Relationships Between Teachers and Students in an Out-of-School Program: The Influence of Network Ties on Perceptions of Program Climate

How students' experience an educational environment extends beyond just academic components and includes relational aspects, especially during adolescence (Eccles & Roeser, 2011). One way to conceptualize this is through the lens of school climate, frequently described as individuals' holistic experience of school life, including the social and relational context (Thapa et. al, 2013). Positive perceptions of school climate are associated with a variety of desirable outcomes for students, from higher grades (Daily et al., 2019) to lower rates of bullying (Acosta et al., 2019). Climate is also relevant in other settings where youth learn and develop, like out-of-school activities. Participation in extracurricular programs is related to a number of benefits for students, both academic and behavioral (e.g., Hansen et al., 2003 & Vandell et al., 2018). Like in schools, climate and the relationships present in these out-of-school activities are an important aspect of students' experiences in these environments (Eccles & Gootman, 2002; Simpkins et al., 2017).

Unfortunately, a student's demographic characteristics have been found to influence how they perceive an educational environment's climate, even within the same school or program. Students from lower socioeconomic backgrounds and students of color have been found to report more negative perceptions of their school climate compared to their peers from higher socioeconomic status households and those who are white (Jia et al., 2009; Voight et al., 2015; Wang et. al., 2010). One possible explanation for this disparity comes from the fact that schools often replicate the norms of the society in which they are placed (Gray et al., 2018), reifying patterns of oppression and discrimination (Valenzuela, 1999; Rios, 2017). Such patterns can also

be seen in out-of-school programming, with research finding participants of color reporting racially motivated negative experiences with peers or program staff (Gutiérrez et al., 2017; Lin et al., 2016). This is not always the case, however, as, some out-of-school activities explicitly focus on nurturing students of color and creating communities of support (Ngo, 2017; Simpkins et al., 2017), which may be of particular importance for students of color who do not experience this in their school environments (Ventura, 2017).

Role of Teacher-Student Relationships

The depth of relationships with teachers, feelings of trust and respect from teachers, and a sense of caring and sensitivity by teachers, are all key components of school climate (Haynes et al., 1997; Noonan, 2004; Marshall, 2004). Social support from teachers has been found to be highly influential on academic success, as students who perceive their teachers as supportive tend to have better academic outcomes, such as higher grade point averages (Jia et al., 2009; Sointu et al., 2017). Positive teacher-student relationships in early adolescence also serve as a protective factor when transitioning to high school, supporting academic achievement and engagement (Longobardi et al., 2016). Additionally, teacher-student relationships influence student behavior, with students who perceive more positive teacher-student relationships at their school having fewer behavior problems (Wang et al, 2010), and reporting less psychological distress when experiencing peer victimization (Sulkowski & Simmons, 2018). Research on adolescents' perspectives of their relationships with teachers have highlighted the importance of teachers' noticing of students' needs and investing in their growth as important facilitators of feelings of closeness to and trust of teachers (Yu et al., 2018).

Emotional support from teachers has also been found to be of particular developmental and academic importance for lower socioeconomic students (Moen et al., 2019), as well as

Latine youth, especially those who are recent arrivals to the United States (Hopkins et al., 2013; Jaffe-Walter, 2018). Being able to discuss aspects of their identity with their teachers has also been found to be valuable for marginalized students, who name such practices as supporting positive teacher-student relationships (Yu et al., 2018). Relatedly, teachers of a shared ethnic background with their students can support their students of color in culturally responsive ways, which too can foster trusting relationships (Flores, 2017). Additional research has found that having a teacher of the same ethnicity can be positively impactful for Black and Latine students especially, who are often perceived more favorably academically and behaviorally by teachers of their same ethnicity (Redding, 2019). Conversely, white teachers working in urban areas with predominantly Black students tend to focus more negatively on student behavior, ability, and contributions, than their Black colleagues (Battey et al., 2018).

Research also suggests that teacher-student relationships may be one of the most salient aspects of school climate in relation to student outcomes. Classroom-level aspects of school climate typically have greater influence on students' overall perceptions of school climate than school-wide factors (Koth et al., 2008) and some have found teacher-student relationships to be a greater predictor of student outcomes than academic aspects of school climate, like curriculum (Wang et al., 2010). Further, efforts to improve school climate that have been the most effective include a focus on improving relationships between teachers and students (Voight & Nation, 2016). Teacher-student relationships also play a particularly important role in fostering school belonging and feelings of being accepted and included in one's school community, which are of noted developmental importance (Osterman, 2000), as teacher support is one of the factors most strongly associated with school belonging (Allen et al., 2018). Teacher-student relationships are crucial elements of school climate at any age, but they can be particularly important for young

adolescents, who have a developmental need for positive relationships with non-parent adults (Eccles et al., 1993; Steinberg, 2017). Research comparing across grade levels supports this, finding a stronger correlation between teacher support and negative academic emotions like shame and anxiety for middle school students compared to elementary school, high school, and undergraduate students (Lei et al., 2018).

Relationships with non-parent adults are also an important component of out-of-school activities and student participants' perceptions of program climate. Such staff often help to build a sense of belonging for students in out-of-school programs, fostering a positive climate and supporting feelings of inclusion (Jones & Deutsch, 2011; Martinez et al. 2016). Positive relationships with staff in out-of-school activities can also create a feeling of psychological safety for participants, further reinforcing the program as a place where they belong (McLaughlin, 2018). Additionally, these adults can provide valuable social capital to program participants, from mentors helping youth navigate unfamiliar educational systems for greater college awareness and attainment (McLaughlin, 2018; Soto-Lara et al., 2021) to increasing students' ties to their local community (Hansen et al., 2003). Relationships between students and staff in out-of-school settings are alike to those within schools, with staff acting in similar roles to teachers by taking on tasks of classroom management and curriculum instruction (Epstein, 2013), but also unique given that the setting of out-of-school activities can allow for the development of closer teacher-student relationships due to decreased relational distance between staff and students (Jones & Deustch, 2011). Additionally, school-based teachers' need to focus on covering materials for standardized tests has been reported by adolescents as impediments to their fostering of positive teacher-student relationships (Ibrahim & Zaatari, 2020), a pressure not likely faced by out-of-school activity leaders.

Benefits of a Social Network Approach

Though research has begun to outline which characteristics may make teacher-student relationships positive (Jones & Deutsch, 2011; Yu et al., 2018), there is still much to be learned about the specifics of how teacher-student relationships impact student outcomes, especially examining these ties bilaterally (Hughes, 2011) and considering the ways in which having connections to multiple teachers across different classes impacts outcomes (Martin & Collie, 2018). One way to expand understanding of teacher-student relationships is through social network analysis, an approach that uses relationships as the unit of analysis, allowing for a holistic view of ties within an educational context, by including all staff in a setting and investigating ties from both teacher and student perspectives (Wasserman & Faust, 1994). This can facilitate a more nuanced view of teacher-student relationships and how they are associated with various outcomes (Kornbluh & Neal, 2016). Thus far, the majority of social network analysis involving adolescents has focused on peer relationships, (Capella & Neal, 2012; Neal & Capella, 2012; Neal, 2007), with much of it being focused on school contexts (Frank et al., 2014; Delgado et al., 2016), and only limited research exploring out-of-school activities (e.g., Fujimoto et al., 2018: Schaefer et al., 2011).

While the use of social network analysis to understand developmental outcomes is growing, such network analyses remain an important area for future research (Kornienko & Rivas-Drake, 2022; Neal, 2020), especially for analysis of teacher-student relationships, which have been underexplored through network methods. Rich qualitative studies have identified features of positive teacher-student relationships both within schools (Jones & Deutsch, 2011; Yu et al., 2018) and in out-of-school programming (McLaughlin, 2018), while surveys have proved effective for demonstrating how students' perceptions of teacher-student relationships

impact a variety of outcomes (e.g., Lei et al., 2018; Sulkowski & Simmons, 2018). Additional quantitative studies have found that students who have a higher number of teachers towards whom they feel close also have higher levels of academic engagement (Martin & Collie, 2018). Despite such studies helping to provide a more quantifiable view of adolescents' ties to their teachers, such research is still limited to one perspective - that of the students - and does not include all teachers within a setting. Thus, existing methods utilized may fail to capture certain ties to staff which may be important to students, as well as overall patterns of teacher-student relationships, all of which can be important school climate indicators (Thapa et al., 2013).

Additionally, a majority of research on teacher-student relationships only focuses on student perceptions of these relationships. Research that has employed both teacher and student perceptions of teacher-student relationships have found these ratings to correspond poorly (Hughes, 2011), suggesting student and teacher perceptions of their relationships with one another differ in ways that are important to consider. However, much of this research has been done with younger students (Gregoriadis et al., 2022; Lim et al., 2021), rather than adolescents, and in traditional school settings. As such, research that utilizes a social network approach, capturing both students' and teachers' perceptions of these relationships with adolescent populations in out-of-school settings, is necessary to fill a current gap in understanding of how these relationships are structured and related to social-emotional outcomes. Further, much research on teacher-student relationships only collects perceptions at one time point, failing to capture how these relationships change over time (e.g., Hughes, 2011). Social network methods can provide valuable insight into how the nature and number of relationships with staff within settings influence outcomes across time points, making them a promising approach for

expanding our understanding of teacher-student relationships in out-of-school programming during adolescence.

Current Study

In order to better understand how teacher-student relationships with young adolescents in out-of-school programming influence social-emotional outcomes over time, this study utilized social network data from the start and the end of a summer enrichment program for low-income, Latine middle school students. Partnering with a nonprofit organization focused on increasing college access and graduation for would-be first-generation college students, this study was set in the context of their five-week summer program, which ran from June through July 2021. Students and teachers were surveyed at the start and end of the program about their ties to one another. Students were additionally asked about their perceptions of program climate and feelings of belonging, mattering, and connection in order to answer the following research questions: 1) How do students' connections with teachers in an out-of-school summer program relate to their feelings of belonging, mattering, connection and perceptions of program climate? 2) How do the overall patterns of relationships in the teacher-student network of an out-of-school summer program relate to feelings of belonging, mattering, connection, and perceptions of program climate?

Method

Participants

This study was designed collaboratively with a nonprofit organization in California, informed by conversations with program staff and previous data collected through a research-practice partnership (Coburn & Penuel, 2016). The organization provides enrichment programming for aspiring to-be first-generation college students from middle school through

college graduation, with most program participants being low-income and Latine. Our project was set within their five-week summer school program, which serves participants who are entering 7th, 8th, or 9th grade and runs from June through the end of July. This summer program consists of school-length days of academic enrichment, taught by current college students, covering content on standard subjects like math and English, as well as electives like art. Additional programming offered includes activities focused on college and career options, as well as games and community building activities.

One hundred and seven students actively participated in the 2021 summer program, 66 of whom completed pre and post surveys for a response rate of 62%. These students were majority Latine (92.5%), followed by Multiracial (4.5%), Asian, (1.5%) and white (1.5%). Over half (55%) of respondents were female, 43.5% male and 1.5% preferred not to state their gender. The student population was almost evenly split between rising 8th graders (36%), 9th graders (34%), and 9th graders (30%). See Table 4.1 for additional information.

Twenty-three college student staff (ages 18-24 years, mean = 20.22, SD = 1.68) were employed by the program during the summer. Twenty-two of these individuals were listed in the survey measures (one was a late addition to the staff team) and 20 completed pre and post surveys for a response rate of 87%. These staff were half Latine, followed by Asian (20%), white (20%), Multiracial (5%) and other (5%). The majority was female (75%), 20% were male and 5% were non-binary. Additionally, 40% were former program participants as middle and high school students, and 50% had previously volunteered or worked for the organization. Lastly, the majority of these staff were teachers during the summer (90%) with two (10%) serving in other staff roles, such as summer program coordinator, leading program-wide community building activities. See Table 4.1 for more information.

Procedure

Data were collected during the summer of 2021, when the summer program ran in a hybrid format, due to the ongoing COVID-19 pandemic. Program staff completed an online orientation week prior to the start of the summer program, during which they were provided a Qualtrics link to complete the electronic pre-survey. Teachers completed their pre-surveys between June 22nd and June 27th. Post-surveys were also completed electronically, with another Qualtrics link shared following the program conclusion, from July 28th to August 16th. When the program began, students met five days a week (Monday – Friday), with four of those days being online and one day being in-person, though students could opt to attend the in-person day virtually. Students were surveyed on their first in-person day on July 1st and again on the last Thursday of the program on 7/29, in-person. Surveys were completed in students' morning "advisory" classes, which students attended either in-person or online via Zoom. Teachers shared a QR code to the Qualtrics survey for students to take via their phones or other devices. Chromebooks were provided for in-person students who did not have their own phone. Upon agreeing to participate in the program, parents, staff, and students received information about the program's research-practice partnership with the university and the data-sharing agreement. A university Institutional Review Board also approved all study procedures.

Measures

Student surveys collected information on students' ethnicity (American Indian or Alaska Native, Asian or Asian American, Black or African American, Hispanic or Latine, or Spanish Origin, Middle Eastern or North African, Native Hawaiian or Pacific Islander, White, or Another race or ethnicity not listed above, with the option to write in their own response). Anyone who selected two or more ethnicities (e.g., "Hispanic or Latine" and "American Indian or Alaska

Native") was re-coded as Multiracial. Students were also asked about their gender (male, female, prefer not to stay, and prefer to self-describe, with the option to write in their own response), as well as which grade they will be entering next year (7th, 8th, or 9th). Additionally, senior program staff shared previously collected demographic data about staff, including age, ethnicity, gender, previous program participation as a student, previous program participation as a staff member or volunteer, and role (e.g., teacher, summer program coordinator, etc.).

Belonging

Psychological Sense of School Membership Scale (PSSM), an 18-item survey (α=0.90) scored on a five-point Likert scale (Goodenow, 1993), with response options ranging from "Not at all true" to "Completely true" was used to assess sense of belonging. This measure has previously been used with ethnically diverse middle school students (Morrison et al., 2003). Sample items from the measure include "I feel like I am a part of [program name]" and "I am included in lots of activities at [program name]." A full measure can be found in the Appendix.

Mattering

Two scales were used to assess feelings of mattering. The first was the 5-item General Mattering Scale (GMS; Marcus & Rosenburg, 1987), which asks respondents to rate their agreement on a four-point Likert scale (0=Not at all to 3 = Very much). It has been found to have high reliability when used with middle school students and ethnically diverse adolescents (Dixon et al., 2009; Watson, 2018). Sample items include "How important do you feel you are to other people?" Additionally, four items from the Adolescent Sense of Community Scale (Abdelkader & Bouslama, 2014) were used, which also uses a four-point Likert scale (0=Strongly disagree to 3 = Strongly agree). These items, which assess needs fulfillment and influence, components of mattering's adding value and receiving value (Prilleltensky, 2019), were included after being

modified to focus on program, rather than larger community context. Sample items include "I influence how [program name] functions." The combined measures included nine items (α=0.84) and can be found in the Appendix.

Connection

Items from the Comprehensive School Connectedness Scale (Chung-Do et al., 2015) and the School Connectedness Questionnaire (Marsh & Randolph, 2020) were used to assess connection to peers and adults in the summer program. Two items from the Comprehensive School Connectedness Scale teacher support subscale and one item from the peer relations subscale were used, while one item from the School Connectedness Questionnaire teacher bonding subscale and three items from the peer bonding subscale were utilized. Three new items were additionally written, being modeled after wording in the current items. Sample items include "I feel connected with the students at [program name]" and "I can talk to my [teachers] at [program name] if I have a problem or need advice." The final measure included ten items (α=0.93) to which responses were given on a four-point Likert scale (response options ranged from "Strongly agree" to "Strongly disagree"), and can be found in the Appendix.

Perceptions of Program Climate

Since the 2021 summer program was a hybrid format (with some programming online and some in-person), a new measure was written to assess program climate with an online component. A 30-item (α=0.89) measure was created, informed by existing school climate measures and the four main areas of school climate – safety, relationships, teaching and learning, and institutional environment (Thapa et al., 2013). To assess agreement on items related to both the in-person and virtual environment of the program, a five-point Likert scale was used. The first half of the measure utilized response options ranging from "Never" (0) to "Always" (4),

while the second half used options from “Strongly disagree” (0) to “Strongly agree” (4). This measure included ten items about safety, nine about relationships, seven about the institutional environment and four about teaching and learning. Sample items include “I feel comfortable turning on my video during meetings for my classes” and “Students at [program name] have a say in how things work.” The full measure can be found in the Appendix.

Teacher-student networks

In order to assess the teacher-student networks within the summer enrichment program, students were given a roster of all participating summer staff, with names organized alphabetically, a typical approach for gathering whole network data (Butts, 2008; Marsden, 2014; Neal, 2020). Students then ranked their level of closeness with each teacher or staff member using a four-point Likert scale. The scale options were co-created with middle school students through focus groups to identify how young adolescents conceptualize their ties to teachers within this program and the language they use. Scale options were listed as follows: 0 – I do not know them, 1– I know of them (meaning you may have seen them at [program name], but have not interacted with them), 2 – I know them (meaning you may have had them as a teacher previously or interacted with them otherwise), and 3 – I am close with them (meaning you have gotten to know them personally or built a close relationship with them). Examples of this roster structure can be found in the Appendix.

A similar approach was utilized to collect teacher/staff perceptions of their relationships with students. Teachers and staff were given a roster of all students participating in the summer program, with names organized by grade and then alphabetically. Teachers then ranked their level of closeness with each student using a four-point Likert scale. The scale options were co-created with former program staff through focus groups to identify how early teachers

conceptualize their ties to students within this program and the language they use. Response options were the same as those used on the student survey, but with the language adjusted based on their role as teachers (e.g., 2 – I know them (meaning you may have taught them previously or interacted with them otherwise)).

Analytic plan

Analyses for this study were run using both STATA (Version IC 15.1, Statacorp, 2017) and RStudio (Version 1.3.1093, RStudio, PBC, 2020). Prior to analysis, the network was dichotomized at two levels for analysis, a medium-level closeness network, where responses of not knowing or knowing of were coded as zero and responses of knowing or being close to a student were coded as one, and a high-level closeness network, where not knowing, knowing of them, or knowing were coded as zero, and being close was coded as one. This approach was used to capture various strengths of ties between teachers and students, as it is unclear what level of closeness to teachers and staff is necessary to improve student perceptions of school climate (Thapa et al., 2013). An additional low-level closeness network (where not knowing a teacher or student was coded as zero and all else as one) was run for a robustness check, but not included in analysis.

Dependent variables

For both research questions, student scores in each of the four constructs (belonging, mattering, connection, and climate) served as dependent variables. Prior to analysis, average scores for every student in each of these areas were calculated at both time points, after necessary items were reverse-coded. Change scores were also calculated, by subtracting students' start of summer average scores from their end of summer average scores. Changes in these constructs amongst individual students from the start to the end of the summer were then

assessed through paired sample t-tests. Additionally, average scores for the entire sample were also calculated at each time point.

Network data structures

Students' individual position in the two-levels of teacher-student networks were calculated three ways – number of outgoing ties (i.e., the number of teachers the student picked), the number of incoming ties, (i.e., number of teachers who picked that student), and the number of reciprocated ties (i.e., the number of the teachers and students who picked each other) (Geven et al., 2013; Ruzzenenti et al., 2010; Wasserman & Faust, 1994). For example, if a student selected six teachers that they knew, they would have six outgoing ties and if four teachers selected that they knew that student, the student would have four incoming ties. Outgoing ties included any of the 22 teachers listed in the roster nominated by the 66 students in the sample, while incoming and reciprocated ties only utilized teachers in the analytic sample of 20. These measures provide a simple measure of network connectedness for each student, as it is solely focused on the number of ties an individual has and provides a more clearly interpretable measure to assess change, as a one-unit increase corresponds to one new tie (Wasserman & Faust, 1994). Change scores were also created for these three metrics, by subtracting students' start of summer scores from their end of summer scores. To assess changes in these three types of connections from the start to the end of the summer in both network levels, paired sample t-tests were again run. Correlations of network ties at each time point and both network levels were run and can be found in the Appendix. Teachers' individual ties in the two-levels of teacher-student networks were calculated in the same three ways – number of outgoing ties (i.e., the number of students the teacher picked), the number of incoming ties, (i.e., the number of students who picked that teacher), and the number of reciprocated ties (i.e., the number of times

both students and teachers picked each other) (Geven et al., 2013; Ruzzenenti et al., 2010; Wasserman & Faust, 1994).

Demographic characteristics

To determine how scores in belonging, mattering, connection, or perception of climate may differ based on student demographic characteristics, gender (coded as female or non-female) and grade were used as control variables. In all regression models, gender and grade were controlled for and rising 7th grade students who did not identify as female were used as the reference group. Further, to determine how feelings of closeness to teachers varied based on teacher identity, two-sample t-tests were run to determine how incoming ties to teachers varied based on teacher ethnicity, as well as their former participation in the program as a student.

RQ 1: How do students' connections with teachers in an out-of-school summer program relate to their feelings of belonging, mattering, connection and perceptions of program climate?

To assess how these four psychological outcomes (belonging, mattering, connection, and perceptions of program climate) related to students' ties to teachers, a number of regression models were run. The first set of models analyzed the association of baseline network indices (outgoing, incoming, and reciprocated ties) at both network levels (i.e., known and close) and baseline psychological constructs, with each of the four constructs being used in one model as the dependent variable. Models were run with outgoing and incoming ties as independent variables, with controls for gender and grade. Reciprocated ties were included as an independent variable in a separate model, due to collinearity with outgoing and incoming ties (see Appendix), again with controls for gender and grade. A second set of models was run using post-test data in the same fashion. A final set of models was run using change scores in psychological constructs as the dependent variable, with change scores in network ties used as independent variables,

again controlling for gender and grade and with one model using change in outgoing and incoming ties as independent variables, and another using change in reciprocated ties.

RQ 2: How do the overall patterns of relationships in the teacher-student network of an out-of-school summer program relate to feelings of belonging, mattering, connection, and perceptions of program climate?

The second research question was answered by looking at trends across the two networks, focusing on how connected the networks were over time. Density, the number of ties present in a network, based on the number of possible ties in the network (Scott, 1991), was calculated for the student-to-teacher network at both levels and at each time point to assess network-wide connectivity. To further assess connectivity within the network, the number of students who were completely isolated, either having no outgoing or incoming ties, in both network levels at each time point was also calculated. These changes in network levels of ties were assessed alongside overall changes in the four constructs of interest (belonging, mattering, connection, and perceptions of program climate) to answer the second research question.

Missing Data

Ninety-three students completed some aspect of the first survey (87% response rate), 85 students completed some aspect of the second survey (79% response rate), and 66 students completed the entirety of both surveys (62% response rate). Students with missing data did not significantly differ in ethnicity, gender, or grade from the analytic sample. Additionally, students with missing data did not significantly differ in incoming ties from teachers at the start of the program, compared with students who completed both surveys. As such, these data are assumed to be missing due to low program attendance (e.g., being absent on survey collection days), but do not significantly differ from the full sample. Twenty-one teachers and staff completed the first

survey (92% response rate) and 20 completed both surveys (87% response rate). Those with missing data did not significantly differ in ethnicity or gender from the analytic sample. Additionally, teachers and staff with missing data did not significantly differ in incoming ties from students at the start of the program, compared with those who completed both surveys. As such, these data are assumed to be missing at random.

Results

Changes in psychological constructs

Over the course of the summer, students' feelings of belonging, mattering, and connection, as well as perceptions of program climate all improved. Average belonging score rose from 3.21 to 3.46 (out of 4), mattering from 2.13 to 2.27 (out of 3), connection from 2.35 to 2.53 (out of 3), and perceptions of climate from 3.36 to 3.5 (out of 4). See Table 4.2 for more information. Further, paired sample t-tests revealed that students in the sample had significantly higher scores on the four psychological constructs at the end of the summer program, when compared with their scores at the start of the summer program. The largest growth was in feelings of belonging ($t=4.96$, $p<0.001$), followed by connection ($t=4.24$, $p<0.001$), then mattering ($t=3.47$, $p<0.001$), and lastly, perceptions of program climate ($t=3.19$, $p<0.001$).

Changes in network ties

Similarly, ties between teachers and students increased over the course of the summer. Within the medium-level closeness network, students' average outgoing ties to teachers rose from 4.71 to 8.3 and their incoming ties from teachers increased from 3.53 to 7.52. Reciprocated ties between students and teachers also went from 1.38 to 4.95. See Table 4.2 for further information**.** Within the high-level closeness network, students' outgoing ties started at 0.41 and rose to 1.58 by the end of the summer, while students' incoming ties increased from 0.39 to 2.51.

Reciprocated ties grew from 0.18 to 0.24. For additional information, see Table 4.2. Paired sample t-tests also revealed students had significantly higher outgoing ties at the end of the summer in both the medium-level closeness network ($t = 7.53$, $p<0.001$) and the high-level closeness network ($t = 5.36$, $p<0.001$). There was also an increase in students' incoming ties from teachers from the start to the end of the summer in the medium-level closeness network ($t = 13.3$, $p<0.001$) and the high-level closeness network ($t = 12.04$, $p<0.001$). Lastly, students' number of reciprocated ties grew significantly over the course of the summer in the medium-level closeness network ($t = 13.89$, $p<0.001$) and the high-level closeness network ($t= 2.05$, $p<0.05$).

Both the medium and high-level closeness networks rose in density, with the medium-level network rising from 0.21 to 0.36 and the high-level network growing from 0.02 to 0.06. Both networks also reduced in number of isolated students. In the medium network, seven students had no outgoing ties at the start of the summer, but just two students had no outgoing ties at the end of the summer. The number of students with no incoming ties from teachers in the medium network reduced from four to zero over the course of the summer. See Table 4.2 for more information. Within the high-level network, 45 students had no outgoing ties to teachers at the start of the summer, but just 28 students had no outgoing ties to teachers at the end of the summer. Similarly, 40 students had no incoming ties from teachers at the start of the summer, but just three had none by the end of the summer. For further information, see Table 4.2. Network visualizations also show both the medium-level and high-level closeness networks becoming more connected over time, with new ties forming from the start to the end of the summer. See Figures 4.1 through 4.8 for more information.

Network ties predicting psychological outcomes

In regression models examining the influence of network ties in the medium-level closeness network at the start of the summer, a variety of variables were predictive of psychological construct scores. At the start of the summer, rising 9th graders had higher sense of belonging, b_5= 0.36, p<0.05, and rising 8th graders had more positive perceptions of program climate, b_4= 0.26, p<0.05. More outgoing ties were associated with higher feelings of connection, b_1= 0.04, p<0.05, and more positive perceptions of program climate, b_1= 0.04, p<0.05. For more information, see Table 4.3. In the high-level closeness network, two network indicators were negatively predictive of psychological constructs. Higher numbers of reciprocated ties were associated with lower feelings of mattering, b_1= -0.31, p<0.05, and perceptions of program climate, b_1= -0.33, p<0.05. Additionally, higher numbers of incoming ties were associated with lower feelings of program connection, b_2= -0.29, p<0.05. See Table 4.3 for more additional information.

In regression models examining the influence of network ties in the medium-level closeness network at the end of the summer, only grade was predictive of psychological construct scores, with rising 9th graders again having higher scores on feelings of belonging, b_5= 0.36, p<0.01. For further information, see Table 4.4. Within the high-level closeness network, outgoing ties were positively predictive of sense of connection, b_1= 0.08, p<0.01 and reciprocated ties were negatively predictive of perceptions of program climate b_1= -0.32, p<0.05. Additionally, grade was again predictive of belonging, with rising 9th graders having higher scores, b_5= 0.35, p<0.01. More information can be found in Table 4.4.

Within regression models assessing how change in network connections influenced changes in psychological constructs, only gender was predictive. In models using change in ties in the medium-level closeness network, female students had greater feelings of mattering, b_3=

0.17, $p<0.05$. See Table 4.5 for additional information. Female students also showed higher growth in mattering in models using change in ties within the high-level closeness network, $b_2=$ 0.18, $p<0.05$ and more information can be found in Table 4.5.

Variance in ties by teacher identity

At the start of the summer, Latine teachers had, on average, the most incoming ties within both the medium-level and high-level closeness network, when compared with non-Latine teachers. See Table 4.6 for additional information. However, paired sample t-tests comparing Latine and non-Latine teachers found no significant differences in number of incoming ties, nor did t-tests comparing white and non-white teachers. At the end of the summer, non-Latine teachers of color had the highest average number of incoming ties in both the medium and high-level closeness network, when compared with Latine and white teachers. Further information can be found in Table 4.6. Like at the start of the summer though, paired sample t-tests comparing Latine and non-Latine teachers found no significant differences in number of incoming ties, as did paired sample t-tests comparing white and non-white teachers.

Relatedly, at the start of the summer, teachers who were former program participants as students had higher average numbers of incoming ties compared to teachers who were not former program participants. For additional information, see Table 4.6. However, paired sample t-tests comparing these groups found no significant differences in the number of incoming ties at either the medium or high level. At the end of the summer, former program participants again had higher average numbers of incoming ties. Additional information can be found in Table 4.6. Paired sample t-tests did not find a difference between these two groups for incoming ties in the medium-level closeness network, but did for the high-level network, ($t=2.1$, $p<0.05$), where

former program participants had an average of 8.3 incoming ties and non-former program participants had 4.08.

Discussion

Network connection and psychological outcomes

Throughout the summer program, ties between teachers and students increased at both medium and high levels of closeness. Overall network indicators revealed this, with density increasing from the start to the end of the summer, and fewer students having no incoming and no outgoing ties by the end of the summer. Further analysis also showed students had significant increases in their number of outgoing, incoming, and reciprocated ties within the medium-level and high-level closeness networks over the course of the summer. This growth was observed alongside both network-level and individual-level increases in feelings of belonging, mattering, connection, and positive perceptions of program climate, with students having statistically higher scores in all four of these areas from the start to the end of the summer.

These increases in ties are notable, given what previous research has uncovered about the impact of positive teacher-student relationships, such as how having more teachers with whom a student feels close is related to academic engagement (Martin & Collie, 2018). This is especially important given that this program took place in a hybrid format due to the COVID-19 pandemic, which meant the majority of the time students were only interacting with their teachers in a remote context. Our results suggest that feelings of closeness to teachers can increase even when in-person interaction is limited, which provides new insight into the features that make teacher-student relationships positive, adding to existing literature (e.g., Yu et al., 2018).

Despite clear increases in ties and feelings of belonging, mattering, connection, and positive perceptions of program climate, the regression models paint a less clear picture of how

increasing network connectivity influenced these psychological constructs. Change scores in network ties were not predictive of change scores in any of the four psychological constructs, making it unclear if increased ties within the network led to increases in these areas. Outgoing ties were the most consistent network indicator that was positively predictive of psychological construct scores. At the start of the summer, higher outgoing ties in the medium-level closeness network predicted higher feelings of connection and more positive perceptions of program climate, while at the end of the summer, higher outgoing ties in the high-level closeness network predicted higher feelings of connection. This aligns with previous research highlighting the beneficial impact that feelings of closeness to teachers can have on both social-emotional (Lei et al., 2018) and academic (Martin et al., 2018) outcomes. These findings also provide additional insight into how young adolescents' relationships with out-of-school staff can benefit them (Soto-Lara et al., 2021). That outgoing ties were predictive for certain constructs within the medium-level closeness network at the start of the summer and the high-level closeness network at the end of the summer, suggests that various feelings of closeness to teachers may be related to students' social-emotional outcomes, though it is worth noting that these models accounted for low amounts of variance in the psychological constructs.

Unexpectedly, some network indicators were inversely related to some of the psychological constructs. At the start of the summer, higher numbers of reciprocated ties in the close-level network were predictive of lower feelings of mattering, as well as lower perceptions of program climate, and higher numbers of incoming ties were also predictive of lower perceptions of program climate. At the end of the summer, higher amounts of reciprocated ties in the high-level closeness network remained negatively predictive of perceptions of program climate. Previous research has found that teachers' and students' perceptions of their relationship

with one another often are not aligned (Hughes, 2011; Lim et al., 2021; Poulu, 2017). This may explain why incoming ties were not positively predictive of psychological constructs – as teachers' increasing feelings of closeness to students may not align with students' experiences of those relationships. Additionally, due to increased feelings of self-consciousness during adolescence (Steinberg, 2017), students may be more likely to assume teachers feel negatively towards them and apply negative intent to teacher behaviors. Additionally, teachers' higher feelings of closeness may not result in behaviors that the student views as caring, as perceptions of care can vary between teachers and students (King & Chan, 2011), as well as differ based on students' ethnicity (Barr & Rothman, 2009). For example, some feelings of care from teachers may result in higher expectations that students might view negatively (Rubie-Davies, 2009). Such misinterpretation of behavior could possibly explain why higher numbers of incoming ties in the high-level closeness network at the start of the summer were predictive of lower feelings of connection, as well as reciprocated ties serving as a negative predictor within the high-level closeness network on perceptions of program climate. Notably, close reciprocated ties were not very common at both the start and the end of the summer, with students ranging only from zero to one in their number of reciprocated ties, suggesting again mismatches in closeness perceptions between teachers and students.

Influence of demographic characteristics

Students' gender and grade level offer additional insight into teacher-student networks and feelings of belonging, mattering, connection, and perceptions of program climate. Scores of belonging at the start and end of summer were higher amongst rising 9th grade students compared to rising 7th and 8th graders in models including both medium-level and high-level closeness network indicators. Previous research has found that sense of belonging in middle

school tends to decrease as students advance in grade (e.g., Anderman, 2003; Renick & Reich, 2020), suggesting something unique about out-of-school program environments compared to traditional school settings when it comes to fostering feelings of belonging. However, grade was not a predictor of changes in belonging scores, so while rising 9th graders may have had higher belonging scores at each time point, all students were experiencing similar rates of growth in belonging over the course of the summer.

Interestingly, gender was predictive of increases in feelings of mattering. Though female students did not have higher scores in mattering than non-female students at the start or end of summer, they did have higher change scores, meaning their feelings of mattering increased at a greater rate, in models including both medium-level and high-level closeness network indicators. Previous research with high school students has found that girls tend to have higher scores of mattering than boys (Rayle, 2005), though understanding of differences in mattering by gender in early adolescence is limited. Related work has found that girls tend to have lower scores of belonging than their male peers in middle school (Renick & Reich, 2020) and that girls' self-esteem tends to drop in middle school, while boys' remains stable (Wigfield & Eccles, 1994). Therefore, the result that girls within this out-of-school program had increased growth in mattering compared to their non-female peers is noteworthy. It is important to consider this particular program's use of gender-inclusive language, employment of non-binary staff, and focus on gender equity in staff training and practices. The structure of this program may create an environment where female students feel particularly valued and able to add value, core components of mattering (Prilleltensky, 2019).

Since the majority of students in the program are Latine (over 90%), differences by ethnicity were not examined, but it is important to contextualize these findings with a focus on

ethnicity. Out-of-school programs' attention to cultural responsiveness (Simpkins et al., 2017), and its influence on positive youth development outcomes are an area of great potential to support students of color. That Latine students increased in their positive perceptions of program climate, and associated constructs like belonging, mattering, and connection, over the course of the program provide insights into possible ways to address some of the negative climate experiences students may have in traditional school spaces (Voight et al., 2015) and out-of-school activities where Latine students are not the majority (Ma et al., 2020).

Additionally, the differences in incoming ties from students based on teacher identity provide further insight into how teacher-student ethnic matching may influence relationships. Though the differences were not statistically significant, teachers of color did have higher numbers of incoming ties than white teachers, which aligns with research outlining the positive effects of having teachers of color on students of color (Redding, 2019). Further, teachers who were former program participants also had higher incoming ties from students than non-former program participants, with a statistically significant difference at the end of the summer within the high-level closeness network. That there were significantly more students who felt close to teachers who were former program participants provides additional evidence of the importance of having teachers to whom students can relate, especially to those whom they were more closely matched. Previous research has highlighted the impact of ethnic matching (Redding, 2019), but these data speak to having additional identity aspects in common, building on what is already known about teacher-student matching. Former program participants had many shared traits with current student participants – living in the same area, going to the same middle and high schools, as well as likely being of a shared ethnic background, socioeconomic status, and college-generation status. Our results suggest that these shared traits supported the development of close

teacher-student relationships throughout the summer, which offer implications for how schools can best support low-income students of color. Notably, ethnic match was not significant, but a more closely shared background was (e.g., same ethnicity, socioeconomic background, college generation status, and geographical region) suggesting increased nuance in the impact of teacher-student matching, beyond just shared ethnicity.

Context of COVID-19 Pandemic

It is important when interpreting these results to consider that this study took place in the summer of 2021, during the COVID-19 pandemic. The students participating in the program attended a middle school that had shifted to virtual instruction in the spring of 2020 and then resumed a voluntary hybrid program in the second half of the 2020-2021 school year, wherein students could attend school virtually only or attend in-person a few days a week. Similarly, this program had shifted to a virtual-only summer program in 2020, with all programming during the 2020-2021 school year taking place virtually as well. As such, students' contact with teachers in the program had been limited over the previous year and a half. Further, the majority of this program took place online – with just one day a week occurring in person and the option to attend those days on-campus or virtually.

Despite all these factors potentially inhibiting students' abilities to connect and form ties with their teachers, as well as the program only lasting five weeks, notable increases in connections were observed. These limited interactions over a short period of time were related to young adolescents' increased feelings of closeness to their teachers. This is especially noteworthy given previous research has shown how the structure of middle schools may inhibit students' ability to build bonds with teachers (Eccles et al., 1993) and what middle school educators have expressed about the challenges of designing online learning environments that

address young adolescents' developmental needs (Brandon, 2021; Eisenbach & Greathouse, 2020).

Implications for Educators

Out-of-school activities offer unique spaces in which students can experience numerous benefits, including forming connections with non-parental adults (Eccles & Gootman, 2002). Our results highlight both how out-of-school programs can foster feelings of closeness to teachers and how higher numbers of outgoing ties to teachers can relate to desirable outcomes, like stronger feelings of connection and more positive perceptions of program climate. Importantly, our findings suggest it may be not just about liking one's teachers, but having multiple teachers you feel connected to, regardless about how those teachers feel about you in return. These findings add to previous research, which has outlined the ways in which out-of-school staff may be particularly well positioned to build positive relationships with adolescents (Jones & Deutsch, 2011), as well as expanding understanding of how these relationships influence outcomes. In particular, it is important for students to feel connected to their teachers, as previous research has found this to be predictive to desirable outcomes (Martin & Collie, 2018). Because the structure of traditional middle school settings can pose challenges for students bonding with their teachers (Eccles et al., 1993), in-school educators should consider approaches used by staff in out-of-school settings to build relationships with adolescent participants. Additionally, these findings showcase how students' having multiple demographic characteristics in common with one's teachers may influence students' feelings of closeness to them, adding to existing research on this phenomenon (e.g., Redding, 2019). In order to better support diverse adolescents, schools should consider prioritizing the hiring of educators who are similar to the student population they will be serving in a variety of ways.

Limitations and Future Directions

This study is not without limitations. Just 62% of student participants completed pre- and post-surveys, and only 87% of staff were included in pre- and post-analysis. In order to calculate in-degrees and reciprocation, the network was limited to those with data at the start and end of summer. As such, aspects of the network structure may have been missed in our analysis and our findings are limited to these subsets of the program population. Additionally, student data were not collected under ideal conditions, with some students completing surveys in-person and others at home, as well as students needing to complete the survey on their phones, as a result of the program not being able to provide computers to all students. This method of survey completion was more time-consuming and tedious due to the smaller screen size of phones. Further, the COVID-19 pandemic changed the context of the program, shortening the program by one week, limiting students' amount of contact with their teachers and causing fewer in-person interactions, with not all teachers or students being present at even the limited on-campus program days. Thus, data were collected in a unique hybrid context, which likely influenced our results, but may offer novel insights into partially remote out-of-school activities. Though these results are limited to the perspectives of the students and staff in the analytic sample and the experiences of the program within the context of the COVID-19, the findings still offer insight into the understudied teacher-student networks of young adolescents within out-of-school programs and how those ties relate to perceptions of program climate and associated constructs, like belonging, mattering, and connection.

Future work should continue to explore teacher-student networks within out-of-school programs, especially collecting whole network data to view these relationships holistically, ideally with higher response rates than achieved in this study. Such research could explore

teacher-student networks in other out-of-school programs, including different content areas, different timeframes or different times of year (after-school versus summer) and serving different student populations. Additionally, future research could examine teacher-student networks over greater lengths of time, to continue to see how students' and teachers' connections in these networks grow and change over one or multiple years. It would also be valuable to continue to try to assess if changes in network indicators are related to changes in program climate and associated constructs. This would help inform how teacher-student relationships might be harnessed as school climate improvement intervention. Also, our sample was majority low-income, Latine students - future research should include greater socioeconomic and ethnic diversity in their samples, in order to understand the different ways in which teachers may match or align with students, and how this impacts students' feelings of connection to them. Lastly, future work should continue to explore these topics after the COVID-19 pandemic, when out-of-school programming is fully in-person again, to see how teacher-student relationships differ when contact is increased.

Conclusion

Teacher-student relationships are of particular developmental importance in early adolescence (Lei et al., 2018) and are highly influential on perceptions of school climate (Wang et al., 2010). These relationships are connected to beneficial outcomes for all students (Jia et al., 2009; Sointu et al., 2017) and can be especially impactful for low-income (Moen et al., 2019) and Latine youth (Hopkins et al., 2013; Jaffe-Walter, 2018). Out-of-school activities are particularly well suited to foster bonds between student participants and non-parental adults (Jones & Deutsch, 2011) and these relationships can help youth with their academic and career goals (McLaughlin, 2018; Soto-Lara et al., 2021). Social network analysis offers a powerful tool

to understand how interpersonal relationships, like those between teachers and students, influence developmental outcomes (Neal, 2020). This study demonstrated how teacher-student networks in an out-of-school context change over time at multiple levels of connection. More ties at both an individual and network level were found alongside higher scores in perceptions of program climate, as well as feelings of belonging, mattering, and connection. Further, students' outgoing ties to teachers were associated with greater feelings of connection and more positive perceptions of program climate, also providing evidence of the benefit of asking students directly how they feel about their teachers. Overall, teacher-student relationships remain influential components of in- and out-of-school educational environments (Hughes, 2011; Soto-Lara et al., 2021) and in these data were notably linked to other aspects of positive youth development, solidifying their importance in early adolescence.

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Tables

Table 4.1

Participant demographics

Student Demographics	
Demographic characteristic	**Frequency**
Gender	
Female	55.5%
Male	45%
Prefer not to say	1.5%
Ethnicity	
Latine	92.5%
Multiracial	4.5%
Asian	1.5%
White	1.5%
Grade	
Seventh	30%
Eighth	36%
Ninth	34%
Teacher Demographics	
Demographic characteristic	**Frequency**
Gender	
Female	75%
Male	20%
Non-binary	5%
Ethnicity	
Latine	50%
Asian	20%
White	20%
Multiracial	5%
Other	5%
Previous participation as a student	
Former program participant	40%
Non-former program participant	60%
Previous participation as a volunteer or staff	
Former program volunteer or staff	50%
Non-former program volunteer or staff	50%
Staff role	
Teacher	90%
Outside of classroom staff	10%

Table 4.2

Psychological constructs and network attributes at the start and the end of the summer

Psychological Constructs		
	Start of Summer	**End of Summer**
Belonging	3.21 (out of 4) SD = 0.45 Range = 2.06 – 4	3.46 (out of 4) SD = 0.45 Range = 2.17 – 4
Mattering	2.13 (out of 3) SD = 0.41 Range = 1.22 – 3	2.27 (out of 3) SD = 0.41 Range = 1.22 – 3
Connection	2.35 (out of 3) SD = 0.4 Range = 1.5 – 3	2.53 (out of 3) SD = 0.41 Range = 1.8 – 3
Perceptions of Program Climate	3.36 (out of 4) SD = 0.36 Range = 2.63 – 3.97	3.5 (out of 4) SD = 0.39 Range = 2.8 – 3.93
Network Attributes		
Medium-level Closeness Network		
	Start of Summer	**End of Summer**
Average Outgoing ties	4.71 (SD = 2.97) Range = 0 – 11	8.3 (SD = 4.36) Range = 0 – 21
Average Incoming ties	3.53 (SD = 2.18) Range = 0 – 9	7.52 (SD = 2.07) Range = 4 – 16
Average Reciprocated ties	1.38 (SD = 1.24) Range = 0 – 5	4.95 (SD = 2.06) Range = 0 – 12
Density	0.21	0.36
Number of students with no outgoing ties	7	2
Number of students with no incoming ties	4	0
High-level Closeness Network		
	Start of Summer	**End of Summer**
Average Outgoing ties	0.41 (SD = 0.72) Range = 0 – 4	1.58 (SD = 1.86) Range = 0 – 7
Average Incoming ties	0.39 (SD = 0.49) Range = 0 – 1	2.51 (SD = 1.42) Range = 0 – 7
Average Reciprocated ties	0.18 (SD = 0.39) Range = 0 – 1	0.24 (SD = 0.43) Range = 0 – 1
Density	0.02	0.06
Number of students with no outgoing ties	45	28
Number of students with no incoming ties	40	3

Table 4.3

Start of summer (baseline) network variables predicting psychological construct pre-scores in OLS regression

	Medium-level Closeness Network							
	Belonging β (SE)	**Belonging β (SE)**	**Mattering β (SE)**	**Mattering β (SE)**	**Connection β (SE)**	**Connection β (SE)**	**Climate β (SE)**	**Climate β (SE)**
Outgoing	0.04(0.02)		0.04(0.02)		**0.04***(0.02)		**0.04***(0.02)	
Incoming	-0.01(0.04)		0.009(0.04)		-0.06(0.04)		-0.04(0.03)	
Reciprocated		-0.05(0.05)		-0.01(0.05)		-0.06(0.05)		-0.03(0.05)
Female	0.11(0.12)	0.21(0.11)	-0.11(0.11)	-0.04(0.11)	-0.009(0.11)	0.07(0.11)	0.05(0.09)	0.12(0.09)
Eighth	0.28(0.16)	0.23(0.14)	-0.01(0.15)	-0.06(0.14)	0.22(0.15)	0.07(0.13)	**0.25***(0.13)	0.12(0.12)
Ninth	0.32(0.21)	**0.36***(0.16)	0.03(0.19)	0.07(0.15)	0.33(0.19)	0.18(0.15)	0.17(0.17)	0.04(0.14)
	High-level Closeness Network							
	Belonging β (SE)	**Belonging β (SE)**	**Mattering β (SE)**	**Mattering β (SE)**	**Connection β (SE)**	**Connection β (SE)**	**Climate β (SE)**	**Climate β (SE)**
Outgoing	0.04 (0.08)		0.03(0.07)		0.06(0.07)		-0.03(0.06)	
Incoming	-0.07 (0.14)		0.03(0.14)		**-0.28***(0.13)		-0.16(0.12)	
Reciprocated		-0.09(0.18)		**-0.31***(0.16)		-0.24(0.16)		**-0.34***(0.14)
Female	0.18 (0.12)	0.19(0.11)	-0.05(0.11)	0.008(0.1)	0.05(0.1)	0.07(0.11)	0.13(0.09)	0.15(0.09)
Eighth	0.21(0.14)	0.18(0.14)	-0.06(0.13)	-0.07(0.12)	0.09(0.13)	0.01(0.13)	0.11(0.12)	0.08(0.12)
Ninth	0.32(0.17)	0.31*(0.16)	0.05(0.16)	0.2(0.14)	0.27(0.15)	0.17(0.14)	0.09(0.14)	0.13(0.12)

Note: Coefficients (betas) listed and standard errors in parentheses. Reference category: rising seventh grade non-female (male or prefer not to say) students

* p<0.05 ** p<0.01 ***p<0.001

Table 4.4

End of summer network variables predicting psychological construct pre-scores in OLS regression

	Belonging β (SE)	**Belonging β (SE)**	**Mattering β (SE)**	**Mattering β (SE)**	**Connection β (SE)**	**Connection β (SE)**	**Climate β (SE)**	**Climate β (SE)**
Medium-level Closeness Network								
Outgoing	0.01(0.01)		0.02(0.01)		0.02(0.01)		0.02(0.01)	
Incoming	-0.01(0.04)		-0.02(0.02)		-0.04(0.03)		-0.04(0.02)	
Reciprocated		-0.02(0.03)		0.005(0.03)		-0.03(0.03)		-0.01(0.02)
Female	0.09(0.11)	0.12(0.11)	0.001(0.1)	0.13(0.11)	0.08(0.10)	0.13(0.1)	0.07(0.09)	0.11(0.09)
Eighth	0.22(0.14)	0.18(0.14)	-0.05(0.12)	0.03(0.13)	0.15(0.13)	0.11(0.13)	0.1(0.11)	0.08(0.12)
Ninth	**0.37****(0.14)	**0.35****(0.14)	0.05(0.12)	0.07(0.13)	0.15(0.12)	0.14(0.13)	-0.01(0.11)	-0.01(0.11)
High-level Closeness Network								
	Belonging β (SE)	**Belonging β (SE)**	**Mattering β (SE)**	**Mattering β (SE)**	**Connection β (SE)**	**Connection β (SE)**	**Climate β (SE)**	**Climate β (SE)**
Outgoing	0.03 (0.03)		0.04(0.04)		**0.08****(0.03)		0.04(0.03)	
Incoming	0.006 (0.04)		-0.009(0.04)		-0.02(0.04)		-0.03(0.04)	
Reciprocated		-0.02(0.16)		-0.05(0.15)		-0.01(0.15)		**-0.32***(0.13)
Female	0.09 (0.11)	0.11(0.11)	0.09(0.11)	0.13(0.11)	0.05(0.1)	0.12(0.1)	0.07(0.09)	0.12(0.09)
Eighth	0.21(0.14)	0.21(0.14)	0.05(0.13)	0.03(0.13)	0.19(0.12)	0.14(0.13)	0.12(0.11)	0.09(0.11)
Ninth	**0.35****(0.14)	**0.37***(0.16)	0.05(0.13)	0.09(0.15)	0.11(0.12)	0.15(0.15)	-0.03(0.11)	0.17(0.13)

Note: Coefficients (betas) listed and standard errors in parentheses. Reference category: rising seventh grade non-female (male or prefer not to say) students

* p<0.05 ** p<0.01 ***p<0.001

Table 4.5

Change in network variables predicting psychological construct change-scores in OLS regression

	Medium-level Closeness Network							
	Belonging β (SE)	**Belonging β (SE)**	**Mattering β (SE)**	**Mattering β (SE)**	**Connection β (SE)**	**Connection β (SE)**	**Climate β (SE)**	**Climate β (SE)**
Outgoing	-0.006 (0.01)		-0.0007(0.01)		0.006(0.01)		-0.01(0.01)	
Incoming	0.02 (0.03)		0.02(0.03)		0.003(0.03)		0.007(0.03)	
Reciprocated		-0.04(0.03)		-0.01(0.02)		-0.01(0.02)		-0.03(0.02)
Female	-0.06 (0.1)	-0.07(0.1)	**0.17***(0.08)	**0.16***(0.08)	0.08(0.09)	0.08(0.09)	-0.006(0.09)	-0.009(0.09)
Eighth	0.07(0.16)	-0.05(0.13)	0.15(0.12)	0.06(0.11)	0.14(0.14)	0.12(0.12)	0.02(0.14)	-0.06(0.12)
Ninth	0.16(0.19)	0.02(0.13)	0.08(0.15)	-0.03(0.1)	0.09(0.17)	0.05(0.12)	0.19(0.16)	0.1(0.12)
	High-level Closeness Network							
	Belonging β (SE)	**Belonging β (SE)**	**Mattering β (SE)**	**Mattering β (SE)**	**Connection β (SE)**	**Connection β (SE)**	**Climate β (SE)**	**Climate β (SE)**
Outgoing	-0.05 (0.03)		-0.03(0.03)		0.02(0.03)		-0.02(0.03)	
Incoming	0.05 (0.04)		0.04(0.03)		0.04(0.04)		0.03(0.04)	
Reciprocated		-0.17(0223)		-0.09(0.17)		-0.06(0.19)		0.2(0.19)
Female	-0.04 (0.1)	-0.08(0.1)	**0.18***(0.08)	0.16(0.08)	0.06(0.09)	0.07(0.09)	0.008(0.09)	0.01(0.08)
Eighth	0.008(0.12)	0.03(0.12)	0.08(0.09)	0.09(0.09)	0.12(0.11)	0.13(0.11)	-0.01(0.11)	-0.006(0.11)
Ninth	0.16(0.13)	0.12(0.12)	0.04(0.1)	0.009(0.1)	0.08(0.12)	0.08(0.12)	0.2(0.11)	0.13(0.11)

Note: Coefficients (betas) listed and standard errors in parentheses. Reference category: rising seventh grade non-female (male or prefer not to say) students

* p<0.05 ** p<0.01 ***p<0.001

Table 4.6

Average incoming ties to teachers by demographic characteristics at the start and end of the summer

Ties by Ethnicity			
Start of Summer			
	Latine	**Multiracial, Asian or Other**	**White**
Medium level	19.25	18.83	16.75
High level	2.42	1.16	0.75
End of Summer			
	Latine	**Multiracial, Asian or Other**	**White**
Medium level	29.42	32.83	25.25
High level	6.25	7.83	2.5
Observations	12	6	4
Ties by Former Student Status			
Start of Summer			
	Former Program Participants	**Non Former Program Participants**	
Medium level	20	17.58	
High level	2.6	1.08	
End of Summer			
	Former Program Participants	**Non Former Program Participants**	
Medium level	30.6	28.75	
High level	8.3	4.08	
Observations	10	12	

Figures

Figure 4.1

Start of summer student ties to teachers in the medium-level closeness network

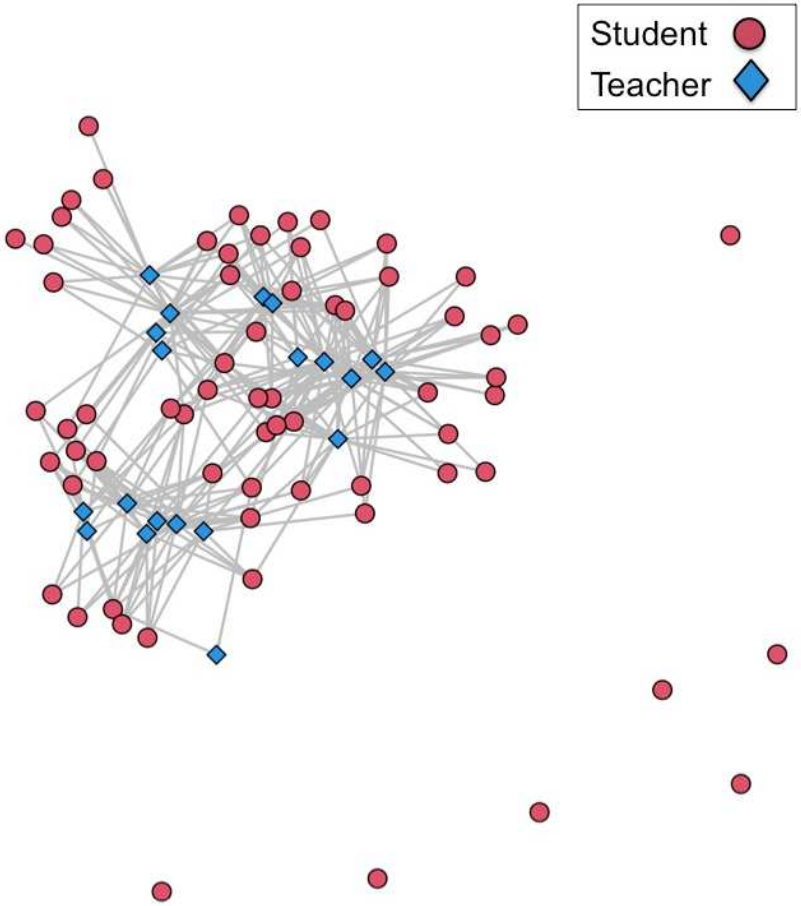


Figure 4.2

End of summer student ties to teachers in the medium-level closeness network with node placement retained from start of summer

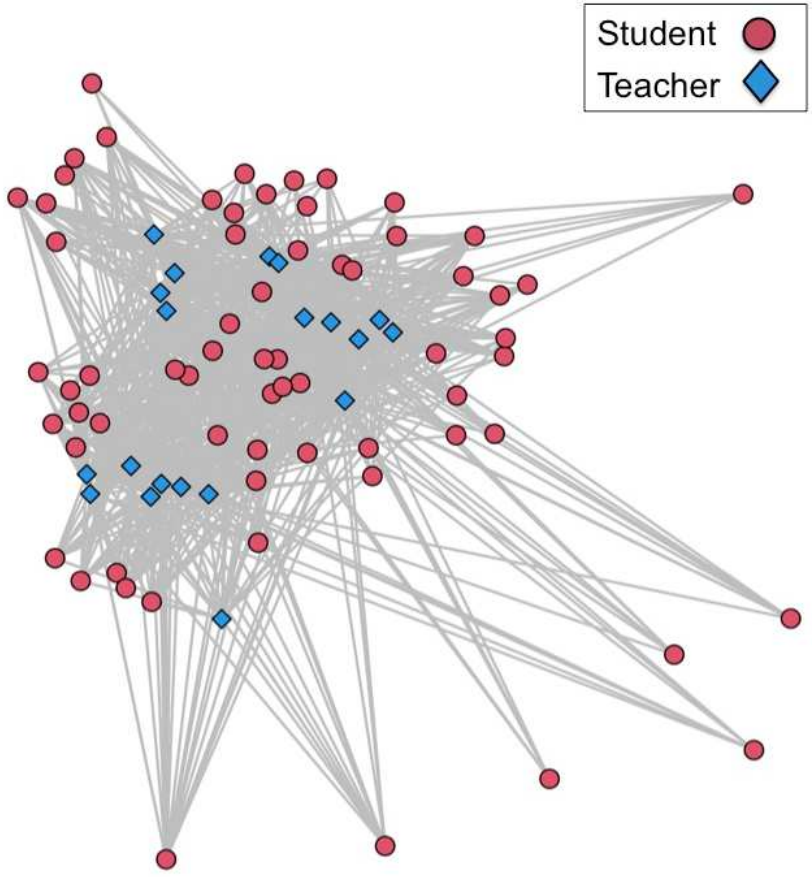


Figure 4.3

Start of summer student ties to teachers in the high-level closeness network

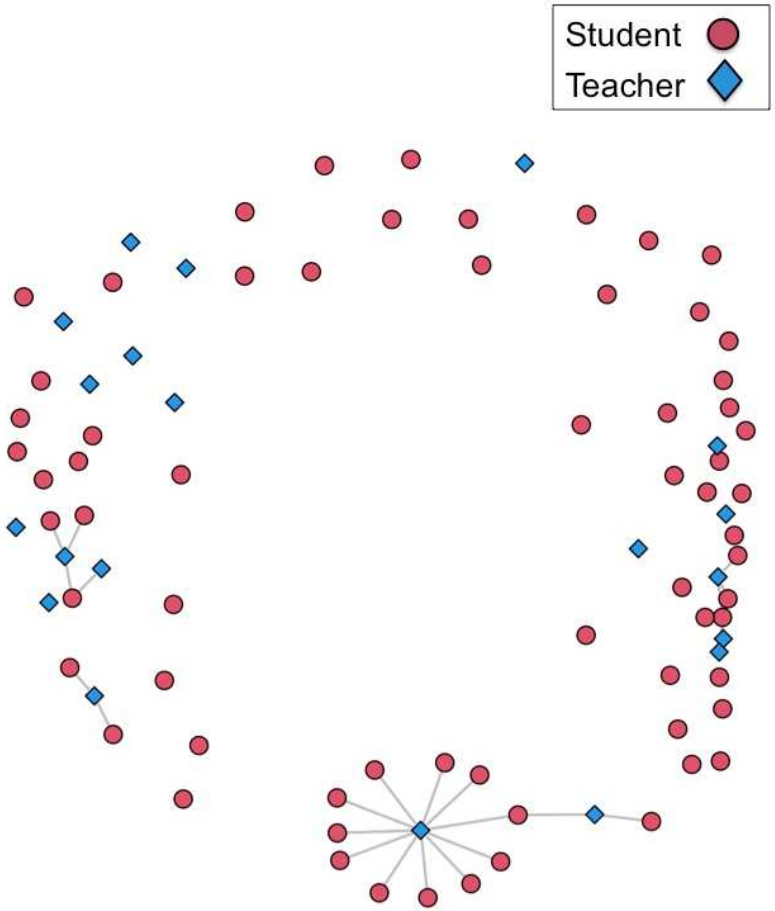


Figure 4.4

End of summer student ties to teachers in the high-level closeness network with node placement retained from start of summer

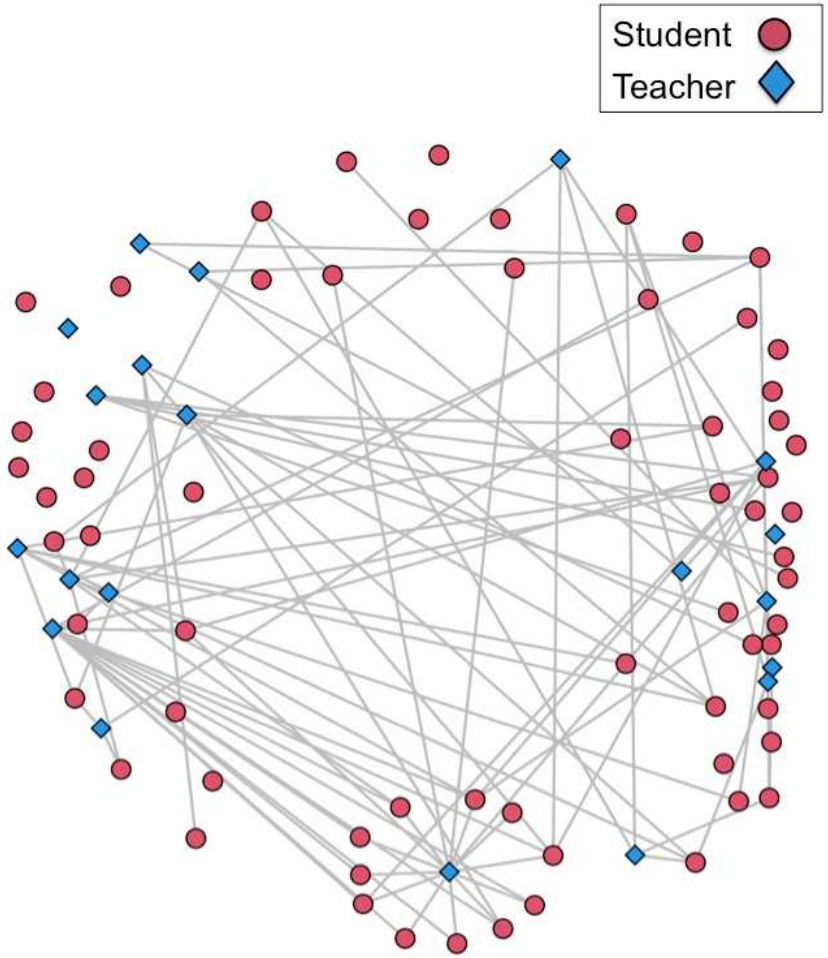


Figure 4.5

Start of summer teacher ties to students in the medium-level closeness network

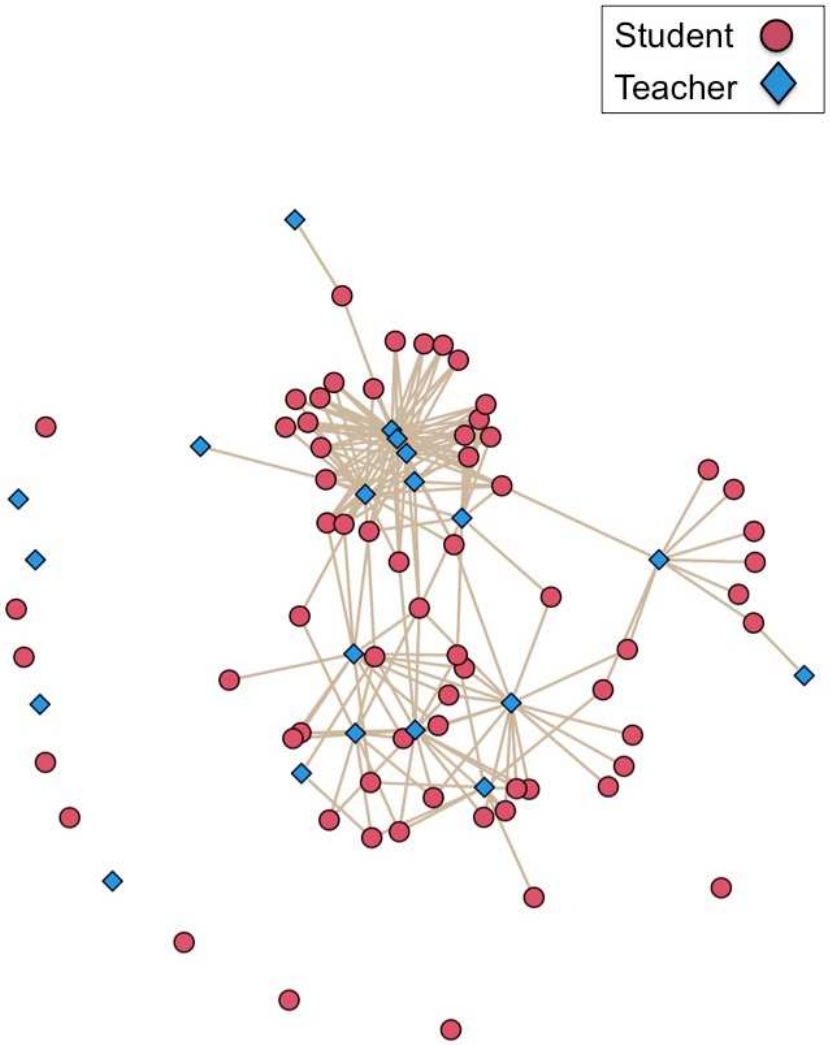


Figure 4.6

End of summer teacher ties to students in the medium-level closeness network with node placement retained from start of summer

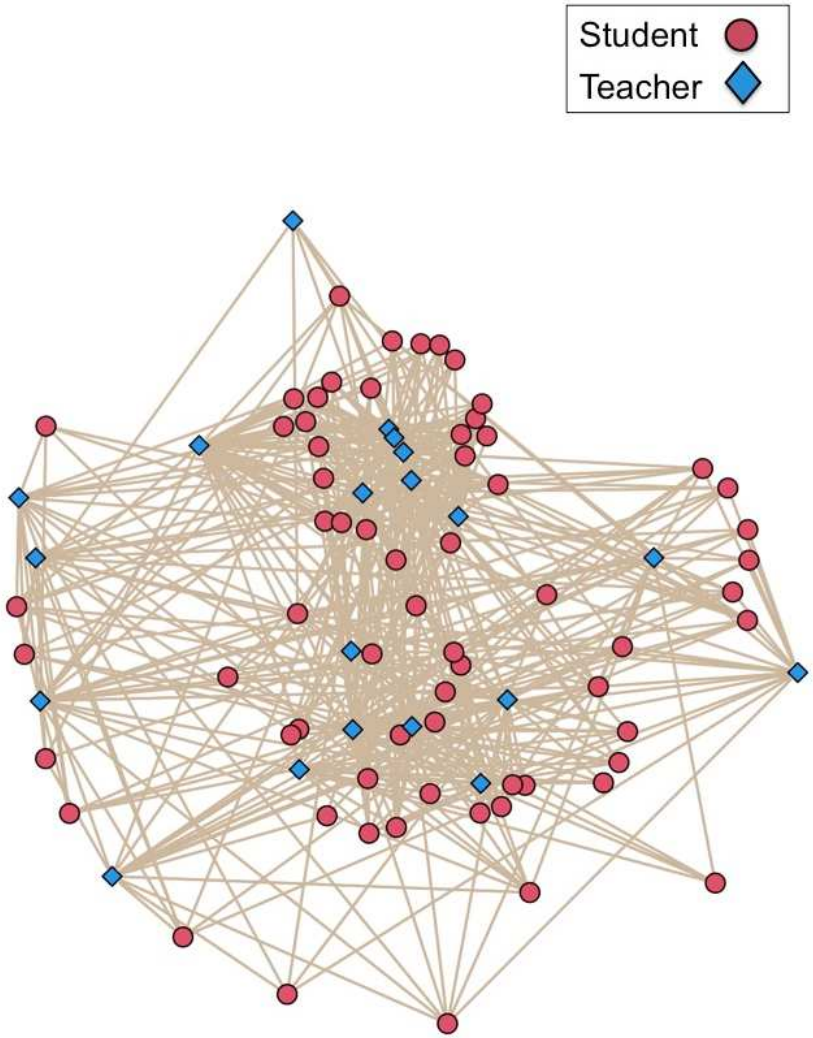


Figure 4.7

Start of summer teacher ties to students in the high-level closeness network

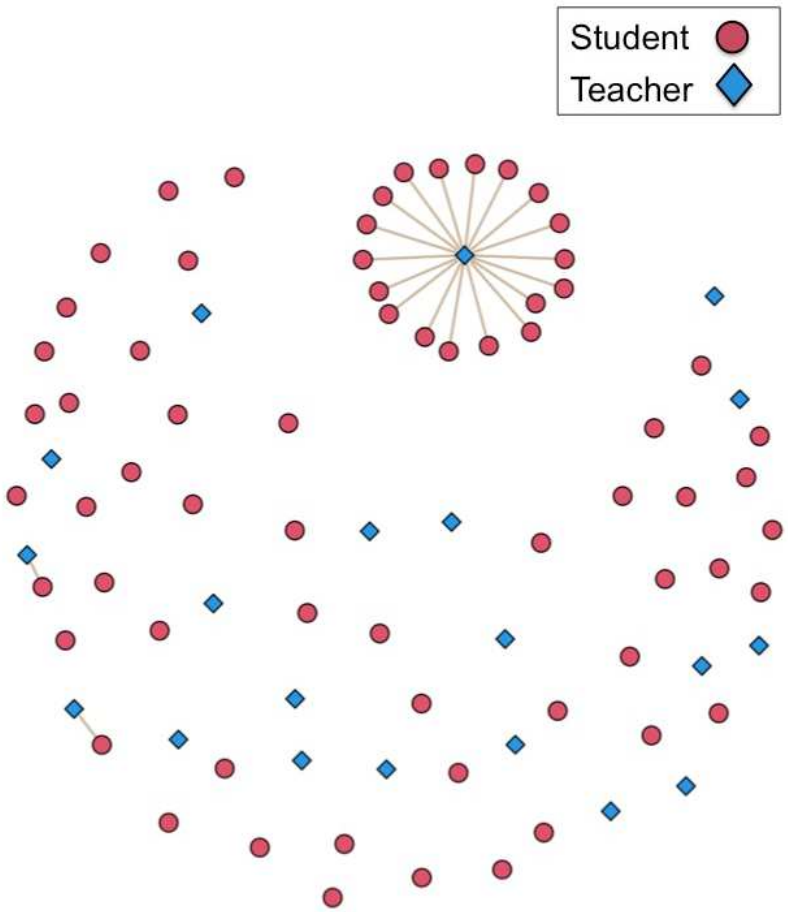
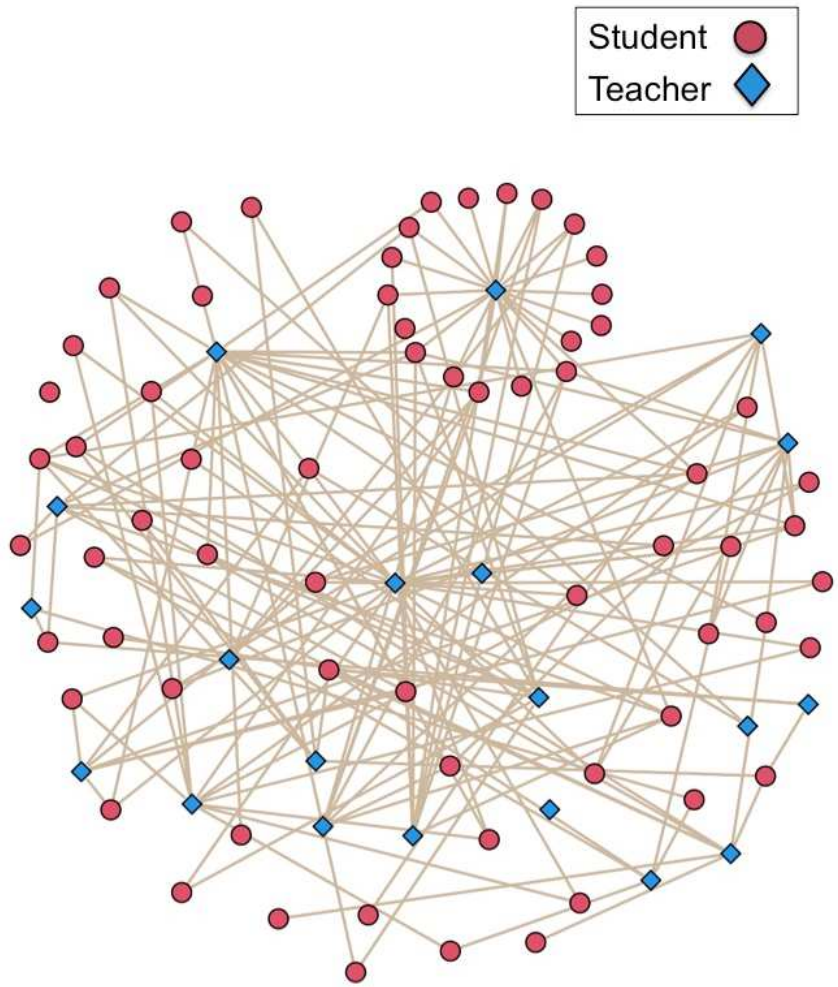


Figure 4.8

End of summer teacher ties to students in the high-level closeness network with node placement retained from start of summer



CHAPTER 5

Conclusion

Together, these three studies help to advance current understandings of school climate as experienced by young adolescents, especially low-income, Latine students. Middle school has been well documented to be a time of many challenges, some of which may be due, in part, to a mismatch between young adolescents' developmental needs and the settings in which they are placed (Eccles, 1993a; Eccles & Roeser, 2009). However, research suggests that this does not have to be the case, as schools and out-of-school settings can be designed to better meet the needs of students (Juvonen, 2007; Mathikithela & Wood, 2019). Yet, there is still additional work needed on the best approaches to improve school climate, particularly for students of color, who may be experiencing school climate more negatively than their white peers (Voight et al., 2015). This dissertation attempts to help fill these gaps by providing novel research on the impact of autonomy and interpersonal relationships on outcomes for Latine adolescents.

Review of Findings

Study One

Study One examined how middle school students perceived and sought to improve their school's climate during the COVID-19 pandemic, as well as how participating in a youth participatory action research project impacted their sense of belonging, mattering, empowerment, and perceptions of school climate. The 14 student participants understood school climate as including both their at-home and in-person environments, but chose to focus their action research on a shared aspect of the school environment – the school lunch – rather than issues housed at home. Participants felt these home issues may be more difficult to change due to being a result of inequities outside of the school's control (e.g., unequal access to WiFi) and less evergreen, as

their school began an expanded hybrid program. Food also represented an equity issue for these students, as the majority of their school population qualified for free and reduced lunch, and food insecurity increased during the pandemic, especially amongst Latine families (Feeding America, 2021). Participating students showcased significant gains in their feelings of mattering and empowerment throughout their participation in the YPAR group, across both qualitative and quantitative data. In particular, they advanced in their advocacy and leadership skills and desire to be change agents, as well as their valuing of others' perspectives and perceptions of their perspectives being valued.

These findings align with previous research, which has shown YPAR to be a promising tool to meet adolescents' developmental needs (Ozer, 2017) and promote positive school climate change (Voight, 2015). Our study also offered insight into the importance of including young people's voice in the issues that impact their lives during times of great upheaval like the COVID-19 pandemic (Efuribe et al., 2020), a time in which such opportunities for expression, as well as connection, were limited (Maciano et al., 2020). While YPAR can be challenging to implement, especially in school settings (Keddie, 2019), our results highlight the impact even short-term YPAR projects conducted exclusively online can have on both individual participants and overall settings. As such, future research should continue to explore YPAR as an intervention strategy for improving school climate and meeting adolescents' developmental needs, especially longer-term projects than this study could accommodate.

Study Two

Study Two explored the relationship between students' ties in the peer network of an out-of-school summer program and feelings of belonging, mattering, connection, and perceptions of program climate, as well as how overall patterns of relationships in this peer network related to

program-wide psychological construct scores. Drawing upon a sample of majority low-income, Latine young adolescents, we found that students had significant gains in their feelings of belonging, mattering, connection, and perceptions of program climate from the start to the end of the summer program, as well as significant increases in their outgoing and incoming peer ties, at both medium and high levels of closeness. Additionally, the overall network became more connected from the start to the end of the summer and fewer students were totally isolated. While change scores in network ties were not predictive of changes in psychological constructs, an association was found between outgoing close ties and certain social emotional outcomes. Having higher amounts of outgoing close ties to peers was positively predictive of start and end of summer scores of mattering, connection, and perceptions of program climate. Interestingly, the number of incoming ties was not predictive of outcomes in both the medium- and high-level closeness networks.

These results affirm what previous research has found about the impact of positive perceptions of peer relationships on psychological outcomes (Long et al., 2021), while also offering further insight into the differing ways adolescents interpret their relationships with peers, which can be unreliable (Brown & Larson, 2009). Though much research has outlined the importance of mutual friendships (Gifford-Smith & Brownell, 2003), our findings found that it was students' feelings of closeness to their peers – not how peers felt about them – that were predictive of school climate and associated constructs. While the structure of educational environments can inhibit the formation of positive peer ties (Eccles et al., 1993), students in our sample had significant increases in their connections to peers, despite the program mainly being held online, affirming what previous research has found about out-of-school programs being fertile grounds for building friendships (Schaefer et al., 2011). Therefore, future research should

continue to examine peer relationships in out-of-school programs, ideally with full network data, which our study did not achieve due to only having a 62% response rate, to better understand how peer ties influence school climate and related psychological outcomes.

Study Three

Study Three investigated how students' connections with teachers in an out-of-school summer program relate to their feelings of belonging, mattering, connection and perceptions of program climate, as well as how overall patterns of relationships in this teacher-student network relate to program-wide psychological construct scores. Utilizing a sample of majority low-income Latine young adolescents and majority teachers of color, this study's results showed that students had significant growth in their outgoing, incoming, and reciprocated teacher ties from the start to the end of the program, at both medium and high levels of closeness. Drawing upon the same psychological surveys from Study Two, students also had meaningful gains in their feelings of belonging, mattering, connection, and perceptions of program climate throughout the course of the summer program. Though change scores in network ties were not predictive of change scores in construct scores, outgoing ties to teachers were consistently positively predictive of a number of psychological outcomes. At the start of the summer, higher outgoing ties in the medium-level closeness network predicted higher feelings of connection and more positive perceptions of program climate, while at the end of the summer, higher outgoing ties in the high-level network predicted higher feelings of connection. These results support previous research that has shown the impact of feelings of closeness to teachers on both social-emotional (Lei et al., 2018) and academic (Martin et al., 2018) outcomes, as well as showing how ties can be fostered between teachers and students, even when in-person interactions are limited.

Incoming and reciprocated ties from teachers, however, served as negative predictors of certain psychological constructs, highlighting the misalignment between teachers' and students' interpretation of their relationships to one another (Hughes, 2011; Lim et al., 2021; Poulu, 2017) and how perceptions of care may vary between teachers and students (King & Chan, 2011). Additionally, students' ties to teachers did vary based on teacher identity, with teachers who were former participants in the out-of-school program having higher incoming close ties from students at the end of the summer, compared to teachers who were not former program participants. This result provides additional insight into previous work, which has highlighted the importance of teachers having shared demographic characteristics with their students (Redding, 2019). Ultimately, future work should continue to explore teacher-student networks both in schools and out-of-school programming, gathering data over longer amounts of time and including diverse student populations, as this study just focused on low-income Latine students.

Synthesis of Results

Across these three studies, various aspects of educational environments influenced adolescent outcomes. Autonomy is an important developmental need for young adolescents (Steinberg, 2017) and the results of the YPAR study showed that creating spaces which allow for students to have their voices heard can support increased feelings of mattering and empowerment. Mattering, the feeling of being valued by and adding value to a setting (Prilleltensky, 2019), is tied to other desirable outcomes for adolescents (Watson, 2018) and can support adolescents' positive perceptions of educational environments (Eccles & Gootman, 2002). Despite the YPAR project focusing on school climate improvement, students in the study did not have significant increases in their perceptions of school climate, suggesting this may be a more difficult metric to move through YPAR, especially without undergoing a full action cycle

to create school climate improvement, which was not possible due to the shortened timeline of the study. However, students' growth in mattering and empowerment still supports YPAR as a promising practice for meeting adolescents' developmental needs, and the early impacts of the students' research suggest YPAR can also influence climate at a school-wide level.

Peer ties are highly influential on adolescent outcomes (Gifford-Smith & Brownell, 2003) and we found higher amounts of close outgoing ties to be predictive of a number of positive outcomes, including mattering, connection, and perceptions of program climate. Teacher-student ties also influence adolescent outcomes (Hughes, 2011) and we found higher amounts of outgoing ties to teachers to be predictive of feelings of connection and perceptions of program climate. Prior research highlights how interpersonal relationships are a key component of school climate (Thapa et al., 2013) and these results affirmed that students' feelings of closeness to their peers and teachers are related to experiences of school climate. Interestingly, it was only outgoing and not incoming ties that were positively predictive of program climate, implying that students' perceptions of their relationships to teachers and peers are more influential than if those relationships are reciprocated. Further, within the peer network, only close-level ties were predictive of outcomes, while in the teacher-student network, medium-level closeness ties were influential on some psychological constructs, and high-level closeness ties were influential on others. This suggests that close peer ties may be of greatest importance to school climate, while teacher-student relationships may be related to outcomes across varying levels of closeness.

Both teacher and peer ties were predictive of connection, but it was only peer ties that were positively predictive of mattering, highlighting the major influence peers can have on adolescent wellbeing (Brown & Larson, 2009). Additionally, mattering being influenced by peer ties, and also seemingly improved through participation in the YPAR project, outlines the

various factors which may influence mattering, including both autonomy and peer relationships. Network ties to peers or teachers were not predictive of feelings of program belonging, suggesting that belonging to a school or a program as a whole may require different mechanisms or perhaps more interpersonal connections that those observed in these data. For example, it is possible these increased ties related to feelings of belonging to a particular peer group or classroom, but not the overall campus. This is similar to results from Study One, which saw increased belonging to the YPAR group, but not the school overall, highlighting the different subsets of an educational environment to which an adolescent may feel a sense of belonging.

All these studies included populations that were majority Latine and low-income, groups that prior research has found may experience a school's climate more negatively (Jia et al., 2009; Voight et al., 2015). However, across our studies, students showed increases in either their perceptions of program climate, or (and sometimes as well as) associated constructs like belonging, mattering, connection, and empowerment. This shows that these negative experiences are far from unavoidable, and more positive perceptions can be achieved, as previous research suggests, if educational environments focus on fostering inclusion and belonging for marginalized students (e.g., Gray et al., 2018; Simpkins et al., 2017). Our YPAR project was structured in a way that allowed students a chance to have their voices heard and recognized. The participating out-of-school program focuses on cultural responsiveness and inclusion of diverse students. Adopting intentional practices to support marginalized adolescents appear to be promising approaches to increase desirable outcomes for such students.

Though not a focus of the dissertation, all of these studies were designed in partnership with the participating educational sites. Community-engaged research approaches, especially in education, can be important strategies for bridging the distance between research and practice

(Corbun & Penuel, 2016). The results of all these studies have been or will be shared back with relevant stakeholders, who can then use these findings to inform future programming. Additionally, by designing studies of interest to the participating sites and fostering deep relationships with key decision-makers, these studies could weather the changes brought on by the pandemic, avoiding some of the challenges of staff turnover often faced when doing research with schools (Farrell et al., 2019). Ultimately, the success of these studies – both their ability to be carried out despite changing circumstances and their likelihood to lead to changes in educational practices – was highly influenced by the deep partnerships within which they were placed.

Future Directions

This dissertation attempted to help bridge gaps in existing research on what aspects of school climate are of greatest importance to young adolescents, with a particular focus on the perspectives of diverse adolescents, as well as the inclusion of out-of-school educational environments. Novel methods (youth participatory action research and social network analysis) were utilized that are especially well matched for exploring issues of student autonomy and interpersonal relationships – key areas of developmental importance in early adolescence (Steinberg, 2017) and central facets of students' experiences of school climate (Thapa et al., 2013). Though these studies advance current understandings, there is still much future work to be done. These studies focused on one understudied group, low-income, Latine adolescents, but future work should include other historically underserved students. Additionally, because all our participant pools were majority Latine, we did not compare across ethnic groups. Future work should include more diversity to better understand how school climate perspectives vary by ethnicity, especially amongst students of color.

Additionally, these studies were exploratory in nature. Given what is known about the importance of student voice, peer ties, and teacher-student relationships, future research should focus on testing interventions in these areas, identifying their efficacy and impact on outcomes. While these studies affirm the importance of these three domains, as well as some of the practices that may support improvement in them, more work must be done to precisely determine approaches schools can utilize if they wish to enhance student autonomy and interpersonal relationships. School climate remains a promising mechanism by which to improve educational outcomes and increase educational equity, but there remain future studies to conduct that can help inform the best practices schools can adopt to promote a more positive school climate.

Closing Contributions

School climate continues to be a growing area of research, offering promise in it's ability to impact student outcomes when positive (Thapa et al., 2013). However, it is important to consider both the developmental appropriateness of a school's environment, especially in early adolescence (Eccles et al., 1993), as well as the way diverse adolescents experience the same school setting (Voight et al., 2015). This dissertation advances understanding of areas of school climate importance in early adolescence, focusing on the highly salient areas of student autonomy and interpersonal relationships, and utilizing samples of predominately low-income, Latine students. Together, these studies showcase the potential mechanisms for improvement in perceptions of school climate, as well as associated outcomes like mattering, and offer directions for future research on how to build educational environments that meet the needs of all students.

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Appendix A

Psychological sense of school membership scale

1. I feel like a part of my (school/ program name).

Not at all true	Not true	Somewhat true	True	Very true
0	1	2	3	4

2. People at (school/program name) notice when I am good at something

Not at all true	Not true	Somewhat true	True	Very true
0	1	2	3	4

3. It is hard for people like me to be accepted at (school/program name).

Not at all true	Not true	Somewhat true	True	Very true
0	1	2	3	4

4. Other students in (school/program name) take my opinions seriously.

Not at all true	Not true	Somewhat true	True	Very true
0	1	2	3	4

5. Most teachers at (school/program name) are interested in me.

Not at all true	Not true	Somewhat true	True	Very true
0	1	2	3	4

6. Sometimes I feel as if I don't belong in (school/program name).

Not at all true	Not true	Somewhat true	True	Very true
0	1	2	3	4

7. There is at least one teacher or adult I can talk to in (school/program name) if I have a problem.

Not at all true	Not true	Somewhat true	True	Very true
0	1	2	3	4

8. People at (school/program name) are friendly to me.

Not at all true	Not true	Somewhat true	True	Very true
0	1	2	3	4

9. Teachers here are not interested in people like me.

Not at all true	Not true	Somewhat true	True	Very true
0	1	2	3	4

10. I am included in lots of activities at (school/program name).

Not at all true	Not true	Somewhat true	True	Very true
0	1	2	3	4

11. I am treated with as much respect as other students in (school/program name).

Not at all true	Not true	Somewhat true	True	Very true
0	1	2	3	4

12. I feel very different from most other students at (school/program name).

Not at all true	Not true	Somewhat true	True	Very true
0	1	2	3	4

13. I can really be myself at (school/program name).

Not at all true	Not true	Somewhat true	True	Very true
0	1	2	3	4

14. Teachers at (school/program name) respect me.

Not at all true	Not true	Somewhat true	True	Very true
0	1	2	3	4

15. People at (school/program name) know that I can do good work.

Not at all true	Not true	Somewhat true	True	Very true
0	1	2	3	4

16. I wish I were in a different (school/program).

Not at all true	Not true	Somewhat true	True	Very true
0	1	2	3	4

17. I feel proud to belong to (school/program name).

Not at all true	Not true	Somewhat true	True	Very true
0	1	2	3	4

18. Other students at (school/program) like me the way that I am.

Not at all true	Not true	Somewhat true	True	Very true
0	1	2	3	4

Mattering scale

1. How important do you feel you are to other people?

Not at all	A little	Somewhat	Very much
0	1	2	3

2. How much do you feel other people pay attention to you?

Not at all	A little	Somewhat	Very much
0	1	2	3

3. How much do you feel others would miss you if you went away?

Not at all	A little	Somewhat	Very much
0	1	2	3

4. How interested are people generally in what you have to say?

Not at all	A little	Somewhat	Very much
0	1	2	3

5. How much do people depend on you?

Not at all	A little	Somewhat	Very much
0	1	2	3

6. I influence how (school/program name) functions.

Strongly disagree	Disagree	Agree	Strongly agree
0	1	2	3

7. People at (school/program name) are good influencers of each other.

Strongly disagree	Disagree	Agree	Strongly agree
0	1	2	3

8. I can get what I need at (school/ program name).

Strongly disagree	Disagree	Agree	Strongly agree
0	1	2	3

9. (School/program name) helps me fulfill my needs.

Strongly disagree	Disagree	Agree	Strongly agree
0	1	2	3

Psychological empowerment instrument

1. I feel like I have a pretty good understanding of the important political issues, which confront our society.

Strongly Disagree	Disagree	Agree	Strongly Agree
0	1	2	3

2. I am often a leader in groups.

Strongly Disagree	Disagree	Agree	Strongly Agree
0	1	2	3

3. I can usually figure out how to get an adult to see, my point of view even if they don't agree with me.

Strongly Disagree	Disagree	Agree	Strongly Agree
0	1	2	3

4. If I want to improve a problem at my school, I know how to gather useful data about the issue.

Strongly Disagree	Disagree	Agree	Strongly Agree
0	1	2	3

5. I know how school rules and policies are made at my school.

Strongly Disagree	Disagree	Agree	Strongly Agree
0	1	2	3

6. If I want to improve a problem in my school, I can work effectively with other students on this issue.

Strongly Disagree	Disagree	Agree	Strongly Agree
0	1	2	3

7. I know how school rules and policies are made.

Strongly Disagree	Disagree	Agree	Strongly Agree
0	1	2	3

8. I want to have as much say as possible in making decisions in my school.

Strongly Disagree	Disagree	Agree	Strongly Agree
0	1	2	3

9. Students should work to improve our school even if we can't always make the changes we want.

Strongly Disagree	Disagree	Agree	Strongly Agree
0	1	2	3

10. I have led a group of young people working on an issue we care about.

Strongly Disagree	Disagree	Agree	Strongly Agree
0	1	2	3

11. I have made a presentation to a group of people I don't know.

Strongly Disagree	Disagree	Agree	Strongly Agree
0	1	2	3

12. I have spoken with adults in my school about issues that I want to improve at the school.

Strongly Disagree	Disagree	Agree	Strongly Agree
0	1	2	3

13. I have interviewed an adult to learn their perspectives about an issue.

Strongly Disagree	Disagree	Agree	Strongly Agree
0	1	2	3

14. I have spoken with other students about issues that I want to improve at the school.

Strongly Disagree	Disagree	Agree	Strongly Agree
0	1	2	3

15. If issues come up that affect students at my school, we do something about it.

Strongly Disagree	Disagree	Agree	Strongly Agree
0	1	2	3

16. There is a student council here that gets to decide on some really important things.

Strongly Disagree	Disagree	Agree	Strongly Agree
0	1	2	3

17. There are plenty of ways for students like me to have a say in what our school does.

Strongly Disagree	Disagree	Agree	Strongly Agree
0	1	2	3

18. Students have a say in what happens at this school.

Strongly Disagree	Disagree	Agree	Strongly Agree
0	1	2	3

19. Students at this school get to help plan special activities and events.

Strongly Disagree	Disagree	Agree	Strongly Agree
0	1	2	3

School climate measure

1. Students in this school/program have a say in how things work.

Never	Hardly Ever	Sometimes	Most of the Time	Always
0	1	2	3	4

2. Students get to help decide some of the rules in this school/program.

Never	Hardly Ever	Sometimes	Most of the Time	Always
0	1	2	3	4

3. Students understand what will happen to them if they break a rule.

Never	Hardly Ever	Sometimes	Most of the Time	Always
0	1	2	3	4

4. The rules in this school/program are too strict.

Never	Hardly Ever	Sometimes	Most of the Time	Always
0	1	2	3	4

5. Students in this school/program have trouble getting along with each other.

Never	Hardly Ever	Sometimes	Most of the Time	Always
0	1	2	3	4

6. I worry about people being mean to me in school/program.

Never	Hardly Ever	Sometimes	Most of the Time	Always
0	1	2	3	4

7. I get hit or threatened by other students.

Never	Hardly Ever	Sometimes	Most of the Time	Always
0	1	2	3	4

8. My school/program handles student behavior problems fairly.

Never	Hardly Ever	Sometimes	Most of the Time	Always
0	1	2	3	4

9. At my school/program, there is a teacher or other adult who listens to me when I have something to say.

Never	Hardly Ever	Sometimes	Most of the Time	Always

0	1	2	3	4

10. A person's skin color can cause problems at my school/program.

Never	Hardly Ever	Sometimes	Most of the Time	Always
0	1	2	3	4

11. The teachers in my school/program make learning fun.

Never	Hardly Ever	Sometimes	Most of the Time	Always
0	1	2	3	4

12. I feel safe in the online meetings my school/program has.

Never	Hardly Ever	Sometimes	Most of the Time	Always
0	1	2	3	4

13. The programs and online tools my teachers use for class work well for me.

Never	Hardly Ever	Sometimes	Most of the Time	Always
0	1	2	3	4

14. I feel comfortable turning on my video during meetings for my classes

Never	Hardly Ever	Sometimes	Most of the Time	Always
0	1	2	3	4

15. At my school/program, there is a teacher or other adult who regularly checks in on me, to see how I am doing.

Never	Hardly Ever	Sometimes	Most of the Time	Always
0	1	2	3	4

16. I like the way my teachers have set up my online platforms.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
0	1	2	3	4

17. I feel safe at school/program.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
0	1	2	3	4

18. I have the tools I need to do online learning, like a working computer.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree

0	1	2	3	4

19. There are teachers at my school/program who care about me.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
0	1	2	3	4

20. At my school/program, I have a friend who I can really trust.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
0	1	2	3	4

21. Students at my school/program respect differences in other students.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
0	1	2	3	4

22. Our teachers encourage us to ask questions when we do not understand.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
0	1	2	3	4

23. My classrooms are clean and tidy.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
0	1	2	3	4

24. I am interested in the things I am learning in my classes.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
0	1	2	3	4

25. The work in my classes is the right level for me – not too easy and not too hard.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
0	1	2	3	4

26. My classrooms have all the resources they need, like textbooks and computers.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
0	1	2	3	4

27. The school/program bathrooms are kept clean and comfortable.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
0	1	2	3	4

28. There are teachers I can go to for help, if I cannot access online materials or am having trouble with distance learning.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
0	1	2	3	4

29. I have friends I have been keeping in contact with, even with school/program being online.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
0	1	2	3	4

30. My school/program campus looks nice and is well maintained.

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
0	1	2	3	4

Teacher and peer connection scale

1. I feel connected with my teachers at (program name).

Strongly disagree	Disagree	Agree	Strongly agree
0	1	2	3

2. I like my teachers at (program name).

Strongly disagree	Disagree	Agree	Strongly agree
0	1	2	3

3. I can talk to my teachers at (program name) if I have a problem or need advice.

Strongly disagree	Disagree	Agree	Strongly agree
0	1	2	3

4. My teachers at (program name) have high expectations of me.

Strongly disagree	Disagree	Agree	Strongly agree
0	1	2	3

5. My teachers at (program name) are happy when I come to class.

Strongly disagree	Disagree	Agree	Strongly agree
0	1	2	3

6. I feel connected with the students at (program name).

Strongly disagree	Disagree	Agree	Strongly agree
0	1	2	3

7. I have a friend at (program name).

Strongly disagree	Disagree	Agree	Strongly agree
0	1	2	3

8. I have more than one friend at (program name).

Strongly disagree	Disagree	Agree	Strongly agree
0	1	2	3

9. I like my friends at (program name).

Strongly disagree	Disagree	Agree	Strongly agree
0	1	2	3

10. My friends are happy when I come to (program name).

Strongly disagree	Disagree	Agree	Strongly agree
0	1	2	3

Sample network roster

Please describe your relationship with each student or teacher using the following options:

- I do not know them
- I know of them (meaning you may have seen them at (program name), but have not interacted with them)
- I know them (meaning you may have been classmates with them previously or interacted with them otherwise)
- I am close with them (meaning you have gotten to know them personally or built a close relationship with them)

1. Chidi

Do not know them	Know of them	Know them	Close with them
0	1	2	3

2. Eleanor

Do not know them	Know of them	Know them	Close with them
0	1	2	3

3. Janet

Do not know them	Know of them	Know them	Close with them
0	1	2	3

4. Jason

Do not know them	Know of them	Know them	Close with them
0	1	2	3

5. Tahani

Do not know them	Know of them	Know them	Close with them
0	1	2	3

6. Michael

Do not know them	Know of them	Know them	Close with them
0	1	2	3

Appendix B

Correlation table of network position indicators within the medium-level closeness network at the end of the summer

	Outgoing ties	Incoming ties	Reciprocated ties
Outgoing ties	1		
Incoming ties	0.62	1	
Reciprocated ties	0.88	0.72	1

Correlation table of network position indicators within the high-level closeness network at the start of the summer

	Outgoing ties	Incoming ties	Reciprocated ties
Outgoing ties	1		
Incoming ties	0.23	1	
Reciprocated ties	0.59	0.66	1

Correlation table of network position indicators within the medium-level closeness network at the end of the summer

	Outgoing ties	Incoming ties	Reciprocated ties
Outgoing ties	1		
Incoming ties	0.61	1	
Reciprocated ties	0.91	0.69	1

Correlation table of network position indicators within the high-level closeness network at the end of the summer

	Outgoing ties	Incoming ties	Reciprocated ties
Outgoing ties	1		
Incoming ties	0.27	1	
Reciprocated ties	0.58	0.55	1

Correlation table of change in network position indicators within the medium-level closeness network

	Outgoing ties	Incoming ties	Reciprocated ties
Outgoing ties	1		
Incoming ties	0.06	1	
Reciprocated ties	0.82	0.29	1

Correlation table of change in network position indicators within the high-level closeness network

	Outgoing ties	Incoming ties	Reciprocated ties
Outgoing ties	1		
Incoming ties	-0.12	1	
Reciprocated ties	0.52	0.25	1

Appendix C

Correlation table of students' network position indicators within the medium-level closeness network at the start of the summer

	Outgoing ties	Incoming ties	Reciprocated ties
Outgoing ties	1		
Incoming ties	0.6	1	
Reciprocated ties	0.44	0.7	1

Correlation table of students' network position indicators within the high-level closeness network at the start of the summer

	Outgoing ties	Incoming ties	Reciprocated ties
Outgoing ties	1		
Incoming ties	0.23	1	
Reciprocated ties	0.5	0.58	1

Correlation table of students' network position indicators within the medium-level closeness network at the end of the summer

	Outgoing ties	Incoming ties	Reciprocated ties
Outgoing ties	1		
Incoming ties	0.28	1	
Reciprocated ties	0.73	0.61	1

Correlation table of students' network position indicators within the high-level closeness network at the end of the summer

	Outgoing ties	Incoming ties	Reciprocated ties
Outgoing ties	1		
Incoming ties	0.38	1	
Reciprocated ties	0.32	-0.06	1

Correlation table of change in network position indicators within the medium-level closeness network

	Outgoing ties	Incoming ties	Reciprocated ties
Outgoing ties	1		
Incoming ties	0.23	1	
Reciprocated ties	0.61	0.59	1

Correlation table of change in network position indicators within the high-level closeness network

	Outgoing ties	Incoming ties	Reciprocated ties
Outgoing ties	1		
Incoming ties	0.35	1	
Reciprocated ties	0.05	-0.25	1