Nashville Longitudinal Study of Youth Safety and Wellbeing
2016-CK-BX-KOO2

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$4,916,705

Summary

In 2015, Nashville experienced an alarming 80% increase in homicides. Closer examination of the homicide rate showed that this trend was driven primarily by a 300% increase in youth homicides. These data place Nashville as an outlier compared to peer cities including Louisville, KY and Oakland, CA. The rates in community violence are corroborated by increases in violence related behavior in Nashville schools. Metropolitan Nashville Public Schools (MNPS) also reported increases in disciplinary referrals for aggressive behavior including fighting and carrying weapons to school. The confluence of these outcomes along with information from other systems (e.g., juvenile justice, youth serving nonprofit organizations) suggested a dynamic relationship between school safety and youths' experiences in their communities and other settings outside of school. This premise was the rationale for the development of the Nashville Longitudinal Study of Youth Safety and Wellbeing (NLSYSW).

MNPS, the Nashville Mayor's Office, Nashville Police Department, Davidson County Juvenile Courts and other stakeholders in youth safety mobilized initiatives to reduce youth violence and promote youth wellbeing ranging from summer jobs programs to professional development for teachers and school staff. The diversity of these efforts highlight both the strengths and limitations of the extant research. Specifically, these efforts are driven by developmental and sociological research that indicates that there are numerous ecological and development influences on youth safety and wellbeing. At the same time, these efforts are limited by research that is fragmented often due to the lack of multi-sector relational data, and the lack of longitudinal studies that could examine the relative impacts of educational, sociological, and developmental influences on student safety and wellbeing over time.

The NLSYSW was designed to address these limitations by developing and archiving a longitudinal database that tracked key educational, developmental, and contextual indicators in ways that might help explicate the problems related to youth safety in school and community context, and might help guide intervention and policy efforts to improve outcomes for Nashville's youths. The NLSYSW research team organized the study around four research questions:
- Does neighborhood exposure to crime and violence affect students' norms/attitudes towards school, their development of social and emotional competence, or the number and type of behavior problems (including referrals for drug use and aggressive behavior)?
- Can positive school climate, social emotional programs, or access to school and community supports buffer (moderate) the effects of neighborhood disadvantage on poor social emotional competence and behavior problem outcomes?

- Does neighborhood disorganization lead to school disorganization and poor school climate? Does neighborhood disorganization increase students' risk of being referred to law enforcement for school misbehavior?
- How are school and neighborhood disadvantage associated with racial/ethnic disparities in office disciplinary referrals and the use of exclusionary discipline?

In the following sections, we describe 1) the procedures the NLSYSW team engaged to complete the study, 2) the outputs from the NLSYSW team, 3) the emerging outcomes from the study procedures and the examination of the study data, and 4) the ongoing impacts that the study has had on the university and the community partners.

NLSYSW Procedures

The work of the NLSYSW was organized into working groups related to major tasks required to develop the multi-sectoral dataset. There were four data collection working groups focused on MNPS administrative data, MNPS survey data, contextual data, and youth mapping data. There were two data management working groups, data anonymization and data archiving. A workflow was established such that the data collection working groups would complete most of their work before providing the resulting dataset to the data management working groups who collectively finalized the NLSYSW dataset.

MNPS Administrative Working Group:

The major tasks of this working group was to identify the relevant administrative data, connect data across different MNPS databases, identify and address (when possible) issues related to data quality, and clean, summarize, and create a codebook for the resulting dataset. The major challenge of this working group was determining how to create study-related variables from very granular data. For example, student attendance was monitored both by attendance in each class on a student's schedule and by summary variables created by MNPS. This working group developed strategies that were designed to preserve as much detail as possible while also creating data that would be easily understood and accessible for the end user. Major milestones include:

- Developed a list of school administrative data items to be collected at the student, teacher, and school levels
- MNPS staff coordinated with multiple departments for each subtopic of the administrative data to gain a contextual understanding, as well as an understanding on each department's data collection records and report-outs, since there is not a single source of data in the school district

- MNPS staff summarized data findings to share with the research team in order to collaboratively make decisions on variable construction, such as developing crosswalks to categorize discipline offenses
- Develop strategies to minimize the risks of including identifiable or potentially identifiable data in the administrative dataset
- Established business rules for variables to link across datasets, such as geographic linking through neighborhood boundaries, standardizing demographic response options, and defining year in the study datasets to represent an academic school year

MNPS Survey Working Group:

The tasks of this working group were to work with MNPS in development of their neighborhood wellbeing survey instrument including helping to identify relevant scales, pilot testing of the student survey, and checking the psychometrics and refining the final version of the surveys. Since the surveys were administered with primary and secondary school students, this group assisted MNPS in developing developmentally appropriate versions of the survey for primary and secondary students. The major milestones for this group include:

- Reviewing existing survey questions, scales, and constructs that assess school and community climate to be included on a pilot and later to be developed into full surveys
- Discussion around which measures would be appropriate to assess in an individually identifiable survey that could be linked to student administrative data, and which measures would be appropriate in an anonymous survey.
- Executing a psychometric analysis of each survey round and using the results to provide recommendations for adaptations to the surveys for the following year, including information about which items to retain, which are appropriate to be asked in an individually identifiable survey, and which are suitable as school-level aggregates

Contextual data working group:

The tasks of this working group involved compiling data from multiple data sources and developing study-related variables to gain an understanding of the neighborhoods where youth live. These data were defined by and connected to the student data by neighborhood geographic boundaries. The challenge presented with these data were the large quantity of data and having it make the most sense for providing neighborhood context and addressing the study research questions. The major accomplishments for this group include:

- Creating a geocoded database for all contextual data pieces by mapping addresses provided from each data source
- Evaluating over 1000 variables to include most pertinent pieces of information to evaluate local context and documented variable changes over time in codebook

Youth Mapping working group:

The goal of the youth mapping group was to provide youth with mapping knowledge and tools in order to gain "on the ground" perspective. Youth programming involved small groups sharing their perceptions of neighborhood resources or lack thereof. Youth also shared places they frequent, their perceptions of those places, and whether they contributed or detracted from their wellness. Outputs of this programming were youth designed maps to share with peers, as well as local city leadership to improve the built environment. Accomplishments include:

- Convening youth to discuss their understanding of the built environment around them and designing a program in conjunction with youth to collect information and improve their built environment
- Developing a youth-derived legend for the constructs that capture youths' experience of safety and wellbeing in their neighborhoods
- Creating output to share across the city with youth peers and influence city leader's decision

Anonymization working group:

The major task of this working group was to apply various de-identification strategies to properly de-identify the study data. Most of this group's efforts were focused on student data in order to archive a FERPA compliant dataset. The major challenge of this working group was developing a process to properly de-identify data, as there is no established method or plan found in the current literature. Process development involved consultation with the Privacy Technical Assistance Center within the US Department of Education, and input from the MNPS school district and study leadership to ensure a rigorous and collaborative statistical disclosure control plan. The major accomplishments for this group include:

- Extensively reviewing literature on disclosure risk and statistical techniques to apply and protect potentially identifiable information within the study data
- Creating a variable review process to gather privacy information from content experts and developed a decision tree to classify sensitive variables
- Piloting different software and their options for anonymization procedures developed by the working group
- Applying statistical disclosure control techniques to de-identify study data, shared output with project leadership and the school district to gather feedback on the results
- Documenting disclosure risk analysis framework, re-identification risk, and statistical disclosure control plan

Archiving working group:

The tasks of this working group included developing protocols for the data and use of data. This group developed data cleaning guidelines, a codebook template to streamline outputs, and

guidelines for the use of data by the research team through a data sharing agreement. Discussions with ICPSR allowed this group to make recommendations for archiving as well as ensure all data and documentation were ready for archiving. Accomplishments include:

- Reviewing other longitudinal datasets to identify conventions for archiving student data securely.
- Developing format for standardizing data sets across working groups including:
  - Establishing naming conventions for variables
  - Documenting methods used for constructing and cleaning datasets
  - Documenting the contents and the appropriate use of each dataset.
- Developing the plan for making the archive deposit.

Impact of COVID-19

The COVID-19 pandemic resulted in significant disruptions in the activities at Vanderbilt, MNPS, and all of the community partners participating in the NLSYSW. MNPS conducted remote learning from March 2020 - March 2021. Vanderbilt suspended in-person meetings and instruction from March 2020 - August 2020, and conducted in-person meetings only with administrative approval throughout the 2020 - 2021 academic year. The Oasis Center suspended all in-person services and activities from March 2020 - April 2021. These disruptions had four major effects on the development of the NLSYSW:

- MNPS Survey Data Collection - efforts to collect survey data for 2020 were affected by a tornado that destroyed one MNPS school and severely damaged others. This event was followed by the MNPS COVID shutdown two weeks later. This affected the number of completed surveys. Also, it should be noted that the 2021 data collection was collected during remote learning and had the lowest participation rate.
- MNPS Administrative Data - while the pandemic did not directly affect administrative data collection, the school shutdown and switch to remote learning did affect the interpretation of the administrative data. For example, there were dramatic decreases in the reports of disciplinary referrals because most disciplinary referrals were less salient in the context of remote learning. Similarly, attendance was monitored differently and was often affected by the availability of computers and broadband internet. Thus, rates of absenteeism and truancy were much higher during remote learning than during in person instruction.
- Youth Mapping Data Collection - The collection of the youth mapping data was predicated upon in-person sessions designed to train youths on how to code their experiences, and group activities in which youths would visit neighborhoods to develop their coding skills. Pandemic related shutdowns resulted in the teams having to pivot to survey- and map-based data collection. While this provided valuable information, it reduced the number and types of data the teams were able to collect.

- Contextual Data - Similar to MNPS administrative data, all the contextual data sources were affected by pandemic related shutdowns. For example, there were notable changes in patterns of police/crime data that corresponded to the pandemic shutdowns.

NLSYSW Outputs/Artifacts

Dataset

The major output of this study is a compilation of multiple data sources containing over 2 million observations and 450 variables. Below is a list of data sources with the years of data included and a short description of each dataset. See the user guide and codebook sections in the archive for complete details.

MNPS student-level administrative data: 2008-2021
- These student data are made up of a 40% sample drawn from the entire student population. They include a geocoded student neighborhood. These data contain student demographics such as gender, race and ethnicity, economic status, disability status, English language learner. The data also contain student-level records of attendance, discipline, and support or interventions.

MNPS school-level administrative data, including teacher demographics: 2008-2021
- These data contain school-level information associated with student records, and a geocoded neighborhood for each school. Information such as programs and interventions by school can be found in this dataset. Certified staff demographics at the school level are also reported.

MNPS student-level neighborhood and well-being survey data: 2018-2021
- The Neighborhood and Wellbeing Survey was developed by the study research team in partnership with the School District. These survey data measure student perceptions of their neighborhoods, their afterschool activities, and their own social-emotional development.

MNPS student-level school climate survey data: 2018-2021
- These survey data capture student perceptions of the climate of their schools. Modules such as school engagement, student involvement, classroom management, inclusive instruction, school safety, peer relations, and student-teacher trust are included in the survey.

MNPS teacher/staff-level school climate survey data: 2018-2021
- These survey data capture staff perceptions of the climate of their schools. Modules included in the survey are discipline, school leadership, professional learning, feedback and coaching, and teacher-parent trust.

211 Nashville Resource data: 2022

- The 211 Helpline is a service that helps connect individuals with information and referrals to service. In these geocoded data, there are 12 overarching call categories such as domestic violence and abuse; housing and utilities; and transportation. Lower levels of data can be assessed through smaller subcategories.

American Community Survey data: 2014 and 2019, 5 year averages

- These geo-coded data include social community-level indicators and capture shifts between the decennial censuses. Modules at the neighborhood level include economic and employment characteristics, household tenure and access, income, population, and poverty levels.

Metro Nashville City Planning data: 2010, 2013, 2016, 2019

- Geo-coded property data include the land use determination per each land parcel.

Crime incident data: 2015-2022

- These geo-coded data from the police department detail each incident by report type, incident status, and whether the investigation is open. Offense type and weapon related to each incident are reported as well.

Gun Violence incident data: 2014-2021

- Data were retrieved from the Gun Violence Archive. Details about the incident including participant characteristics are found in this geo-coded dataset. Variables include fatalities, injuries, child/teen involvement, and the nature of the incident (such as substance related, property crime, firearm use, etc.).

Oasis Youth Mapping data (Maptivists): 2018-2021

- These data include place level geo-coded data from youth to provide insight of their experiences in the city. Each place is categorized and youth perceptions about the place such as belonging are captured. The last module of these data contain youth perspectives of the assets in their neighborhood.

Nashville Civic Design Center Youth Mapping data (Youth Design Team): 2021

- The first module of these data detail the perceptions of youth wellness (e.g., physical, social, intellectual). These data also include place level geo-coded data from youth to provide insight into whether the place supports or takes away from their wellness.

Dissemination

Papers:

Nation, M., Christens, B., Bess, K., Perkins, D., Shinn, M., & Speer, P. (2020). Addressing the problems of urban education: An ecological systems perspective. *Journal of Urban Affairs*, 42(5), 715-730. https://doi.org/10.1080/07352166.2019.1705847

Singer-Gabella, M., Nation, M., & Christopher, C. (In review). Helping Stakeholders Engage with Urban Educational Ecosystems: The Case for Panarchy. *Journal of Community Practice*.

Davis, K., Nation, M., Christopher, C., & Fisher, B. (In review). The role of social emotional competencies in student discipline and disciplinary disparities. *Journal of School Violence*.

Chung, Y., Nation, M., & Christopher, C. (In preparation). Why School Context Matters: Urban Youth's Social-Emotional Competencies and Community Violence.

Rolfes, E. Nation, M., Christopher, C., & Fisher, B. (In preparation). School discipline policies as mediators of the effect of community violence on student outcomes.

Wilfong, C.D., et al. (In preparation). Maptivist: A community geographic model for youth participatory action research.

Presentations:
Nation, M., Fisher, B., & Stenson, C. (2018, November 14 -17). *Using Multiple Data Sources to Conceptualize School and Youth Safety*. 74th Annual Meeting of the American Society of Criminology, Atlanta, GA.

Malpert, A., Zape, M., Deiter, K., Thomas, B., & Nation, M. (2019, June 26-29). *Oh, the places youth go!: Understanding Youth Negotiations of Space and Place through Participatory Community Mapping*. The 17th Biennial Conference of the Society for Community Research and Action, Chicago, IL.

Deiter, K. (2019, July 7-9). *Finding the Passion in Data: Empowering Youth to Channel their Activism using GIS*. ESRI User Conference: 2019 Education Summit, San Diego, CA.

Nation, M., Fisher, B., Speer, P., & Stenson, T. (2019, November 14 -17). *The politics of youth safety and wellbeing: Issues and opportunities associated with collecting longitudinal survey data*. 75th Annual Meeting of the American Society of Criminology, San Francisco, CA.

Nation, M. (2020, October). *Addressing Racial/Ethnic Disparities in Disciplinary Outcomes*. Coming Together for Action 2020: The annual meeting for the Global Alliance for Behavioral Health and Social Justice (Virtual).

Nation, M. & Christopher, C. (2021, February 16-18). *Developing a Longitudinal Dataset to Study the Relations Between Community and School Context and Student Outcomes*. NIJ's Conference on School Safety (Virtual).

Nashville Youth Design Team (2020). *Youth Voice, Community Development, and Spatial Justice: Reflections from the Nashville Youth Design Team*. The 18th Biennial Conference of the Society for Community Research and Action (Virtual).

S. Trevino, N. Hinton, Y. Chung, A. Caruthers, C. Christopher, and M. Nation. (2022, May 31-June 3). *Research Practice Partnerships and FERPA: Balancing Student Privacy and Data Utility*. 30th Annual Meeting of the Society for Prevention Research, Seattle, WA.

K. Morgan, C. Christopher, K. Anderson, C. Marks, B. Fisher, and C. Stenson. (2022, May 31-June 3). *The Role of Students in Research Practice Partnership: The Case for Utilizing YPAR to Support Engagement and Dissemination*. 30th Annual Meeting of the Society for Prevention Research, Seattle, WA.

M. Singer-Gabella, M. Nation, and D. Williams. (2022, May 31-June 3). *Using Panarchy to Promote Engagement in a Research Practice Partnership: Helping Stakeholders See Interacting Systems, Structures and Policies*. 30th Annual Meeting of the Society for Prevention Research, Seattle, WA.

Nation, M. (2023). *What Works in CVI Strategies: Lessons Learned and Implications for Practice* (Panelist). Community Based Violence Intervention and Prevention Initiative Grantee Conference. St. Louis, MO.

Rolfes, E. Nation, M., Christopher, C., & Fisher, B. (Accepted). *School discipline policies as mediators of the effect of community violence on student outcomes*. Annual Conference of the Urban Affairs Association. Nashville, TN.

Chung, Y., Nation, M., & Christopher, C. (Accepted). *Why School Context Matters: Urban Youth's Social-Emotional Competencies and Community Violence*. Annual Conference of the Urban Affairs Association. Nashville, TN.

Rolfes, E., Nation, M. & Christopher, C. (Accepted). *Neighborhood violence and school discipline: How is high-violence exposure associated with school disciplinary practices?* Society for Community Research and Action. Atlanta, GA.

Selected Community/Local Presentations:

Nation, M., Rolfes, E., & Chung, Y. (February 2023). *Lunch and Learn: Updates from the Nashville Longitudinal Study of Youth Safety and Wellbeing*. Metro Nashville Public Schools.

Nation, M. (January, 2023). *Managing partnerships in implementation research*. Webinar presented for the Research Institute for Implementation Science in Education. University of Washington.

Nation, M. (December, 2022). *Historical Complexities of Nashville, Education, & Community* (Panel). Education Day, Leadership Nashville.

Nation, M. (April 2022). *Leadership Nashville Education and Criminal Justice Day* (Panelist). Leadership Nashville, Nashville, TN

Nation, M. (February 2022). *The relations between urban schools and urban communities: How urban social problems affect student outcomes*. Peabody Research Office Research Conversation. Vanderbilt University.

Nation, M. (December 2021). *Inequities in student outcomes: An Analysis of Causes and Trends. Presented at Continuing the Conversation: Dismantling Inequities of the Nashville Youth Experience*. Nashville Public Education Foundation.

Nation, M. (December 2021). *Engaging communities in youth violence prevention.* Presented at the Vanderbilt University Community Engagement Forum

Nation M. (October 2021). *By Design: The Shaping of Nashville's Public Schools* (Panelist). Peabody College of Human Development Office of Diversity, Equity, and Inclusion.

Nation, M. (September 2021). *Conducting Community-Engaged Research at a Research 1 University* (Panelist). University of North Carolina Charlotte.

Nation, M. (August 2021). *By Design: The Shaping of Nashville's Public Schools* (Panelist). Nashville Public Education Foundation.

Nation, M. (December 2020). *Promoting youth safety and wellbeing.* Presented at the monthly meeting of the Alignment Nashville Student Discipline A-Team.

Nation, M. (July, 2020). *Conceptualizing and treating bullying and other student behavioral problems.* Presented at the Nashville Psychotherapy Institute.

Nation, M. (June, 2020). *A city where all children thrive: A conversation about dismantling the inequities of the Nashville youth experience.* Presented to the Nashville Public Education Foundation.

Other Community Engagements:

The PI briefed the Nashville Youth Violence Taskforce regarding the planned work. This has contributed to a discussion among city departments regarding the methods to use data improve service coordination for youth

NLSYSW project staff (Caroline Marks) collaborated with MNPS's Social and Emotional Learning department to train school leadership teams on how to analyze and develop next steps based on the results of student, teacher, and staff feedback on the District's School Climate Survey. They trained a total of 178 school leadership team members through 12 interactive sessions.

NLSYSW project staff developed a public-facing report based on the Winter 2019 Neighborhood and Wellbeing Survey that was released to the public in December 2019 in coordination with Vanderbilt's communications team

PI and NLSYSW project staff conducted individual meetings related to the initial findings from the 2019 neighborhood and well-being survey with the following community stakeholders:
- Dr. Adrienne Battle, Director of MNPS Schools;
- Fabian Bedne, Planner, Neighborhood Development, Infrastructure, office of the Mayor;
- Meribah Knight, reporter and podcast producer, WLPN, local NPR radio;
- Rachel Wegner, criminal justice reporter, The Tennessean
- Michael Reicher, education reporter, The Tennessean
- Women of Color for Education Equity
- My Brother's Keeper planning committee
- Alignment Nashville Explore Team (Discipline)
- Samantha Perez, Education Committee, Nashville Chamber of Commerce

NLSYSW project staff (Caroline Marks) collaborated with MNPS's Social and Emotional Learning department to train school leadership teams on how to analyze and develop next steps based on the results of student, teacher, and staff feedback to "Plan with Student/Employee Voice" on the District's School Climate Survey.

Artifacts

Website:

The Youth Community Mapping Website: A Youth Guide to Nashville. Click here to view.

Report:

Nashville Longitudinal Study of Youth Safety and Wellbeing: Results from 2019 Year-One Survey. Click here to view.

Press release:

Vanderbilt's Youth Safety and Well-being Study releases early findings. Click here to view.

Blog post:

Wilfong, D. (2020, November 10). *Maptivists Promotes Youth Safety and Wellbeing*. Robert Penn Warren Center. https://as.vanderbilt.edu/robert-penn-warren-center/2020/11/10/maptivists-promotes-youth-safety-and-wellbeing/

NLSYSW Outcomes

The research team was approved to work with the NLSYSW dataset in November 2022. Since this approval, the team has focused on conducting descriptive analyses related to key study constructs and the initial analyses related to the study question. These analyses indicate (note more detail discussion of the analyses is provided in the appendices):

Violent crime is common across Nashville, however a small number of neighborhoods have high concentrations of violence crime. A majority of neighborhoods within Davidson County have rates of violence that are higher than the national average. There are concentrations of violence, however. When measured by the incidence of all types of violent crime, GIS maps indicate that neighborhoods with violence rates that meet or exceed the 75th percentile within the county are concentrated in the central business district, and in select areas of North, East, and Southeast Nashville (see Map 1, below). The rates in the central business districts are likely influenced by assaults associated with population concentrations drawn by the tourist and entertainment industries, and a relatively high density of outlets serving alcohol (i.e., "honky tonks", bars, and restaurants). However, when limited to firearm related violence, the most violent neighborhoods are found mostly in North and Southeast Nashville, neighborhoods that have historically served Black and Latinx communities (see Map 2, below). Additional analysis indicates that students may be differentially affected by violence exposure based on race and ethnicity.   Twenty-nice percent of MNPS students live in high-violence neighborhoods. Among the students, 51% are Black, 29% Latinx, and 15% are White.

Map 1. Levels of Violence by Neighborhood
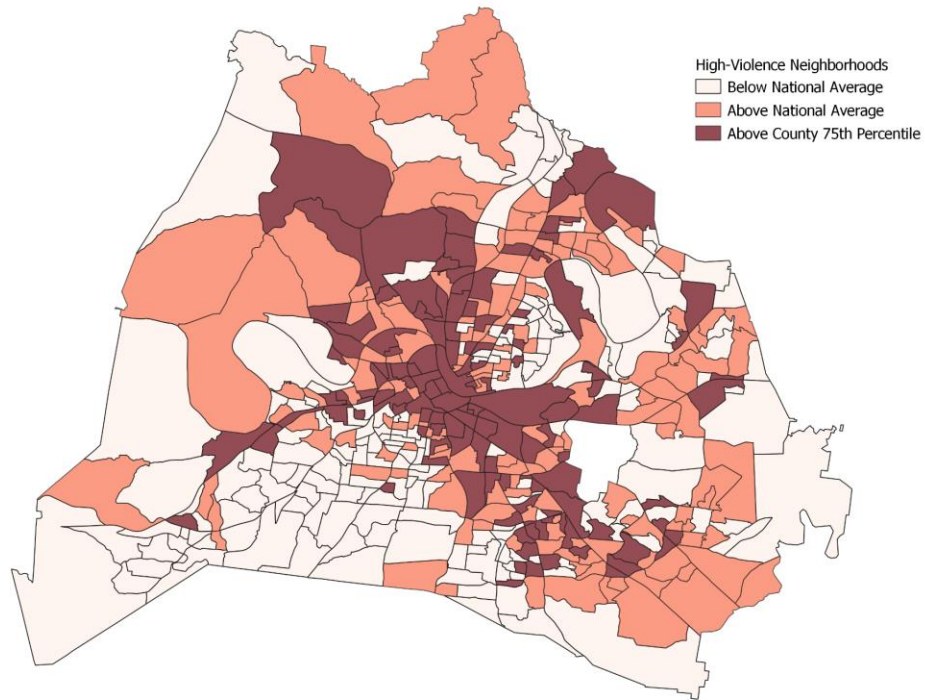
Map 2. Levels of Firearm- Related Violence by Neighborhood
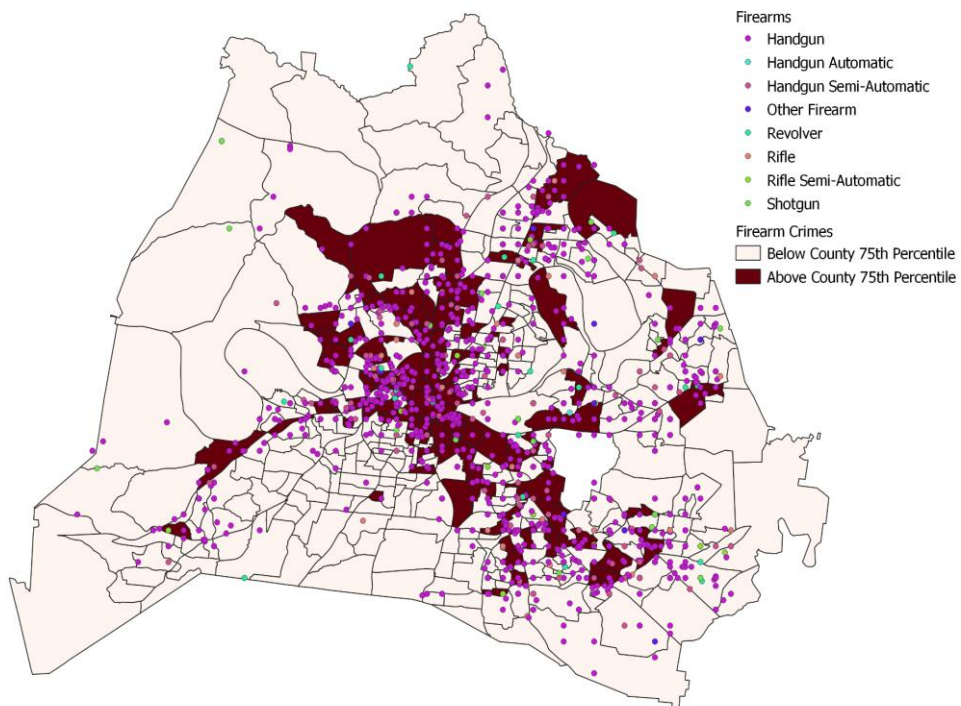
Social and Emotional Competencies are associated with students' out of school suspensions, but do not explain racial and ethnic disparities in suspensions.

While research suggests that social emotional competencies (SECs) influence students' disciplinary outcomes, less is known of their potential to explain racial inequities in those outcomes. This analysis used survey and administrative data from 30,494 students in grades 3–12 to examine the degree to which SECs were related to discipline outcomes, and whether the relationship differed by race or grade tier. Results indicated that students with higher SEC had fewer behavior incidents, in-school suspensions, and out-of-school suspensions. Further analyses revealed that race and grade tier were predictive of all discipline outcomes. Regardless of SEC level, Black and mixed-race students had higher behavior incidents. When race and grade tier were included as factors, the relationship between SEC and discipline was diminished. Implications for practice are discussed.

Violent Crime differentially affects Schools

This analysis examines schools' exposure to violent crime and its association with students' social-emotional competencies (SECs). Using crime and school data from Nashville, Tennessee, we found that schools are located in the hotspots of violent crimes. In 2019, there were on average nine violent crime incidents within a two-block boundary of a school. Some schools experienced as many as 171 violent crimes within their two-block radius. Schools with high violence exposure were more likely to be elementary schools and serve disproportionately more Black, economically disadvantaged, or homeless students than schools with lower violence exposure. Students' self-awareness and relationship skills were significantly associated with their schools' exposure to violence. Students in moderate-violence schools reported lower self-awareness and relationship skills than those in low-violence schools. In contrast, students in high-violence schools reported higher self-awareness than those in low-violence schools. Implications for future research, policy, and practices were discussed.

Some schools may discipline students who live in high violent neighborhoods more punitively

This study seeks to examine how the distribution of violence within communities can be used to better understand how community violence impacts students' academic experiences at school. Many studies examining the relationship between exposure to violence and health, mental health, and educational outcomes for children and adolescents are focused on the individual experiences with violence. However, less is known about whether or how school-related mechanisms might mediate the impact of violent crime on student outcomes. Using geo-coded violent crime data and high school behavior data from a Southeastern city during the 2018-2019 school year, this study examines the relationship between schools' reports of disciplinary infractions and the experiences of violence in the communities they serve. This analysis examines whether the prevalence of violence within a student's community affects schools'

disciplinary practices. Violent crimes were sorted into census block groups to identify neighborhoods that experience higher rates of violence. Preliminary results indicate that generally students from more violent neighborhoods are more likely to be "missanctioned" or suspended for non-violent offenses. However, school-level analysis found wide variations across schools, with significant levels of missanctioning identified in only two schools.

New processes are needed for effective community engagement in school safety research

In education scholarship there are few resources that promote and facilitate community engagement in ways that allow the perspectives and lived experiences of community stakeholders to influence the conceptualizations of the problems or the development of the research questions. There has been even less attention to the question of how to support stakeholders in system thinking with the goal of broad systems change. In this paper, we make a case for the use of "Panarchy" (Lipmanowicz, & McCandless, 2014) as a conceptual metaphor to ground an activity sequence designed to support stakeholders' cross-sector thinking. We begin with an overview of panarchy theory and then turn to its advantages for understanding the complex dynamics of school systems and their communities. To illustrate these ideas, we draw from our ongoing work with a stakeholder coalition interested in addressing the use of exclusionary discipline, with a specific interest in reducing the racial and ethnic disparities in out of school suspensions. Panarchy provided an occasion for participants to see and consider interdependencies of micro-, meso-, and macro-level factors and systems, and to trouble and revise their narratives about factors that contribute to disciplinary disparities.

School safety research request considerable due diligence to develop achievable FERPA complaint datasets

RPPs offer the opportunity for researchers to utilize content and analytic expertise to help school and community stakeholders understand practical problems and engage in data-based decision making. However, access to data and protecting the privacy of students has been a significant issue for schools and educational researchers hoping to utilize the RPP methodology. The Family Education Rights and Privacy Act (FERPA) was passed in 1974 and amended in 2012 with the goal of providing guidelines for education agencies to protect student information. Under FERPA, school districts receiving federal funding can share data without consent for research or if the data has been properly de-identified or anonymized. However, research practice partnerships do not fit the traditional criteria of the study exemption, and there are few established standards or procedures for anonymizing longitudinal data to avoid unique cases involving combinations of sensitive variables.

This paper provides an overview of the data de-identification process we developed as part of the Nashville Longitudinal Study of Youth Safety and Wellbeing (NLSYSW). Proper de-identification requires removing or obscuring any potentially identifiable information from the

dataset so that no individual can be identified by a reasonable person. However, the definition of a reasonable person and the identifiability of personal information can vary significantly based on the type and sensitivity of data. Thus, standards for appropriately de-identifying data are context specific and require a deep understanding of how the data will be used, the type of information included in the dataset, and the data sharing environment. Specifically, this paper describes a data de-identification process for creating a properly de-identified dataset that is FERPA compliant and that maximizes data utility. The de-identification process included the three steps: 1) identifying all the FERPA protected personally identifiable information (PII) in the data, 2) measuring the amount of re-identification risk present, and 3) applying statistical disclosure control techniques to reduce re-identification risk to an acceptable level. Each step involved analysis of the raw data, consultation with content experts, application of privacy models, and the development of comprehensive data archiving and sharing protocols.

Where students spend time after school is associated with some school outcomes

This analysis describes students' self-reported activities after school, and examines relations between these activities and students' attendance and discipline. Students were asked to select where they most often go after school, with multiple responses allowed. Differences among race and attendance rates are found in the following response options: home, work, another's house, an organized community activity, an unorganized community activity, or a school-based activity.

African American students report lower percentages of going home after school, while Hispanic/Latino students report higher percentages of going home. The analysis also found Hispanic/Latino students participate less in school-based activities. Many factors play into this finding such as lack of transportation options and access. Moreover, students who are chronically absent report lower percentages of participating in either an organized community or school-based activity after school. This finding suggests students may show up to school if involved in other organized activities. Chronically absent students report higher percentages of participating in an unorganized community activity or going to another's house. High school students who are chronically absent report higher percentages of going to work after school. Also among high school students, African Americans and Hispanic/Latinos report higher percentages of going to work. Factors contributing to higher percentages in these populations may be the need to work in order to contribute to their household. While these descriptive findings have many contributing factors, it is important to note differences among populations. All findings reported are statistically significant.

The Impact of the NLSYSW

The study has had ongoing engagement with MNPS and others involved in promoting youth safety through ongoing engagement with the PASSAGE steering committee. These efforts were

led by team member Derrick Williams who convened the PASSAGE committee and community stakeholders to review the top suspending schools and develop action plans to reduce suspensions and racial/ethnic disparities in suspension.

Some key accomplishments include working with the PASSAGE steering committee to:

- Student-Parent Handbook Roll out Plan: A community based approach with a focus on engaging all stakeholders around the MNPS's Discipline philosophy, helping everyone to gain a better understanding of the handbook.
- Alongside the Social Emotional Learning Division in developing more training and support to help better address discipline concerns and the development of a tool kit of best practices and alternative interventions that can be used as opposed to exclusionary discipline.
- Key Performance Indicators (KPI) Alignment: working closely with MNPS Research and Evaluation office to improve the goals and metrics associated with district KPIs. Specifically, the disproportionate exclusionary discipline KPI.
- Co-chaired Alignment Nashville's Student Voice and Engagement (SVE) Committee: working to help address discipline, culture/climate, student engagement, and academics. Organized MNPS's first SVE listening session, rolling MNPS's employees dedicated to SVE, Alignment Nashville's SVE committee, and a core group of students into one committee to do the following:
  - Create a Logic Model
  - Establish an open line of communication for students to adults at the classroom, school, and district levels
  - Develop a framework for student SVE groups at the classroom, school, and district levels
  - Schedule ongoing student town hall meetings
  - Develop student and staff trainings to ensure success of SVE in action.
- Established an MNPS Disproportionality Team that consists of employees from multiple departments whose work focuses on disparities, diversity, equity, and inclusion. This team reviews district data and develops action steps based on district, cluster, and school level data.
- Work with Metro Nashville Juvenile Courts to expand Youth Courts in MNPS schools.

Members of the research team at VU along with other VU faculty worked with MNPS to establish a formal Research Practice Partnership between the two institutions. The Partnership for Educational Equity Research (PEER), a Research Practice Partnership between Vanderbilt University and MNPS was launched in September 2022. This partnership included commitments by Vanderbilt University and Metro Nashville Public Schools to provide additional faculty and staff support in examining questions related to inequities in students' achievement

and behavioral outcomes, and in developing additional studies of interventions to reduce inequities.

To facilitate communication with Metro Nashville departments, the Nashville Mayor's Office has assigned a staff person to consult with the NLSYSW team during data analysis to help inform their development of a new Youth Master Plan for Nashville, and inform other public health and public safety interventions.

Appendix

1. Addressing the problems of urban education: An ecological systems perspective.
2. Helping Stakeholders Engage with Urban Educational Ecosystems: The Case for Panarchy
3. The role of social emotional competencies in student discipline and disciplinary disparities.
4. Why School Context Matters: Urban Youth's Social-Emotional Competencies and Community Violence
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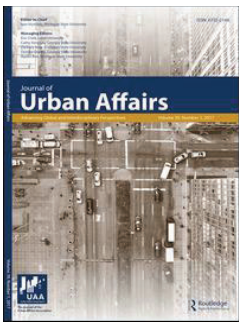
Addressing the problems of urban education: An ecological systems perspective

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Addressing the problems of urban education: An ecological systems perspective

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ABSTRACT

Many urban school districts have been beset by a variety of problems including low achievement, high dropout, and disciplinary referral rates. Frequently, efforts to improve urban education are focused on interventions at the student, school, or district level. However, urban scholars recognize that many of these problems are embedded in urban poverty and related issues, including residential racial segregation, housing and food insecurity, and high levels of residential mobility and criminal justice system involvement. Ecological systems theory can help to explicate some of the mechanisms through which poverty and related problems adversely affects educational outcomes, and to identify systemic changes likely to lead to improved educational outcomes. This article describes how housing and criminal justice systems are interrelated with urban education, and examines these dynamics in Nashville, Tennessee. We then describe several multi-sectoral change efforts to improve urban education in Nashville, including their effects and limitations.

Human ecological perspectives, which emphasize interconnections between individuals, behavior settings, and contexts, have been influential in education for some time. For instance, one of the founders of the field of community psychology, Seymour Sarason, published extensively on educational reforms and programs from political and psychological perspectives simultaneously, including how less advantaged parents and communities are too often ignored by school and other government officials and bureaucracies (2003). Sarason encouraged teachers as well as parents and community advocates to recognize their collective power and strive to work together to influence local, state, and national education policies rather than simply allow school boards and administrators to make decisions in isolation from individual, classroom, family, and local community needs and concerns.

Sarason's work exemplified the ecological perspective, which holds that all human behavior, perception, thought, and emotion must be understood in the many levels of ecological context that influence it (Trickett, 2009). In relation to education, ecological theory argues that school and classroom environments are important contextual influences on child and adolescent learning, academic performance, and behaviors, but so are local, state, and national macrosystems that influence educational goals, standards, and other policies (Bronfenbrenner, 1979; Gaias, Johnson, White, Pettigrew, & Dumka, 2017). Classrooms (as microsystems) are interrelated with macrosystems through complex webs of organizations (dubbed meso- and exosystems) that function in-between them (Neal & Neal, 2013). Collectively, these systems create and/or influence the social conditions that children experience, which in turn influence their educational outcomes.

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Also, ecological theory draws attention to both formally organized and informal processes that promote individual and collective well-being and refocuses community change to improve youth development (Garcia-Reid, Reid, & Peterson, 2005). Elements of the macrosystem, such as housing and criminal justice, have a less direct, but no less important, impact on student outcomes. In short, ecological theory provides a lens through which researchers can more holistically analyze human development and conceptualize interventions to improve outcomes.

Interrelated problems in urban education

This approach seems especially useful for analyzing the problems associated with urban education. Many urban school districts in the U.S. share a similar set of problems, including low achievement, high rates of dropout, and high rates of behavioral problems/disciplinary referrals (Ritter, 2018). As a result, urban districts often share a reputation of being poorly managed and in perpetual turmoil (Fabricant & Fine, 2016). Philadelphia; Washington, DC; Kansas City; and Atlanta are just a few of the cities that have dealt with crises related to districts serving the majority of their children (Balfanz, Herzog, & Mac Iver, 2007).

The problems with achievement are frequently paired with problems related to discipline and race. Buoyed by the proliferation of zero-tolerance discipline policies, urban districts have increased their use of exclusionary discipline (Losen & Skiba, 2010; Verdugo, 2002), resulting in cascading risks for affected students. Suspended students are at higher risk of poor academic performance, contact with the juvenile justice systems, and dropping out of school (Lee, Cornell, Gregory, & Fan, 2011; Skiba, Arredondo, & Williams, 2014). Further, students in urban schools are more likely to experience surveillance and security measures (e.g., metal detectors) that are associated with poorer school climate and increased fear and concerns about safety (Perumean-Chaney & Sutton, 2012).

Urban schools are simultaneously embedded in a complex web of social and contextual influences that affect their ability to achieve their mission. The combination of neighborhood racial segregation, out-migration of Whites to suburban districts, and high rates of private school attendance by White and higher income residents leave many districts with majority–minority schools serving mostly low-income students (Baum-Snow & Lutz, 2011; Clotfelter, 2001). In fact, Frankenberg (2009) reported that White student participation in public schools had dropped 25% since 1960, such that in large cities more than half the schools are termed "segregated minority schools" (i.e., schools that were consistently 90–100% minority students).

Among the schools experiencing low achievement and discipline problems, urban "majority–minority" schools are overrepresented. Urban districts consistently report racial/ethnic disparities in suspensions and expulsions (Mendez, Knoff, & Ferron, 2002), achievement, and graduation (Ladson-Billings, 2006). Further, students from low-income, mostly minority neighborhoods are more likely to experience higher rates of residential and school mobility, greater exposure to violence, less access to resources, and lower levels of collective efficacy to address the problems (Murry, Berkel, Gaylord-Harden, Copeland-Linder, & Nation, 2011). These conditions are ubiquitous across the United States, such that Balfanz and Legters (2004) concluded that in some cities public school students had no choice but to attend a low-achieving high school.

Strategies for addressing problems

Over the past decades, there have been several reform strategies to address these problems. One of the most common is to change district leadership in hopes of improving performance (Finnigan, Daly, & Liou, 2016). This strategy is so pervasive that Grissom and Andersen (2012) found that the average tenure of superintendents in large urban districts that serve large percentages of poor or minority students was 3 years, a span less than half the national average for district leaders. Interventions aimed at reshaping educational policy are another common option. The No Child Left Behind (NCLB) Act, for example, conceptualized reform as shifting the target for change to

schools rather than senior administrators. Through analysis of child academic performance on standardized assessments, this policy intervention held schools accountable for annual improvement targets on standardized tests (Linn, Baker, & Betebenner, 2002). However, the analysis of this policy approach finds that most of the failing schools were those serving minority students primarily in cities.

A third approach has focused on charter schools in an effort to introduce choice and a market-oriented sensibility to educational problems. This strategy held that giving parents choice and schools autonomy over structure, curriculum, and discipline would leverage "market forces" to address problems in urban education (Murphy & Shiffman, 2002). As a group, however, charter schools do not have superior academic performance to traditional schools and have similar issues with student discipline and racial/ethnic disparities in exclusionary discipline (Clark, Gleason, Tuttle, & Silverberg, 2015; Losen, Keith, Hodson, & Martinez, 2016).

These solutions to addressing educational problems, whether focused on school leadership, school accountability, or school structure, all have shown limited ability to deliver scalable solutions to the problems affecting urban education such as reducing racial disparities in achievement and addressing racialized disciplinary practices (McGill, 2015).[1] Issues targeted by these interventions are important. The difficulty with these approaches to reform, however, is their localizing the majority of the problems and solutions within the students or the school building (Noguera, 2017).

Ecological perspectives

In contrast, urban education can be understood as a problem that involves children, embedded in families, neighborhoods, and schools, which in turn are embedded in citywide social and economic structures and regional, national, and global economic, political, and cultural systems. A number of theories and frameworks have described the contextual influences on health and mental health, including critical race theory (Brown, 2003) and the World Health Organization's (WHO) social determinants of health framework (World Health Organization, 2010). However, these types of frameworks have been less influential in framing the problems of urban education such that strategies addressing the influences of social structure on schools and students are much less prominent than strategies addressing the perceived deficits and problems of students and educators.

Attentiveness to this complexity in relationships within and between organizations and systems can enhance understanding and ultimately improve urban education (Neal & Neal, 2012). In the remainder of this paper, we describe and highlight a few problems in macrosystemic sectors that are regularly manifest in urban areas, but not traditionally associated with education. We provide a brief rationale for including them in the conceptualization of urban education. We then illustrate the influence of these macrosystems and related meso- and exosystemic factors on student outcomes through the analysis of an urban district in Nashville, Tennessee. Finally, we discuss some of the implications of this conceptualization for developing and implementing interventions to address problems in urban education.

Ecological systems affecting urban education

Which sectors or ecological systems are most important for urban education? There is a rich body of research within urban studies, education, public health, psychology, and human development that implicate several sectors. WHO's social determinants framework, for example, highlights a number of sectors including housing and labor markets, and public policies related to health and education that affect both living conditions of individuals and health-care delivery resulting in direct and indirect influences on individual health and well-being. While the framework does not directly address educational outcomes and student well-being, there is ample evidence to suggest that similar types of relations exist. For example, several studies have demonstrated that parents and the family environment have a substantial influence on school readiness and performance (e.g., Greenman, Bodovski, & Reed, 2011; Hill, 2001). In turn, others

have demonstrated that exposure to dangerous neighborhoods affects parenting practices (e.g., restricting outdoor activities and using more authoritarian parenting strategies) in ways that are detrimental to child development (Dearing, 2004: Tolan, Gorman-Smith, & Henry, 2003). These types of studies demonstrate both the potential direct and indirect effects seemingly distal context has on child and family functioning and the potential for these contexts to expose children to adversities that have long-lasting developmental effects (e.g., Murry et al., 2011; Umberson, Williams, Thomas, Liu, & Thomeer, 2014).

One of the challenges presented in these frameworks is that they highlight the potential for education to be a central driver of health and well-being, but they note that educational and health inequities are interrelated and are affected by the same structural problems (Zajacova & Lawrence, 2018). We believe that schools are among the more malleable levers for addressing the consequences of macrosystemic issues when schools are sufficiently resourced, and school policies and interventions are informed by the direct and indirect effects structural inequities in other sectors exert on student well-being (Atkins, Cappella, Shernoff, Mehta, & Gustafson, 2017). For illustration purposes, we focus on two sectors, housing and criminal justice, acknowledging that these are a subset of the sectors and problems that might have a direct or indirect effect on student outcomes.

Housing instability and homelessness

To the extent that homelessness, residential moves, and consequent school moves are concentrated in particular neighborhoods, schools serving those neighborhoods must contend with both a high proportion of children whose achievement may be compromised and high levels of student turnover. Homelessness among families, a phenomenon not seen since the Hoovervilles of the Great Depression, began to appear again in the late 1980s as the number of low-income households began to outstrip the supply of housing they could afford (Dolbeare, 1991, 1992; Lazere, Leonard, Dolbeare, & Zigas, 1991; Shinn & Gillespie, 1994). From October 2016 to September 2017 (the most recent year available), 320,000 children under the age of 18 stayed in homeless shelters, 90% with their families (Henry, Bishop, de Sousa, Shivji, & Watt, 2018, pp. 2–7, 3–9). The McKinney–Vento Homeless Assistance Act requires state education agencies to submit data on homelessness among public school children, using a broader definition. Using these data, the U.S. Department of Education estimates that 1.36 million children of school age were homeless at some time in the 2016–2017 school year (National Center for Homeless Education, 2019). These numbers, based on reports from schools, are likely to be underestimates. Schools have little ability to ferret out homelessness among students, and families have little incentive to announce themselves to schools.

Further, homelessness is more concentrated in some urban neighborhoods than is poverty. Using geospatial analysis, Culhane, Lee, and Wachter (1996) showed that families entering homeless shelters in New York and Philadelphia were disproportionately from a limited group of neighborhoods characterized not only by a concentration of poor, African American families, but also higher rates of unemployment, lower labor-force participation rates, more housing crowding, higher vacancy rates, more abandonment, and higher rent-to-income ratios.

Housing instability is also manifest by within-district residential mobility, or residential moves that may or may not require a change of schools within the same school district. These types of moves tend to be common in urban districts. For example, in a 10-city sample of poor neighborhoods, 69% of children whose school moves did not involve a graduation (for example, leaving middle school for high school) had moved residences (Theodos, Coulton, & Budde, 2014). Among poor children, homelessness and housing instability are associated with poorer school performance. Some authors find it hard to distinguish these phenomena and simply report that a combined group of homeless and highly mobile youth show substantial decrements in achievement compared to other low-income children. School moves, as well as residential moves, are associated with lower academic achievement (Mehana & Reynolds, 2004; National Research Council and Institute of Medicine, 2010). The gaps appear at the earliest stages of standardized testing and widen over time (Cutuli et al., 2013; Masten, Fiat, Labella, & Strack, 2015; Obradović et al., 2009).

Finally, homelessness and housing instability, like other ecological systems described here, are unevenly distributed by race. African Americans and Native Americans are at much higher risk of homelessness than other groups, due in part to discrimination in housing, employment, and incarceration. Historical, as well as ongoing discrimination in housing, employment, and incarceration, has limited the ability of these groups to accumulate assets, so that the distribution of wealth by race is far more uneven than the distribution of income. For poor people, most wealth is in the form of housing, so that poor African American households are less likely to have relatives with space to take them in when they fall on hard times (Shinn, 2010).

Criminal justice system: Policing, mass incarceration, and the school-to-prison pipeline

Following decades of relative stability, rates of incarceration in the United States increased sevenfold between the 1970s and 2010 (Wakefield & Wildeman, 2011) making the United States the world's leader in incarceration (Wildeman & Wang, 2017). This prison boom was driven by changes to laws, enforcement practices, and punishment system functioning (e.g., sentencing and parole) consistent with "tough on crime" rhetoric. The resultant phenomenon of mass incarceration is unevenly experienced in the extreme based on race and ethnicity, with particularly acute effects on Blacks (Alexander, 2010; Oliver, 2008). For instance, African Americans are incarcerated in state prisons at more than five times the rate of Whites (Nellis, 2016), and nearly a third of Black men experience incarceration at some point during their lives (Bonczar, 2003).

Incarceration inflicts direct and interrelated psychological, social, economic, and health burdens on those who experience it. But the long-lasting negative effects of incarceration are not limited to incarcerated individuals themselves. Growing bodies of research identify ways that children, families, neighborhoods, and schools are also negatively affected. For example, children of a parent who has been incarcerated are more likely to exhibit behavioral and mental health problems, which are in turn linked to lower educational attainment and poorer employment outcomes (Turney, 2014; Wakefield & Wildeman, 2011). Many of the negative effects of parental incarceration (including increased rates of depression, anxiety, substance abuse, asthma, and obesity) have been shown to persist through adolescence and early adulthood (Lee, Fang, & Luo, 2013). Paternal incarceration is associated with greater risk of child homelessness, to the extent that incarceration has been estimated to be responsible for increasing the Black-White disparity in risk for child homelessness by 65% since the 1970s (Wildeman, 2014). Nationally, approximately one in 10 non-Hispanic Black children aged 0–17 had a parent in prison or jail in 2015, and a larger number had a parent with a history of incarceration. The 2015 figure for current parental incarceration among Hispanic children is 3.6%, and for non-Hispanic Whites it is 1.7% (Pettit & Sykes, 2017).

Criminal justice system involvement is heavily concentrated within disadvantaged neighborhoods, which experience negative ripple effects from incarceration (Lugalia-Hollon & Cooper, 2018; Sampson & Loeffler, 2010). Residents of these neighborhoods are at greater risk for mental health problems, for example, whether they themselves have been incarcerated or not (Hatzenbuehler, Keyes, Hamilton, Uddin, & Galea, 2015). Schools have been identified in particular as key institutions linking the micro-level (e.g., psychological and health effects, family circumstances) and macro-level (state and national punishment system policies) (Foster & Hagan, 2015). Some schools have disproportionate numbers of children whose parents spend time in prison during their children's early lives, and there are negative effects on educational outcomes at the school level, even when individual-level characteristics and other risk factors besides incarceration are considered (Hagan & Foster, 2012). In other words, simply attending a school in which a high percentage of children's parents have been incarcerated introduces a risk for negative outcomes independent of a student's own family and neighborhood characteristics.

Another dimension of how schools operate as important institutional links in the ecology of mass incarceration is captured in the concept of the "school-to-prison pipeline" (Wald & Losen, 2003). Often the same schools that have higher levels of parental incarceration and serve greater percentages of students of

color also lack the resources to provide quality educational experiences. Many of these schools function in ways akin to prisons with police and guards stationed in entrances, hallways, and exits. Harsh "zero-tolerance" disciplinary policies are common in these schools, which push students out of school through suspensions, expulsions, and arrests. In U.S. public schools, Black students are suspended at three times the rate of White students, and this disparity is twice as high (six-to-one) for female students (U.S. Department of Education Civil Rights Office, 2014). Moreover, schools with a larger percentage of Black students, regardless of levels of student misbehavior, are more likely to employ harsh disciplinary techniques, including arrests (Welch & Payne, 2010).

Nashville case study

Nashville, the capital of Tennessee, had an estimated 692,587 residents in 2018 (U.S. Census Bureau, 2018a). The city's steady growth has accelerated in recent years, and the larger metropolitan statistical area, which had an estimated 1.93 million residents in 2018 (U.S. Census Bureau, 2018b), has been growing at rates of up to 100 people per day (Reicher, 2018). Metro Nashville Public Schools (MNPS) is currently the second-largest school district in Tennessee, and all of the ecological effects on urban education described previously are evident in Nashville. MNPS has a long and complex history influenced by Jim Crow segregation as well as the desegregation processes in its aftermath, with school locational decisions influencing housing and neighborhood changes, and vice versa (Erickson, 2016).

As is frequently the case in urban districts, MNPS is bordered by suburban districts that are wealthier and less diverse. One district, Williamson County, is the wealthiest county in the state, and among the top 10 wealthiest in the U.S. (Lerner, 2017). Also, its school district is the top-performing county-run school district within Tennessee (Niche, 2018). Although Williamson County represents the most extreme example, several of the suburban counties that make up the metropolitan statistical area surrounding Nashville have county-run districts that are higher achieving while serving less diverse and more advantaged students than MNPS or the rural districts that account for the majority of Tennessee school districts. Both the area's growth and its relations to surrounding counties have contributed to a demographic transformation of MNPS.

In 1970, for example, MNPS student body largely reflected the demographics of Nashville, where roughly 75% of students were White and 25% were Black (Erickson, 2016). Erickson (2016) documents a process in which a combination of White outmigration to suburban counties, and the growth of private schools, resulted in substantial changes in MNPS demographics such that currently, despite steady growth in the student population, the percentage of the student population accounted for by White students has declined from 57% in 1993 to 29% in 2018. During the same period, the population of Black students has increased from 39 to 42%, and Latino students has increased from .7 to 25% (Metro Nashville Public Schools, 2018; Tennessee Department of Education, 1999, 2018). These changes have occurred despite Nashville's population remaining 63% White (U.S. Census Bureau, 2018c). Also, the percentage qualifying for free or reduced-price lunch increased such that in 2014 the district qualified for the National Free Lunch Program which allows impoverished districts to provide free lunch to all students.

One of the most pressing problems for MNPS is a low achievement as measured by Tennessee standardized test scores, and relative to students in the districts surrounding Nashville. An examination of performance across MNPS schools illustrates that achievement is quite variable across schools. MNPS has two of the top three high schools in Tennessee. These "magnet" high schools' student population are selected by a lottery system for students who meet an achievement threshold (U.S. News and World Report, 2018). However, the population of these schools tends to be Whiter and better resourced when compared to other high schools within MNPS. In 2015, for example, the percentage of White students in the highest performing magnet school was 18% higher than the percent of White students in the zoned high school with the highest percentage of White students. At the same time, MNPS has 21 schools designated as priority schools, indicating that

they are performing in the bottom 5% of schools in Tennessee. All of the priority schools are majority–minority schools.

Another problem is the rate of discipline problems and racial-ethnic disparities in exclusionary discipline. In 2015 more than 11% of all MNPS students received an out-of-school suspension, with Black students making up nearly 66% of this group despite making up only 42% of the student population. Additional analysis found that the racial disparity is driven primarily by two problems that operate at different levels of aggregation. First, there were relatively large within-school disparities for a small number of schools. However, much of the disparity was driven by between-school differences in the rates of suspension for schools serving primarily Black children as compared to the other school (Nation, 2018).

Ecological systems and MNPS

Research in Nashville has illustrated how these educational problems are embedded in ecological systems. In relation to housing, for example, Voight, Shinn, and Nation (2012) found both that early residential mobility (grades K-2) was associated with gaps in reading and math achievement in grade 3, gaps that were never made up, and further that moves during the elementary and middle-school years were associated with additional negative deviations from children's trajectories of math achievement. This suggests that moves—or events closely associated with them in time—have a causal impact, not merely an association, with children's achievement. Students who changed residences were also suspended at higher rates, had lower grades across courses, and had worse attendance than non-mobile peers, after controlling for these outcomes in the previous year. Associations of mobility with adverse outcomes, however, were reduced for children who were actively engaged in afterschool programs or were leaders in a school group or club, suggesting the complex ecology of schools and importance of opportunities outside of classrooms (Voight, Giraldo-Garcia, & Shinn, 2017). Also, in contrast to national findings that about a quarter of residential moves are associated with school moves (Swanson & Schneider, 1999), in Nashville, among students who were in a study school across 2 years, 42% of those who changed addresses also changed schools, the types of moves that are most detrimental to academic success. Davidson County schools reported 3,401 children experiencing homelessness in 2016–2017, most of them "doubled up" in shared housing due to housing loss or economic hardship (U.S. Department of Education, 2019).

Housing stability and frequency of moves are in turn influenced by a variety of economic and sociodemographic factors. For example, due in part to the city's growth, the costs of housing in Nashville have increased rapidly, exacerbating an affordable housing crisis (Brasuell, 2018). Many neighborhoods closer to the center of the city have experienced especially rapid change due to infill development and gentrification. Over the last decade, the proportion of Black residents declined significantly in many of the neighborhoods closer to downtown, while the tracts that saw significant increases in the proportions of Black residents were farther from the city's center (Reicher, 2017).

These gentrification-related changes in urban housing costs and neighborhood demographics exert multiple influences not only on families and students, but also on schools. For example, although some schools have become more diverse through shifts in neighborhood demographics, some other schools that were once racially diverse have become much more segregated (Knight, 2018). School performance and changing perceptions of school quality likewise influence residential development patterns and perceived neighborhood desirability.

The role of housing affordability on schools and educational performance is but one factor impacting education in Nashville. The influence of incarceration on the Nashville community starts with being situated in the state of Tennessee. Although the United States has the highest national level of incarceration in the world (World Prison Brief, 2018), Tennessee's rate of incarceration exceeds that of the United States by 22% (Prison Policy Initiative, 2018). Tennessee's incarceration has disproportionate and compounding effects on minority children and neighborhoods. In terms of proportional representation in prison, Blacks represent 17% of the state's population, yet they are

44% of those incarcerated, whereas Whites represent 76% of the state's population, but compose 51% of those incarcerated. These racial disparities follow individuals upon release but are amplified such that 21% of all African Americans in the state are unable to vote as a result of the state's felony disenfranchisement laws.

The impacts on children and youth are multidimensional. Tennessee considers prison "voluntary unemployment" so that child support payments continue to grow for those incarcerated, meaning that upon release prisoners are already in arrears and wages are automatically garnished in magnitudes that make paying for food and rent—already a challenge given the gap between the state's wage structure and housing costs—impossible. Policies that so aggressively garnish wages for formerly incarcerated individuals who successfully negotiate employment mean that they are incentivized to move to an underground economy, further elevating the already high risk for re-incarceration. Tennessee is tied for the U.S. state with the third highest rate of children with incarcerated parents (Todd, 2016).

Within the state of Tennessee, Nashville is distinctive for its levels of incarceration. One zip code in North Nashville (37208), in which 93% of residents identify as Black/African American, had the highest rate of incarceration for men born between 1980 and 1986 of any zip code in the United States (14%); nearby zip code 37207 was 38th highest at 9% (Looney & Turner, 2018). Both zip codes have high rates of child poverty: 29% in 37207 and 42% in 37208. These zip codes may experience such high rates of incarceration as a result of policing practices. A recent report found that Metro Nashville Police makes traffic stops at 7.7 times the national average rate, and that Black drivers were stopped and searched at disproportionate rates (Gideon's Army, 2016). In fact, between the years 2011–2015, more stops were made of Black drivers than there were Black residents age 16 and over living in Nashville. Furthermore, these unusually aggressive and discriminatory policing practices do not appear to result in reductions in crime or traffic fatalities (Gideon's Army, 2016).

Overall, the situation in Nashville, like many American cities, reflects a social and economic structure that emerged from the country's early history of policies and practices based upon White supremacy and economic exploitation, and more recent policies developed that maintain those racial and economic inequities. In relation to urban education, this is illustrated in the decline of the social welfare state and the rise of neoliberalism, including devolution of services to the local level, increased competition for limited resources, and new forms of accountability that pressure schools and youth-serving organizations to develop delivery systems that favor efficiency and short-term outcomes (Boris, de Leon, Roeger, & Nikolova, 2010; Ebrahim, 2005; Hasenfeld & Garrow, 2012). Community psychologists argue that this is a failed approach that primarily serves to replicate the status quo.

Implications for urban education

The Nashville case study employs ecological theory to view the problems of urban schools and to highlight how many solutions to those problems are embedded in larger macro-social structures and policies and in the intermediary organizations in neighborhoods and communities. This conceptualization presents a plethora of potential targets for intervention that address contextual factors contributing to poor educational outcomes in urban districts in addition to, or instead of interventions that are focused exclusively on educators, curriculum, and pedagogy.

This ecological systems orientation has guided the educational improvement efforts of some Nashville stakeholders, including engaged researchers at Vanderbilt University's Peabody College. At the program level, for example, Nation, Bess, Voight, Perkins, and Juarez (2011) implemented the Alignment Enhanced Service (AES) Project, which utilized a community-based participatory research (CBPR) approach to improve school climate and student outcomes in four poor-performing middle schools. The approach involved assessing the needs of the school and students, and then establishing strategic partnerships with community organizations to align services to meet the needs. Some needs involved social and emotional supports. However, some needs involved instrumental services such as funding a clothes closet so that students would not have to be sent

home for dress code violations. Although a fully controlled evaluation was not possible, analysis of district administrative and survey data found 40% increases in the availability of community supports, 30% reductions in disciplinary referrals among AES intervention schools. Also, in comparison to the control schools, the AES schools reported statistically significant declines in bullying perpetration and victimization, and increases in prosocial behavior (Nation & Voight, 2011).

At the organizational level, a project called NEW SPECS (Strengths, Prevention, Empowerment, and Community Change) exemplifies Kelly's (1966; Trickett, 1984) ecological principle of succession —that human communities, like other biological communities, change and adapt over time—as well as the importance of understanding and documenting the temporal aspects of community change work. This work involved Vanderbilt researchers partnering with five local community-based organizations to transform their approach to human service and youth development work (Bess, Prilleltensky, Perkins, & Collins, 2009; Evans, Hanlin, & Prilleltensky, 2007). Each of these organizations was experiencing high levels of employee burnout and a wide gap between growing community needs and their capacity to respond effectively and to secure funds in an increasingly competitive environment. Researchers worked with each organization to consider how it might more effectively employ its resources by incorporating prevention, empowerment, strengths-based approaches into both internal organizational and external community practices. In three organizations, this work resulted in the development of new conceptual models to inform their work, leading to changes in organizational structure and practices. For example, one participating organization redefined several key staff positions from a treatment focus to a community organizing/engagement focus (Bess et al., 2009).

The "pebble in the pond" metaphor captures the potential influence of this type of community psychology mesosystem work over time: that is, the initial impact of this organizational intervention was small and localized, but can have a ripple effect over time and a broader impact on the local community organizational landscape. In the case of NEW SPECS, several of the participants in the original project emerged as local leaders and have been at the forefront of innovative local educational and youth development initiatives. The following examples of subsequent projects illustrate how researchers and community partners have built on this initial work to experiment with new ways of addressing the challenge of urban education and related problems.

Several individuals from NEW SPECS, including members of the research team, became part of the Nashville Urban Partnership Academic Center for Excellence for Youth Violence Prevention (NUPACE, YVP), a project funded by the National Center for Injury and Prevention Control which studied how local organizations engaged individually and collectively in YVP work over a 5-year period. Part of this investigation examined the relationship between 30 of the organizations that were involved in a local YVP coalition and the larger network of 99 organizations (Bess, 2015; Bess, Speer, & Perkins, 2012), finding that the YVP coalition emerged out of a preexisting network of inter-organizational relations and that coalition members occupied more central positions in the larger network. At a local level, the study found that few organizations were engaged in policy/advocacy work and most focused on prevention and intervention programs and services targeting youth. The findings from this research highlight the importance of research that contextualizes change initiatives, such as coalitions, in the broader local landscape in which they operate and the need for research that studies inter-organizational collaboration and relationships over time.

At the policy level, community psychologists contributed to the 12-site Family Options experiment that showed that offering housing subsidies to families in homeless shelters not only ended homelessness but reduced children's separation from parents and foster care placements, school moves, absenteeism, and behavior problems as reported by parents, parental distress, substance use, and domestic violence, and family food insecurity (Gubits et al., 2018). Again, the distinctive contribution of ecological systems theory was to examine the ways that problems which might initially appear to reside in children, families, or schools are influenced by a community landscape with a paucity of affordable housing. One of the organizations that participated in NEW SPECS has spearheaded efforts to address homelessness among youth and secured a planning grant for a Youth

Homelessness Demonstration Project from the Department of Housing and Urban Development. Researchers (who did not lead this charge) are supporting the local efforts.

Ecological researchers are also strategically positioned to contribute to the effectiveness of broader/bolder education interventions such as Promise Neighborhoods. The lead organization for the Nashville Promise Neighborhoods (NPN) initiative was another of the organizations that participated in the NEW SPECS projects. This organization went on to form a collaborative partnership with MNPS, nonprofit organizations, government agencies, and university partners to launch Nashville Promise Neighborhood (NPN). With funding from a 2011 U.S. Department of Education Promise Neighborhoods Planning Grant, the NPN collaborative network engaged in research and planning to establish a place-based cradle-to-career system of supports and services with the goal of improving academic outcomes and increasing educational opportunities for families living in concentrated poverty.

During the planning year, NPN developed structures to support inter-organizational collaboration and system integration, worked with Metro Nashville Public Schools to create a data-sharing partnership, and conducted a community survey of 485 residents and series of focus groups. Since 2012, however, government funding for Promise Neighborhoods has significantly declined, with no awards during 2013, 2014 and 2015, and only six awards in 2016—NPN not among them. Despite resource scarcity, NPN's lead organization continues to innovate in the community organizational landscape, partnering with two local high schools and other partners to create two academic student unions and with the district to launch two K-8 charter schools.

As this Nashville case study illustrates, ecological interventions can be beneficial, but they come with a variety of challenges. These challenges include difficulties in developing multi-sectoral collaborations, difficulties in getting collaborators to develop systems-level understandings of problems, and difficulties in developing a common vision for systems-level change among members of a coalition. Moreover, these groups and coalitions often lack deep engagement of community residents (Wolff et al., 2016). Furthermore, within collaborations, there is rarely a strategic analysis of power and power inequities among collaborators such that the problems and interventions get defined in terms that focus on constituencies who are most affected by the problems, while avoiding systemic issues. This is particularly true when the leaders with a collaboration are situated within or are beholden to powerful local institutions, and lack the capacity to engage in the kind of conflicts that are necessary to achieve systemic changes (Christens & Inzeo, 2015). Even when multi-sectoral efforts avoid all of these problems to develop participatory systemic interventions, they are rarely sufficient to transform structural inequities found in most cities.

These weaknesses point to the value of grassroots community organizing for achieving systemic changes. In fact, much of the progress that has been made around affordable housing in Nashville has been driven by organizing initiatives (e.g., Thurber & Fraser, 2016). Resources available for organizing, however, pale in comparison to funding for coalitions, let alone the much larger set of resources dedicated to individually focused prevention and intervention. Moreover, Nashville has had relatively little organizing that involves leadership by youth/students—a form of systemic and educational intervention that has proved especially effective at simultaneously addressing systemic issues while also improving educational outcomes for the youth who are involved (Conner, Zaino, & Scarola, 2013; Kirshner & Ginwright, 2012).

Community organizations and coalitions cannot solve these problems by themselves. Ultimately, governmental involvement is needed. Yet, governmental entities are already involved in each of the systems described in this article in both helpful and unhelpful ways. The police and the jails and prisons, for instance, are either public or publicly funded. The ecological interventions we describe are therefore not simply seeking more governmental involvement or funding, but changes in how government operates and allocates resources (e.g., "justice reinvestment" as described by Lugalia-Hollon and Cooper, 2018). Some interventions aim to provide a proof of concept that could be scalable, or to build power and align agendas for policy and systemic changes that could affect large groups of people. Voices of the people affected should be central in decisions about how resources

are deployed. The need for better allocation of resources generalizes across communities, but particular intervention strategies must attend to the local context.

Conclusions

Nearly 50 years after its original publication, many aspects of Rist's (1973/2002) description of urban schools as a "factory for failure" still ring true, with Black students attending mostly segregated, low-performing schools. This situation has endured despite decades of education reform, changes in educational standards, and changes in local and national leadership. As Karner noted in a recent reprint of Rist's book (1973/2002), they reflect the "enduring realities" related to race and class that make systemic intervention not just important, but necessary for making progress in improving urban education.

We believe there is value in having urban education interventions become integrated multi-sectoral interventions (focusing not just on schools but also housing and urban planning, public health, juvenile justice, and violence prevention, and the civic voluntary sector) rather than focusing on an isolated piece (e.g., changing superintendents) of a complex, connected, and interdependent system. The challenges inherent in ecological analyses and interventions require not only more resources and more interventions, but also critical long-term commitment to building and exercising power to challenge and transform the status quo. Toward that goal, community psychologists encourage transdisciplinary engaged research (Perkins & Schensul, 2017) designed to advance Sarason's (2003) call for promoting and evaluating actions that empower students, parents, teachers, and the entire community.

Note

1. The strategies that we critique here, while prevalent, do not typically originate from educators or educational researchers. They are most often politically driven approaches. Other more promising strategies exist that are focused on classroom and school-level changes, but few if any have had the prevalence of the more politically driven approaches to education reform. Furthermore, in some cases, promising strategies (such as small schools) are taken as silver bullet solutions by policy elites and then quickly abandoned when they fail to "fix" all of the issues facing public education systems (e.g., Schneider, 2016).

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Helping Stakeholders Engage with Urban Educational Ecosystems: The Case for Panarchy

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Helping Stakeholders Engage with Urban Education Ecosystems: The Case for Panarchy:

In education scholarship, there are few resources to inform the design of community engagements that allow the perspectives and lived experiences of community stakeholders to influence the conceptualizations of focal problems or the development of research questions. There has been even less attention to the question of how to support stakeholders in systems thinking with the goal of broad systems change. In this article, we make a case for the use of "Panarchy" (Lipmanowicz, & McCandless, 2014) as a conceptual metaphor to ground an activity sequence designed to support stakeholders' cross-sector thinking. We begin with an overview of panarchy theory and then turn to its advantages for understanding the complex dynamics of school systems and their communities. To illustrate these ideas, we draw from our work with a stakeholder coalition interested in addressing the use of exclusionary discipline, with a specific interest in reducing the racial and ethnic disparities in out of school suspensions. Panarchy provided an occasion for participants to see and consider interdependencies of micro-, meso-, and macro-level factors and systems, and to trouble and revise their narratives about factors that contribute to disciplinary disparities.

Keywords: panarchy, stakeholder engagement, cross-sector data, urban education

Engaging Community Stakeholders to Address Problems in Urban Education:

The Case for Panarchy

Introduction

There is substantial evidence that the challenges faced by urban schools are linked with social and structural problems affecting urban communities. The COVID-19 pandemic underscored these links: when schools across the United States shuttered in March 2020, the significance of their role as hubs for basic services became immediately visible as communities and school districts struggled to construct new systems to ensure children and their families had food, housing, medical care, and other social supports.

This interconnectedness among institutions has a corollary: disparities in students' experiences of and outcomes in school align with disparities in social resources available in their communities (Crowder & South, 2011; Wodtke, Harding, & Elwert, 2011; Witherspoon, Rivas-Drake, & Banerjee, 2018). Thus, among educators and other youth-serving personnel there has been increasing concern that troubling trends in students' communities (e.g., increasing rates of food and housing insecurity, violence, drug and alcohol dependency, suicide, etc.) may continue to shape students' school experiences and outcomes for years to come.

Given the links between community and school dynamics and outcomes, the engagement of community stakeholders is all the more crucial as a mechanism for understanding and addressing the problems affecting urban schools. Community stakeholders frequently express interests in and passion for their schools, even when the schools are performing poorly. However, in education scholarship there are few resources that promote and facilitate community engagement in ways that allow the perspectives and lived experiences of community

stakeholders to influence the conceptualizations of the problems or the development of the research questions.

There has been even less attention to the question of how to support stakeholders in systems thinking with the goal of broad systems change. The scholarly literature that does exist lacks thick description of the processes and practices enabling rich engagement, skipping from powerful goals to outcomes without a clear picture of what was necessary to achieve them (Biag, 2017). Practitioner-facing outlets offer more detail about tools (cf. Newmann & Sipes, 2020), but similarly offer little detail about what the work of collective sensemaking and developing "studyable" conjectures might entail.

A few research paradigms have attended to the important role of community engagement. Community based participatory research (CBPR), for example, emerged from public health researchers' attempts to develop and implement interventions that were matched to the local context. In education, research practice partnerships have emerged as a strategy for engaging school stakeholders to develop co constructed understandings of the phenomena affecting student outcomes. More recently, implementation research has emerged as a strategy for understanding whether interventions are acceptable to educators and students, and how the local context might affect the uptake and fidelity of the interventions.

While each of the strategies have made important contributions to educational research, there is little documentation of efforts to engage community stakeholders in addressing cross-sector, *stakeholder defined* questions in the context of urban schools. Both CBPR and implementation research more often engage community stakeholders in relation to researcher-driven research questions or interventions. Research-practice partnerships tend to emphasize engagement with school and district personnel, but there are few published examples in which

there is significant engagement of other community stakeholders. This distinction is especially important for urban districts, where the lived experiences of school administration and staff may be substantially different than those of the students and their families.

Moreover, we find that the efforts described in the research and practice literature do not address the dimensions of community engagement we believe are necessary to promote stakeholder agency and impact. While "data walks" and similar structures for data sharing and collective interpretation are increasingly common in the fields of education and public health as strategies for helping researchers contextualize data, typically these engagements are researcher-driven rather than positioning stakeholders as agents in formulating questions or driving solutions, much less selecting the data to spotlight. With few exceptions, these accounts seem to lack criticality – a commitment to identifying, disrupting and transforming inequity. Critical and participatory forms of research do center stakeholder agency and certainly have informed our work (cf., Oakes, Rogers & Lipton, 2006; Fine, 2019), however, we have not identified accounts of supporting stakeholders' engagement with data across multiple sectors to explore systems interactions. One result of this dynamic is the continuing focus on targeted, "school-centric" interventions that fail to account for the complexities that perpetuate poor outcomes and outcome disparities among urban schools.

So how might researchers support stakeholders in engaging with data to interrogate and address the systemic, cross-sector issues shaping youth educational trajectories? In this article, we make a case for the use of "panarchy" as a constructive conceptual metaphor and activity sequence[1] designed to support stakeholders' cross-sector thinking. We begin with an overview of panarchy theory and then turn to its advantages for understanding the complex dynamics of

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[1] We are grateful to Fischer Qua and Anna Jackson, who were key thought partners in adapting the Panarchy process from Liberating Structures, founded by Keith McCandless.

school systems and their communities. To illustrate these ideas, we drawn on an example drawn from our ongoing work with a stakeholder coalition focused on reducing disproportionalities in out-of-school suspensions.

Panarchy Theory

Panarchy theory originated in the field of environmental sustainability to describe the structure of complex systems across scales of space, time, and meaning (Allen et al., 2014). The driving dynamic of panarchy is the "ecocycle" or "adaptive cycle", which models a pattern of growth and decay seen in natural or ecological systems. Ecocycles are often described as having four major phases: growth, conservation, creative destruction, and reorganization.

Panarchy captures the insight that ecological systems exist at multiple spatial and temporal scales, and ecocycles progress at different rates. Ecosystems range from the very small to the very large (a cell, an organism, an ocean, the solar system; a person, a group, an organization, a society), and their ecocycles may span from seconds to millenia. Importantly, these systems are interconnected with one another in ways that defy traditional hierarchies (thus the term "pan"-archy). The panarchy metaphor therefore offers a way of describing dynamic relations within and across complex systems, and for identifying and integrating both top down and bottom up conceptualizations of the structure and dynamics of these systems. Crucially, panarchy theory enables us to think about the relations across systems with regard to growth and stability, continuity and variation. For example, we can model how resources released in one ecosystem might be taken up by a neighboring system in the process of reorganization and growth (Allen et al., 2014).

Panarchy scholars distinguish human from natural systems, spotlighting the role of the "symbolic", i.e., "the interpretive schemes that give meaning to our activities, sometimes

described as myths, paradigms or ideologies" (Westley et al., 2002, p. 105). In this third dimension human actors engage in reflection and sensemaking about experience, abstracting it from the physical world to generate frames which then guide their action in the physical world. In other words, their interpretive work undergirds human intention and action.

While originally conceived to describe environmental systems and their management for sustainability (Angeler et al., 2016), over the past decade, panarchy theory has attracted scholars and some practitioners focused on the management of human systems ranging from individuals to organizations to supply chains. Varey (2011) calls for the application of panarchy in conceptualizing human psychology. Randle, Stroink, and Nelson (2015) argue that panarchy theory provides a useful way to understand the complex cycles of addiction and how addiction changes over time. In the field of organizational leadership, panarchy theory has been taken up to spotlight the premise that understanding organizational cycles of growth and destruction can be a resource for strategic planning and analysis (c.f. Lipmanowicz & McCandless, 2014), and that failure to do so can put organizations and institutions at risk (Holland, Gunderson & Ludwig, 2002).

More recently, in a critique of what he describes as reductionist and static frameworks, Wieland (2021) has argued for the application of panarchy to the field of supply chain management. In his analysis, Wieland not only considers spatial and temporal dimensions of supply chains, but also attends to the symbolic or narrative interpretations that animate human activity at each level. He writes:

> Adding a qualitative meaning scale to the typically quantitative notion inherent in scales of space and time allows us to see how different narratives are embedded in each other … A smaller narrative (e.g., 'a green business model') at one level of meaning can then

interact with a larger narrative (e.g., 'the climate crisis') at another level (p. 63).

While the metaphor is conceptually complex, we have found that educational stakeholders find it compelling and productive as a means to surface questions about the interrelationships among community and school dynamics and student outcomes. To support their engagement, we have created a four-step activity sequence adapted from the work of Keith McCandless' Liberating Structures. First, participants are introduced to the panarchy metaphor. Next, participants are asked to use this metaphor to analyze and conceptualize a complex problem. Third, participants are asked to consider points of intervention to promote change based upon the conceptualization they developed in step two. Finally, in step four, participants generate potential "research questions" that might help them explore, test, or refine their proposed conceptualization of the problem or explore the impact of their proposed interventions. We believe that the panarchy metaphor and activity sequence offers a productive frame for stakeholders' understanding of the complex dynamics of urban schooling, and a foundation for planning, enacting, and sustaining meaningful change in youth outcomes. We illustrate these ideas in relation to our work with an urban school district and the Steering Committee of the Educational Equity Coalition (EEC)[2], a coalition of community stakeholders convened to address discipline-related issues in an urban school district.

Community Engagement with the Educational Equity Coalition

Background

Since 2016, our team has been working to describe and understand the dynamics surrounding disparities in disciplinary outcomes for Black and Brown youth. Specifically, we

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[2] A pseudonym. The university IRB determined that our work with the EEC meets 45CFR 46.104(d) category (2) for Exempt status.

have inquired into the ways in which the challenges and supports students experience in their neighborhoods affect their school experiences and outcomes, as well as the climate of the schools they attend. We also have asked whether and how schools and communities can work together not only to mitigate the impact of, but also *address* factors like lack of stable housing, challenges to health, and violence that are impacting student outcomes. In this work, we reject the idea that the causes for disparities in academic and behavioral outcomes reside in students, their families, or even particular schools. Rather, we assume an ecological systems approach to urban education, framing students and schools as embedded in meso- and macro-level policies, structures and systems that profoundly disadvantage certain communities (Nation et al., 2020).

Our understanding of ecological effects on student outcomes are informed by multiple studies examining the impact of specific factors in students' environments on singular outcomes like rates of suspension or expulsion, or achievement in reading or math. Our work extends these studies in several ways. First, we linked geocoded community data (e.g., employment, housing, health, transportation, and violence) to an extensive, multicohort, longitudinal set of individual- and school-level factors (e.g., student enrollment, achievement, attendance, discipline), *and* to perception data on school climate (students and educators) and neighborhood cohesion and safety (students). Additionally, we engaged youth as partners in designing survey instruments, collecting data and making sense of the dataset. Thus by connecting city, school, and youth-collected data sources and artifacts, we constructed a multifaceted picture of the trajectories of more than 30,000 students across a large urban district, exploring the unique combinations of factors that shape students' paths as they navigate their home and schools.

By balancing more conventional administrative data with more equity focused measures (surveys of student perceptions about school climate and neighborhood wellbeing, surveys

designed and administered by youth, etc.) there is an opportunity to center perspectives and expertise that often are marginalized (Irby, 2018; Ishimaru et al., 2022). In a further step to challenge what Ishimaru and her colleagues (2022) have described as a "technical-rational data driven decision-making logic that enables administrative racism and obscures the adult practices and organizational processes that shape student experiences in schools", we developed a version of the dataset that is available to community stakeholders and outside researchers (Trevino et al, 2022). Our university research team, school district, and community partners believe that these data should be shared and used in ways that speak to, and produce positive change for, youth and their families – especially those who are least advantaged within the city ecosystem. Therefore, while preparing the data archive for public use, we also investigated the research and practice literature for insight into how we can support stakeholders' critical engagement with this archive.

The Educational Equity Coalition (EEC) Steering Committee

The EEC was formed in 2014 to examine and take action to reduce racial disproportionalities in disciplinary outcomes tied to race, to promote alternatives to punitive and exclusionary disciplinary strategies, and so to disrupt the school to prison pipeline. The EEC Steering Committee, like the broader coalition, included stakeholders from youth-serving nonprofit organizations, juvenile court, the public defender's office, the school district, a local university, parents, and a cross-faith, justice-centered advocacy group. Between 2014 and 2020, much of the EEC's work focused on the District's discipline handbook and codes, which EEC members saw as key in shaping disciplinary action. The Steering Committee's coordinator felt it was time for the group to take a step back to consider disproportionalities in relation to a broader set of dynamics of inequity operating in the city. He viewed the data archive being constructed

by the research team as a potentially helpful resource. As we began to think about what this might look like, we realized that we would need a step before engaging with the data itself – to support stakeholders to become oriented to a broader, more complex landscape of interactions, to generate questions about that landscape, and ultimately to approach the data in light of those questions. We conjectured that Panarchy could be a useful frame for this engagement, and so worked with the EEC coordinator to set up a session with the group.

Panarchy Implementation

In January 2021, 14 members of the EEC Steering Committee gathered via Zoom. As pre-work, participants watched a brief video "How Wolves Change Rivers" to seed the idea of interacting ecological systems. During the session, the facilitator (one of the co-authors) introduced the theory of panarchy as a conceptual metaphor to represent the kinds of interdependencies captured in the video. Participants then were asked to do a quick brainstorm of factors that affect disciplinary outcomes for children and youth, entering their ideas into the chat. Perhaps given the historical moment,[3] it was not surprising that participants' responses focused primarily on macro level systems and structures – systemic racism and bias, poverty, inequitable access to resources (see Figure 1).

Participants then moved into breakout groups to work on a series of tasks. The first task prompted them to identify what might be missing in the initial brainstorm, prioritizing and unpacking their "top" three or four, and organizing them into three levels: broad macro-level systems, organizational-level (meso), and individual or interpersonal level (micro).   Each breakout group was joined by a research team member who took notes and placed factors on the panarchy map as directed by group members. Over the next 20 minutes, participants began to

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[3] A time marked by surging rates of Covid-19, ongoing murders of Black and Brown individuals at the hands of police, and increasing political polarization symbolized by the January 6 assault on the U.S. Capitol.

construct narratives around the factors they selected – justifying their significance in relation to disciplinary disproportionalities.

The second task asked participants where they would take action to create change. This time, responses were dominated by two ideas: training of teachers and students, and school-level policies and culture. While they had initially framed disparities in outcomes as a result of an array of complex systems and structures, the small group discussions focused primarily on schools, and more specifically the people in them, as accountable for action.

However, as groups shifted to the third task – which asked them to generate questions about areas they would need to know more about, the group began to pivot outward again, emphasizing the need to engage and garner support of the city at large. As they considered questions about the interventions they proposed, the group's perspective on their potential spheres of action expanded – and participants began to contemplate how actors and policies beyond schooling might share responsibility for youth outcomes.

Panarchy Outcomes

Our observations suggest that the panarchy process conveyed several benefits as a strategy for surfacing complex issues related to urban schools. Below we highlight three benefits that emerged in participants' exchanges: recognizing and leveraging interdependencies, expanding accountabilities, and disrupting unproductive narratives.

Recognizing and Leveraging Interdependencies.

Schools and school systems, like supply chains, are commonly described as complex, but siloed systems. Improvement strategies focus on changing the behaviors of educators, staff, or students

– proactively through training, or reactively through behavioral or academic intervention. Yet, as has been amply documented by decades of research, students' academic and disciplinary outcomes are also shaped by economic, and political, and social systems and policies that inform what is taught and to whom (Anderson, 1982; Erickson, 2016), and can serve to reinforce privilege and marginalization in and beyond school. Panarchy theory challenges us to envision the improvement of student outcomes as the work of *a system of systems* characterized by complex interdependencies. As stakeholders become attuned to these interdependencies, we can leverage them – strategically and systematically identifying opportunities (and threats) posed by adjacent social systems. How might, for example, investments in a city's public transportation system enhance youth access to city resources and opportunities? Or simply make it more likely that the student will arrive at school on a given day?

While initially members of the EEC focused on the impact of school level factors on youth outcomes, after introducing the panarchy metaphor, they began to attend to these interdependencies.

> I think about the Mayor's Youth Initiative opportunity… a big one that provides mentorship, job learning skills. One of the obstacles would be access to the program as in transportation … like the program exists, the mentors are in place. But then our young people who need it can't always get to it.

Later in the conversation, another groups member zeroed more explicitly on the coordination of different systems:

> [T]he question I'd like to ask is, are we leveraging … the different entities like the police department, the district, different community organizations - like everyone going in the same direction around a few things?

Expanding Accountabilities

Even as we recognize the impacts of global events on youth, social and political narratives commonly locate accountability for improving youth outcomes inside schools and districts. Indeed there is a well-documented tradition of assigning schools responsibility for addressing our most intractable social challenges (Cuban, 1990; Labaree, 2010). Attunement to the interdependencies of the panarchy enables stakeholders not only to explore the ways in which youth outcomes are jointly produced by actions and policies across a complex socio-political ecosystem – but also how these systems might be implicated in or held accountable for improvement. We saw the beginnings of such conversations as EEC participants worked to locate factors contributing disciplinary disparities across micro, meso, and macro levels. Consider the following exchange in one of the subgroups:

> Those of us who've been in this EEC space for the last six years, we'd spend a lot of time talking about, How can we make this better at the school level? … but we haven't talked a lot about, What do we do from the city level? Like, structurally? How do we get the city leadership more involved in changing exactly the things that L was talking about, concerns about poverty and homelessness?

This led to a lengthy exchange supporting a refocusing of the group's efforts to understand the ways that broader socioeconomic disadvantage, state law, and school funding bear on students' experiences.

Disrupting Narratives

Finally, panarchy theory's articulation of the symbolic prompts us to critically examine

how our personal and organizational narratives about educational equity intersect with social

narratives at other levels. Creating space for participants to contextualize/interrogate their

personal narratives in relation to narratives at different levels of the panarchy opened new lines

of questioning. For example, as they considered how to organize factors contributing to

disciplinary disparities in the panarchy framework (step 2), participants realized that narratives

about bias, discipline, and youth varied from the narrow and concrete to the broad and abstract.

This realization created an entry point both to trouble the concept of bias and question how it

operates in different systems. Specifically, participants' varying perspectives on bias and where

it "lives" became a context for considering how different social systems interact to shape student

experience. Ultimately, their discussion of bias became a reference point as participants began to

broaden their circle of action steps to include not simply implicit bias training for educators, but

engagement of stakeholders and leaders from multiple sectors as a critical next step in their

work.

Discussion

So what have we learned about panarchy as a tool for preparing stakeholders for critical

engagement with data? Our work with the EEC has pointed to several design considerations.

First, surfacing the diversity of stakeholder voices is a crucial resource for participant learning,

helping to disrupt assumptions about the causes of inequitable outcomes. Our thinking is

informed in part by John Forester's (2019) conception of the "reconstruction clinic", which

makes use of stakeholder narratives to enable participants to confront a range of views, and to

construct a collective understanding of causes and consequences of city planning decisions.

Through such efforts, Forester writes, there is opportunity for "participants [to] change their

senses of value, of what matters, of not only utility but identity, *including what they take to be ethically possible and desirable"* (Forester, 2019, pp. 472-473, emphasis added). While Forester is more explicitly focused on the context of dispute resolution, we believe that there are lessons for our quest to help stakeholders push beyond what have come to be habitual ways of seeing and acting.

Second, stakeholder engagement practices themselves are highly subject to power dynamics – they can reify oppressive relations by privileging or marginalizing particular data or stakeholder perspectives. Thus it is crucial to design to disrupt normative dynamics around not only *who* gets a seat at the table, but also *how* voices are heard. Models like solidarity driven co-design (Ishimaru and Bang, 2022) are helpful in illustrating the intentionality and structure required to ensure that voices of those historically marginalized are invited and honored.

Finally, representational models matter. Informed by situated perspectives on learning, we understood that participants' insights would be shaped and constrained not only by the structures for talk and participation, but also the nature of the tasks, tools, and representations to support their work. Engaging in modeling practices in strategic decision-making has been shown to support stakeholders in reasoning about how systems work, making predictions, explaining observations, and even strategizing about policies and practices to increase equity (Fulton et al, 2011). In our initial outreach to stakeholders, we have found that groups tend to focus on single indicators or levers – e.g., suspension data or school discipline codes, and in turn become oriented narrowly around individual actors (students, teachers, and principal). Thus we have sought to highlight how data can reflect more complex, multi-level *systems interactions*, rather than simply as statistics about individual behaviors.

Attending to this complexity requires a step before engaging with the data - one that (re)orients stakeholders to a broader, more intricate landscape of interactions, to generate questions about that landscape, and to approach the data in light of those questions. In other words, to expand participants' sense of the problem space and to leverage the diversity of perspectives about that space, we needed to attend carefully to the models participants had available to represent their ideas and how they engaged with those models. In planning to work with the EEC, we thus sought a model that would not only promote cross-systems analysis, but also recognize that interactions are often multidirectional, and that changes in any given system might pose opportunities - or additional challenges - for developments at other levels.

Conclusion

The growing interest in and need for the use of cross-sector data to address multi-sector challenges requires innovations like panarchy to leverage the knowledge of actors within and across the multiple systems affecting urban education. While there is an emerging body of scholarship on the technical and ethical dimensions of engagement with cross-sector data, there has been less attention to supporting its use by those closest to the challenges. In the preceding pages, we have described an early effort to understand what this might look like. We drew on panarchy for its affordances in representing complex systems interactions. At the same time, we acknowledge that continued development of this approach will require users to address several questions, e.g., Is panarchy a productive metaphor when bringing together stakeholders with varying positional authority? Or who bring varying representational repertoires? How might differences in perspective be represented and leveraged to forge a plan for socially just action – supporting the shift from understanding to addressing complex social challenges? However

panarchy's affordances as a metaphor and structure, as well as our early experiences supporting

stakeholders to explore it, suggest to us these questions are well worth pursuing.

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Figure 1. EEC WordCloud of Factors Contributing to Disciplinary Disparities

The Role of Social Emotional Competencies in Student Discipline

and Discipline Disparities

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Abstract

While research suggests that social emotional competencies (SECs) influence students'
disciplinary outcomes, less is known their potential to explain racial inequities in those
outcomes. This study used survey and administrative data from 30,494 students in grades 3–12 to
examine the degree to which SECs were related to discipline outcomes, and whether the
relationship differed by race or grade tier. Results indicated that students with higher SEC had
fewer behavior incidents, in-school suspensions, and out-of-school suspensions. Further analyses
revealed that race and grade tier were predictive of all discipline outcomes. Regardless of SEC
level, Black and mixed-race students had higher behavior incidents. When race and grade tier
were included as factors, the relationship between SEC and discipline was diminished.
Implications for practice are discussed.

Keywords: social emotional competencies, student discipline outcomes, discipline
disparities, social emotional learning

Introduction

There is widespread agreement that best practices in education include the successful integration of academic, social, and emotional learning (Brackett & Rivers, 2014; Weissberg et al., 2015). Humphrey (2013) neatly summarized the salience of the field of social emotional learning (SEL) by stating, "To many, SEL is the 'missing piece' in the quest to provide effective education for all children and young people" (p. 1).

This sentiment is shared by many; SEL has generated interest from both researchers and practitioners to promote interventions that improve student outcomes (Weissberg et al., 2015). One of the most promising aspects of SEL interventions is their potential to address student behavior problems. In a summary of empirical support for SEL in education, Greenberg et al. (2003) suggested that these interventions embolden youth to grow into well-rounded citizens— academically, socially, and emotionally—who have the potential to contribute to society in positive ways. Also, Elias and colleagues (2007) noted, "young people equipped with skills, and the corresponding prosocial attitudes and beliefs, would be more likely to make healthy, caring, ethical and responsible decisions, and to avoid engaging in behaviors with negative consequences" (p. 170). Thus, the growth in interest in SEL represents a paradigm shift in education by recognizing the importance of linking academics with other essential skills needed to succeed in life—whether it be in school, the workforce, the community, or other social contexts (Elias et al., 2007).

The potential for SEL to address student behavior is especially important in urban districts where racial disparities have been a persistent feature of office disciplinary referrals and exclusionary disciplinary sanctions. In relation to suspensions, for example, estimates from the 2017–18 Civil Rights Data Collection indicate there were over 2.5 million students who received

out-of-school suspension at least once, with 38.2% of these students classified as Black or African American, despite Black students constituting only 15.1% of the total population of students that year. By contrast, 47.3% of students nationwide were White, but represented only 32.9% of the number of suspended students. These disparities were particularly egregious in Tennessee, where Black students were 21.1% of the population, but represented 57.1% of the students suspended from school at least once. White students, who made up 63.5% of the state's population of students, were 32% of suspended students, only about half their expected rate.

Unfortunately, the extant research indicates that office disciplinary referrals (ODRs) and exclusionary discipline sanctions do not function as a corrective for students, but frequently mark a turning point that often leads to worse outcomes (Mowen & Brent, 2016; Novak, 2022). A recent meta-analysis found that suspensions were associated with higher levels of subsequent delinquency, punishment, and contact with the criminal justice system (Gerlinger et al., 2022), suggesting that racial disparities in school discipline likely exacerbate further downstream disparities across a variety of domains.

Development of Social Emotional Competencies

Social emotional competencies (SECs) are constructs that represent the knowledge, attitudes, and skills an individual manifests as a byproduct of SEL. They are frequently the target of SEL interventions. SECs encompass domains related to intrapersonal, interpersonal, and cognitive competence (Weissberg et al., 2015). As suggested by Elias et al. (2007) and others (e.g., Jones & Doolittle, 2017), as students develop SECs, presumably they are able to use these skills to navigate classrooms and other social settings successfully, reducing the risks for disruptive behavior and other poor school outcomes.

The behavioral expression of SECs changes across developmental stages. In early childhood, and particularly upon school entry, students begin to develop and strengthen self-management and relationship skills (Collie, 2020). In grade school, students develop the ability to use cognitive strategies to regulate their emotions independently (Denham et al., 2009). As students move through elementary school, their emotional expression becomes more sophisticated (Denham et al., 2009), and their perspective-taking is more advanced, allowing them to go from developing the ability to empathize with the experiences of another individual to developing empathy for the experiences of groups of people (Eisenberg et al., 2006), contributing to increased social awareness. Also, competencies related to emotion regulation and perspective-taking appear to develop in conjunction with students' ability to navigate interpersonal relationships, a critical developmental task (Mitic et al., 2021; Ryan, 2001).

While there is evidence that students gain relationship skills over time, studies have found that as students move into middle school (i.e., early adolescence), some of their self-management skills tend to decline (West et al., 2016, 2020). This decline is most pronounced in early adolescence but continues to decline to a lesser degree through high school. However, not all aspects of self-management evolve in the same ways. For example, while some studies find that students' ability to self-monitor increases over the years (Gestsdottir & Lerner, 2008), other researchers have found that students' interest in school and motivation decline in adolescence (Pintrich & Zusho, 2002) as does their self-efficacy (West et al., 2016).

Just as the SECs change across developmental stages, the importance of SECs may also vary. For example, while there is evidence that students' self-management increases until adolescence and then declines (West et al., 2020), it may be increasingly important to implement self-management in adolescence as compared to elementary school. Research indicates that

students with higher SECs are more likely to adapt to their middle school environment (Hall & DiPerna, 2017) and engage in behaviors related to responsible decision-making and self-management. These behaviors allow them to be successful when academic performance becomes increasingly important due to its ties to future opportunities (e.g., pursuing higher education).

At the same time, gains in relationship skills noted in middle childhood and early adolescence coincide with a period in which students are becoming less dependent upon relationships with parents for meeting their social needs and more focused on peer relationships (Mitic et al., 2021). In fact, developing supportive peer relationships, which is predicated on having some level of self-awareness and relationships skills, has significant influence over adolescents' psychological development and emotional wellbeing (e.g., Lamblin et al., 2017). Moreover, research has demonstrated that an inability to foster supportive peer relationships is associated with a host of long-term negative outcomes including increases in risk-taking behaviors, police arrests, and unemployment (Campbell et al., 2020).

SECs and Student Outcomes

A number of reviews have indicated positive relations between social emotional learning and student outcomes (e.g., Denham & Brown, 2010). However, much of the literature promoting benefits of social emotional development in education has focused on students' exposure to SEL programs in schools as opposed to a focus on students' social emotional *competence* (Corcoran et al., 2018; Durlak et al., 2011; Low et al., 2019; Taylor et al., 2017; Zins et al. 2007). This distinction is important because some studies suggest that SEL programs can have positive effects on student outcomes without significant improvement in students' SECs (Kendziora & Osher, 2016).

Several studies support the hypothesized relations between SECs and student outcomes. A study conducted by the Washoe County School District (2018), for example, found that students with higher SEC scores had lower rates of suspension, while controlling for student demographics, prior test scores, prior GPA, prior suspension rate, and prior attendance rate. Similarly, Mantz and colleagues (2018) found positive correlations between a measure of SECs and academic achievement and a negative correlation with school suspensions. A study using the California CORE SEL Survey found SECs were positively correlated with test scores and GPA, and negatively associated with suspensions (West et al., 2018). Also, Hemmeler (2012) found that SECs as measured by teacher ratings, were the strongest predictor of behavioral problems explaining 21% of variance in ODRs.

Studies examining specific SECs have found positive relationships with student outcomes. For example, several studies indicate that students with higher levels of emotional self-regulation and social competence have fewer conduct problems (e.g., Webster-Stratton et al., 2018). Conversely, researchers have found that students exhibiting lower levels of self-regulatory skills and social competence are far more likely to have behavior problems at school (Huffman et al., 2001). There are both direct and indirect pathways by which students with lower SEC may exhibit behavior problems and, thus, discipline at school. For example, students with lower inhibitory control will have more difficulty staying engaged at school and be more likely to exhibit disruptive behaviors (Maszk et al., 1999). Indirectly, SECs may lead to behavior problems that occur in response to students' negative experiences, such as peer rejection, which in turn predicts antisocial behaviors (Trentacosta & Shaw, 2009).

The extant research suggests important variations in disciplinary referrals and sanctions by tier, with studies indicating that the amount of exclusionary discipline practices increases

from elementary to middle school and is at its highest rate in high school (Welsh, 2022).

Moreover, racial inequities in discipline, which already exist in elementary school, increase in middle and high school, where African Americans, and boys in particular, receive more referrals and exclusionary discipline than White students, and receive harsher punishments for similar infractions (e.g., Gopalan & Nelson, 2019). There are several factors potentially leading to this (e.g., as students develop, infractions may be perceived as more threatening, etc.). Regardless of the reasons, the case remains that discipline referrals increase by tier, and racial disparities increase along with them.

Despite research largely supporting the positive relations between SECs and student outcomes, there is less evidence regarding SECs ability to explain racial disparities or variations by tier. A potential reason for a connection between SECs and racial disparities is found in the differential involvement hypothesis (Skiba et al., 2002), which states that disparities in discipline may be related to differential rates of misbehavior between White students and students of color. More specifically, this hypothesis would suggest that multiple processes ranging from differential exposure to trauma to racial bias among teachers might result in students experiencing more difficulty at school. A second and related hypothesis is that White students are more likely to be disciplined for objective rule violations, while students of color are more likely to be disciplined for disruptive behaviors that are not explicit rule violations (Skiba et al. 2002). These "disruptive" behaviors may be more reflective of low SECs and thus more strongly associated with social emotional competence.

The research investigating these hypotheses has had mixed findings. In relation to the differential involvement hypothesis, Bradshaw and colleagues' (2010) analysis of 21 elementary schools found that there were no racial differences in the rate of referrals for major infractions,

yet Black students were more likely to receive referrals in analysis of all infractions. Also, this study and others (Huang, 2018) suggest that even when there are racial differences in the rates of problem behavior, these differences do not fully explain the racial differences in harsh disciplinary sanctions such as out-of-school suspension.

When considering the objective versus subjective hypothesis, several studies have supported this notion. Notably, a study utilizing a national sample (Girvan et al., 2017) found that racial inequities were much larger in subjective infractions. However, the potential role of SECs in the disparities is unclear. Okonofua and colleagues (2016) suggested that, in addition to overt biases, the disparities might be influenced by a complex process in which student and teacher perceptions of the others' behaviors might result in teachers punishing students of color for perceived disrespect. Unfortunately, to date, we are not aware of studies that have examined the contributions of SECs to these student/teacher transactions.

Finally, a few studies have examined whether racial disparities in discipline can be explained by SECs or related factors. Most notably, Wright et al., (2014) reported that the likelihood of Black and White students being suspended in the 8th grade could be explained by an SEC proxy measure. However, Huang's (2020) subsequent analysis of the same data disputed this finding and suggested that disparities were still present after controlling for SECs. A second study of middle school students, Hemmeler (2012) found that race did not explain racial disparities in disciplinary outcomes after controlling for SECs. Also, Finder's (2021) study of an elementary, middle, and high school sample found that many of the specific SECs (e.g., self-management, self-awareness, social awareness) accounted for the largest amount of variance in office disciplinary referrals even when controlling for race. However, this analysis did not examine or control for the correlations among the SECs.

Extant research suggests there is substantial reason to believe that SECs are related to student behavior and that they could explain racial/ethnic disparities in student outcomes. However, there are several limitations of the research in this area. First, many of the studies examining student factors influencing racial disparities in discipline are limited in that their SEC measures appear to include academic and behavior outcome variables instead of students' SECs (e.g., Mantz et al., 2018; West et al., 2018). As illustrated by Huang (2020), this creates a number of problems in determining the degree to which racial inequities can be explained by race or SECs. A second limitation is that many measures of SECs involve parent or teacher reports. While these measures have the advantage of providing an external assessment of SECs, research also suggests that proxy measures are often affected by many of the biases that have been implicated in racial disparities in disciplinary outcomes (Ura & d'Abreu, 2022).

A third limitation is that student measures of SECs have varied in their validity such that they may lack the sensitivity to capture nuances in the types and strengths of SEC competencies (Davis, 2020). The insensitivity of these measures may result in an underestimation of the influence of SECs since these analyses suggest that they may only be effective in capturing gross differences in overall SECs as opposed to nuances in the type or strength of individual competencies. Finally, many of these studies have focused on only one tier of schools, with elementary being the most frequently studied (e.g., Bradshaw et al., 2010). This limitation is significant because several studies have suggested that both the strength and importance of the skills may vary as students age, and because studies indicate that the overall number of suspensions increases in middle and high schools.

The purpose of the current study was to address these limitations and add to the research evidence by examining the following questions:

1. Is a student's self-reported SECs related to concurrent discipline outcomes?

2. Is there a quartile-based threshold at which SECs become stronger predictors of student behavior problems?

3. If so, do these thresholds affect students differentially by race or grade tier?

4. If so, do these differentials explain racial/ethnic differences in discipline outcomes?

To investigate these research questions, we utilized a student measure of SECs with elementary, middle, and high school students to examine the relations of SECs to office disciplinary referrals and suspensions. Also, given the potential limited sensitivity of student measures of SECs, we categorized students into quadrants based on their responses to SEC measures.

Method

Sample

Participants in the current study were 30,494 students attending a large district in a Southeastern state. The specific sample of students in this study were those who had the opportunity to complete district surveys, which included students enrolled in grades 3–12 only. Before applying any other exclusion criteria, the population of students in these grades was close to 70,000. However, in addition to the grade level restrictions, students were excluded from the sample if they were enrolled in a charter school or if their parent or guardian opted them out of participating. This reduced the eligible sample size to approximately 50,000 students. All eligible students from the district population were invited to participate. Response rates were 61% ($n = 30,494$)—and the sample was generally representative of the district's student population overall. The district obtained parental consent for survey participation at the beginning of the academic year, and a second notice to allow parents to opt out two weeks before survey administration.

The study protocol was reviewed and approved by the Vanderbilt University Institutional Review Board, and the district's research review committee.

Data Collection and Measurement

Three kinds of data were collected for this study: (a) student survey data with ratings of their own social emotional competence, (b) student discipline data, and (c) student demographic and enrollment data.

Survey Data

The Neighborhood and Wellbeing Survey was developed by the research team in partnership with the school district to measure student perceptions of their neighborhoods, their peers, and their own social-emotional development as part of a broader longitudinal study. During the active years of data collection for the study (SY2019 to SY2021), the Neighborhood and Wellbeing Survey was administered via an online survey platform to students in district-operated schools annually in the winter. The present study used survey data collected in January 2020. The Neighborhood and Wellbeing Survey was available for students to complete in multiple languages (e.g., English, Spanish, Arabic, Kurdish). An elementary version of the survey was assigned to students in grades 3–6, and a secondary version was assigned to students in grades 7–12. Students were allowed to use any accommodation that may be used for assessments, including having items read aloud. Students in exceptional education who could not understand the questions could be excused. Student assent was also collected as part of the survey.

The SEC scale was one of several topics assessed in the Neighborhood and Wellbeing Survey. SEC items were intended to measure social emotional competence through the constructs of self-awareness, self-management, social awareness, relationship skills, and

responsible decision making. Specifically, students were presented with items for each SEC area and asked to rate the degree of difficulty on a scale of 1 (*very difficult*) to 4 (*very easy*). This 20-item scale was adapted from the open-source Washoe County School District Social Emotional Competency Assessment (WSCD-SECA) Short Form, which is a 17-item student survey with questions related to the five CASEL competencies.

Discipline Data

Student discipline was operationalized as the number of behavior incidents, number of days of in school suspension (ISS), and number of days of out-of-school suspension (OSS). These data were recorded in the district's electronic student information system, which was maintained by each school's staff throughout the school year.

Demographic and Enrollment Data

Beyond student SECs and student discipline data, the present study incorporated other administrative data including student race/ethnicity and grade tier of the school in which they were enrolled.

Variable Definitions and Analytic Approach

The shortened version of the variable name and the operational definition are provided below. The name that is used in description of the analysis and results subsequently is italicized in parentheses.

- Social emotional competence score (*SEC Score*): Each student's average score on the 20 survey items from January 2020 that assessed self-awareness, self-management, social awareness, relationship skills, and responsible decision-making. The response scale ranged from 1 (*very difficult*) to 4 (*very easy*).

- Social emotional competence level (*SEC Level*): Each student's category of SEC, determined from visually binning SEC Score into Low, MidLow, MidHigh, and High categories using cut points at the mean and +/-1 standard deviation from the mean. The Low category included SEC scores between 1.0–2.495, MidLow between 2.496–2.935, MidHigh between 2.936–3.374, and High between 3.375–4.0.

- Behavior incidents (*Incidents*): Number of each student's behavior incidents recorded between August 2019 and February 2020. This date range was used as a concurrent discipline measure because the survey responses were collected in January–February 2020.

- Days of in school suspension (*ISS*): Number of each student's ISS days recorded between August 2019 and February 2020.

- Days of out-of-school suspension (*OSS*): Number of each student's OSS days recorded between August 2019 and February 2020.

- Race/ethnicity (*Race*): Categorical variable that indicated the student's race or ethnicity. Categories included American Indian or Alaska Native, Asian, Black or African American, Hispanic or Latino, Native Hawaiian or Other Pacific Islander, Two or More Races/Ethnicities, and White.

- Grade level tier (*Grade Tier*): Categorical variable that indicated whether a student was enrolled in an elementary (3–4), middle (5–8), or high (9–12) grade level.

To address RQ1, descriptive analysis of demographic variables and bivariate correlations were conducted with SEC Score and the three discipline variables (Incidents, ISS, OSS). To address RQ2, one-way multivariate analysis of variance (MANOVA) was performed with SEC Level as the single independent variable and Incidents, ISS, and OSS as dependent variables. To

address RQ3 and RQ4, a three-way MANOVA was performed to determine the effect of students' SEC Level, Race, and Grade Tier on students' Incidents, ISS, and OSS.

Results

After data screening, the first step in the analysis was bivariate correlations between the continuous SEC Score and three discipline variables. Table 1 displays the correlations among SEC Score, Incidents, ISS, and OSS, along with descriptive statistics for each variable. Results indicated small but statistically significant correlations between the SEC variable and the discipline outcome variables. Pearson's correlation coefficients between the predictor and outcome variables ranged from -.03 (for SEC Score and OSS) to -.07 (for SEC Score and Incidents).

Next, one-way MANOVA was performed to investigate differences in discipline outcomes between the four categories of SEL Level. Before running the test, outliers were removed from the dataset for extreme cases of Incidents, ISS, and OSS. Box's test was significant [$F(18, 79534041) = 206.5$, $p = .000$], indicating a violation of the assumption of homogeneity of variance-covariance. This could be expected because Box's test is sensitive to normality, and the nature of the discipline variables made normality difficult to achieve. To account for this violation, Pillai's Trace was used for interpreting the MANOVA results. Multivariate results from the one-way MANOVA indicated a significant difference between SEC Level for the combined discipline outcomes [Pillai's Trace = .004, $F(9, 80544) = 12.78$, $p = .000$]. That is, students with lower SEC Level had significantly more of the combined discipline outcomes than students with higher SEC Level. Figure 1 displays the estimated marginal means for the three discipline variables by SEC Level. Post hoc results indicated significant differences among all six combinations of SEC levels for Incidents ($p < .05$ for each comparison

combination), significant differences between Low SEC and the other three levels for ISS ($p <$ .05 for each comparison combination), and significant differences between Low SEC and the other three levels for *OSS* ($p < .05$ for each comparison combination).

Lastly, we examined whether there was an effect of students' SEC Level, Race, and Grade Tier on students' Incidents, ISS, and OSS. Table 2 displays descriptive statistics for the three discipline outcomes by Race and Grade Tier. Table 2 indicates that the average number of incidents was highest for Black students, more than twice the average for Latinx students, and nearing three times the average of White students. A similar pattern was observed with ISS and OSS. Analysis of grade tier indicates higher averages for all behavioral outcomes for middle and high school students. Table 3 includes the frequencies of students in each SEC Level by Race and Grade Tier. According to Table 3, in comparison to White students, there was a larger percentage of Black and Hispanic students in the low SEC group. Also, there was a smaller percentage of Latinx students in the high SEC group as compared to White and Black students. In relation to grade tier, only 10% of high school students were in the low SEC group compared to 13% of middle and 17% of elementary school students.

Multivariate results from the three-way MANOVA revealed no effect of SEC Level [Pillai's Trace = .000, F(9, 80448) = .997, $p =$.440], a significant effect of Race [Pillai's Trace = .013, F(18, 80448) = 19.83, $p =$.000], and a significant effect of Grade Tier [Pillai's Trace = .026, F(6, 53630) = 116.69, $p =$.000] on the combined discipline outcomes. However, there was a significant interaction of SEC Level and Grade Tier [Pillai's Trace = .003, F(18, 80448) = 5.16, $p =$.000], which indicated a moderating effect of Grade Tier and SEC Level on the discipline variables. Therefore, limited inferences could be derived from the main effects because there was a significant interaction in the model. Specifically, Low SEC Level was associated with having

significantly more Incidents, particularly for students in middle and high school Grade Tier.

Figure 2 displays the estimated marginal means for Incidents by Grade Tier and SEC Level.

Because there were significant multivariate results, analysis of variance (ANOVA) and Bonferroni post hoc tests were conducted to examine the degree to which each of the independent variables (SEC Level, Race, and Grade Tier) differed for each of the three discipline variables (Incidents, ISS, and OSS). Univariate results indicated a significant effect of Race on each of the three discipline variables ($p = .000$ for each); a significant effect of Grade Tier on each of the three discipline variables ($p = .000$ for each); and a significant effect of SEC Level for Incidents ($p = .034$), but not for ISS ($p = .409$) or OSS ($p = .678$). This suggests that Race and Grade Tier are significant predictors of discipline outcomes, and when they are included in the model, the effect of SEC Level on discipline outcomes is diminished with regard to ISS and OSS.

Post hoc results were examined to identify which categories of Race, Grade Tier, and SEC Level were different from each other, with regard to Incidents. For Race, the most notable differences in Incidents were between Black students and all other racial/ethnic categories, and between mixed race and all other racial/ethnic categories. That is, students in these two categories had more Incidents reported than students in the other racial/ethnic categories. The significant differences were -.85 between Asian and Black students ($p = .000$), 95% CI [-1.1, -.6]; -.29 between Asian and Latinx ($p = .001$), 95% CI [-.5,-.1]; -.52 between Asian and Two or More Races ($p = .000$), 95% CI [-.9, -.2]; -.22 between Asian and White ($p = .029$), 95% CI [-.4,-.01]; .56 between Black and Latinx ($p = .000$), 95% CI [.5,.7]; .32 between Black and Two or More Races ($p = .013$), 95% CI [.04,.6]; .62 between Black and White ($p = .000$), 95% CI [.5,.7]; and .30 between White and Two or More Races ($p = .034$), 95% CI [.01,.59]. For Grade Tier,

middle and high students had more Incidents reported than elementary. The mean differences in Incidents were significant for every combination: a difference of -.71 between elementary and middle (p = .000), 95% CI [-.8, -.6]; a difference of -.86 between elementary and high (p = .000), 95% CI [-.95, -.8]; and a difference of -.15 between middle and high (p = .000), 95% CI [-.2, -.1]. Finally, for SEC Level, there were significant differences among all six combinations of the categories (p < .01 for every pairing). In particular, there were many more Incidents reported for students in the Low SEC Level.

Discussion

Bivariate correlational analysis revealed a small but significant relationship between SEC Score and discipline outcomes. However, our results suggest that when using student self-reports of SECs, the relationship with their discipline data is not linear; instead, SECs only become salient when students report very low SEC. This may be due to issues with the content or sensitivity of the measures (Davis, 2020), and/or it may be that students have a limited ability to provide nuanced assessments of their own SECs. In either case, the results suggest that scores in the lowest quartile might be a useful measure in assessing high risk for behavior problems in middle and high school.

When considering the importance of the low SEC threshold, the results of this study indicate that low SECs are most problematic in middle and high school. This is consistent with Finder (2021) and other studies that have considered middle and high school tiers. Additionally, it suggests that behaviors associated with low SECs could be more problematic or disruptive as students get older. Another implication from our results is that low SECs may not predict the most severe disciplinary infractions because ISS and OSS were largely unrelated to SECs at any tier level.

However, it is clear that race persists as an important factor in disciplinary outcomes, and that Black and mixed-race students have higher rates of incidents and suspensions than other racial/ethnic groups. Also, the findings indicate that while SECs are important, they cannot explain racial differences in the number of incidents or in the frequency of exclusionary sanctions. That is, analysis of the SEC level indicates that students of color are not more likely to be in the low SEC group than White students. Instead, Black students at all levels of SECs are higher averages of referrals than their White peers. As to why race remained a prominent predictor, the results do not provide conclusive results that support either differential participation or the objective/subjective hypotheses. In relation to the objective/subjective hypothesis, OSS is frequently associated with objective, zero-tolerance offenses. The results related to OSS seem to suggest that the offenses prompting these sanctions may have less connection to SEC and race as compared to other behavioral outcomes.

These findings suggest that we have to consider other mechanisms that might contribute to racial ethnic disparities. For example, it is possible that schools themselves function as a tool to reinforce the existing social stratification (Bowles & Gintis, 1976). In this social reproduction perspective, schools reward White, middle-class norms, and since many students of color are not exposed to these norms in their home environments, they are often punished for not meeting these norms. This pattern of punishment is reflected, for instance, in the large racial disparities for minor misbehaviors (Skiba et al., 2011) and likely influenced by cultural scripts about what sort of behavior and speech is considered normative in schools. Another explanation for existing racial disparities in exclusionary discipline is that educators subscribe to racial biases against students of color—especially Black students. Consistent with deeply entrenched stereotypes linking Blackness to criminality (Muhammad, 2010), previous studies indicate that educators

surveil Black students more than White students when primed to expect misbehavior (Gilliam et al., 2016), and are more likely to recommend punishment for Black (compared to White) students when they believe that misbehavior is part of a pattern (Okonofua & Eberhardt, 2015). Although educators' biases may persist, when students of color are equipped with SECs, there may be fewer behaviors that lead educators to act on those biases by imposing disciplinary sanctions.

The examination of race/ethnicity and SECs raised other important and unanswered questions. For example, why do larger proportions of Latinx students report low SECs as compared to other groups of students? Differences in SECs could be one of several artifacts of the types of social and structural inequities that Latinx students of color face at higher rates than other students (Doan et al., 2019). Also, it is possible that differences reflect are a byproduct of cultural or linguistic differences in the meaning-making associated with social and competencies (Hinton et al., 2020).

In relation to future research on SECs, this study suggests that it is necessary to consider additional contextual differences in the way SECs are conceptualized, measured, and examined empirically. From a critical perspective, the assumption that SEL and/or SEC is a one-size-fits-all approach has "obscure[ed] the degree to which basic concepts may mean very different things in different cultures" (Hoffman, 2009, p. 542). Hoffman (2009) explained,

> When it comes to understanding the play of emotion and its interrelationship with complex cultural domains of significance such as experiences and understandings of self and others, the difficulties of encoding such understandings into "teachable SEL competencies" for "all children" become evident. (p. 542)

This quote highlights a gap that exists in SEL research—the obfuscation of differing cultural contexts when it comes to understanding how SECs manifest for students. Moving from understanding social emotional competence as one notion into a more particularized understanding of the competencies could help.

Limitations

This study has numerous limitations worth mentioning. As noted, our measure of social emotional competence was a student self-report survey. One advantage of using this kind of data is to avoid well-established biases that have been observed in teacher assessments of student SECs and student discipline (Ura & d'Abreu, 2022). Nevertheless, the data may be limited by students' ability to assess their own behavior. This could be especially true for SECs focused on awareness because students with low social and self-awareness are likely to be poor assessors of their own competence in these areas.

A second issue is related to the use of administrative data to assess the study outcomes. While administrative data are excellent resources for providing population level data, their scale also makes them vulnerable to variations in reporting and recording the data. In the case of this study, the district promoted data quality by providing clear procedures for recording and entering discipline data. Though there were expected procedures, district documentation suggested that the actual processes may have differed depending on the school or the person. Discipline records may have been entered and/or maintained by many different roles within a school, such as front office clerks, deans, or assistant principals. Despite concerns about data quality, these data were the best indicators available to operationalize student discipline.

A final limitation is that the analysis did not account for differences across schools. Extant research is clear that schools frequently have distinct climates as it relates to managing

student behavior, such that even within a district there may be large differences in the rates of disciplinary problems and the use of exclusionary discipline practices (Skiba et al., 2014). This may be all the more important in districts and cities where there is substantial residential or educational segregation. If there are no school-level controls, effects associated with race may be masking school-level effects when students of color and White students are largely attending different schools. In this study, school-level analysis was excluded to protect the confidentiality of the schools and participants. Future studies might pay particular attention to this factor as an additional way of unpacking the racial inequities in disciplinary outcomes.

Conclusion

Previous research does suggest that enthusiasm for SECs is warranted in that these competencies do make a difference in the outcomes of students. This study adds to this literature by noting the special relations between low SECs and student behavior problems, and how this relationship becomes more critical in middle and high school. However, this study does not indicate that SECs have a substantial role in reducing racial and ethnic disparities in discipline outcomes. Thus, schools and districts might look to pair SEL interventions with other policies and practices (e.g., implicit bias training; Skiba et al., 2014) that might address racial disparities more directly.

Acknowledgements

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<div align="center">**References**</div>

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Table 1

Descriptive Statistics and Correlations for Variables Related to RQ1

Variable	n	M	SD	1	2	3	4
Outcome (Discipline)							
1. Incidents	26,852	0.63	2.36	–			
2. ISS	26,852	0.15	0.88	.57*	–		
3. OSS	26,852	0.19	1.21	.48*	.25*	–	
Predictor (SEC Score)							
4. SEC Score	26,852	2.93	0.44	-.07*	-.05*	-.03*	–

Note. ISS = in school suspension, OSS = out of school suspension, SEC = social emotional competence.

*$p < .01$.

Table 2

Descriptive Statistics for Discipline Outcomes by Race/Ethnicity and Grade Tier

	n	Incidents		ISS Days		OSS Days	
		M	SD	M	SD	M	SD
Race/Ethnicity							
Am	34	0.21	1.04	0.03	0.17	0.06	0.34
As	1,237	0.17	0.96	0.07	0.60	0.05	0.51
B	9,554	1.02	3.13	0.23	1.08	0.34	1.54
H	7,398	0.46	1.71	0.14	0.78	0.12	1.11
N	26	0.58	1.33	0.15	0.46	0.00	0.00
T	634	0.69	3.10	0.18	1.54	0.20	1.11
W	7,969	0.39	1.74	0.09	0.62	0.10	0.87
Grade Tier							
ES	9,220	0.13	0.87	0.01	0.14	0.02	0.24
MS	11,690	0.84	2.80	0.22	1.03	0.24	1.11
HS	5,942	0.99	2.82	0.24	1.17	0.37	2.00

Note. Am = American Indian or Alaska Native; As = Asian; B = Black; H = Hispanic or Latinx; N = Native Hawaiian or Other Pacific Islander; T = Two or More Races/Ethnicities; W = White; ES = Elementary; MS = Middle; H = High.

Table 3

Frequencies of Students in Each SEC Level by Race/Ethnicity and Grade Tier

	Low SEC		MidLow SEC		MidHigh SEC		High SEC	
	n	*%*	*n*	*%*	*n*	*%*	*n*	*%*
Race/Ethnicity								
Am	7	0.2	12	0.1	11	0.1	4	0.1
As	164	4.5	465	4.9	450	4.6	158	4.0
B	1,258	34.6	3,311	34.7	3,500	36.0	1,485	37.5
H	1,230	33.9	2,840	29.8	2,509	25.8	819	20.7
N	3	0.1	9	0.1	7	0.1	7	0.2
T	97	2.7	209	2.2	233	2.4	95	2.4
W	873	24.0	2,693	28.2	3,006	30.9	1,397	35.2
Grade Tier								
ES	1,535	42.3	3,173	33.3	3,161	32.5	1,351	34.1
MS	1,490	41.0	4,298	45.1	4,293	44.2	1,609	40.6
HS	607	16.7	2,068	21.7	2,262	23.3	1,005	25.3

Note. Am = American Indian or Alaska Native; As = Asian; B = Black; H = Hispanic or Latinx; N = Native Hawaiian or Other Pacific Islander; T = Two or More Races/Ethnicities; W = White; ES = Elementary; MS = Middle; H = High.

Figure 1

Differences in Discipline Outcomes by SEC Level
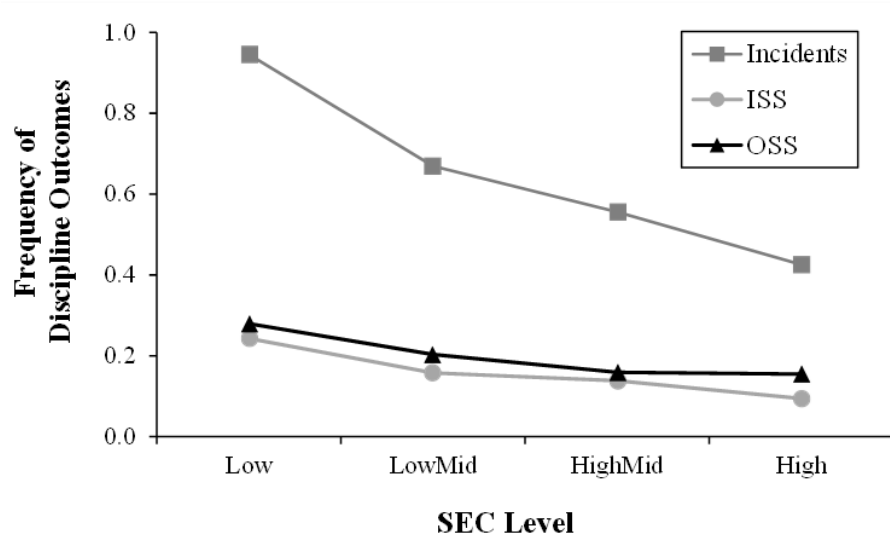
Figure 2

Differences in Incidents by Grade Tier and SEC Level
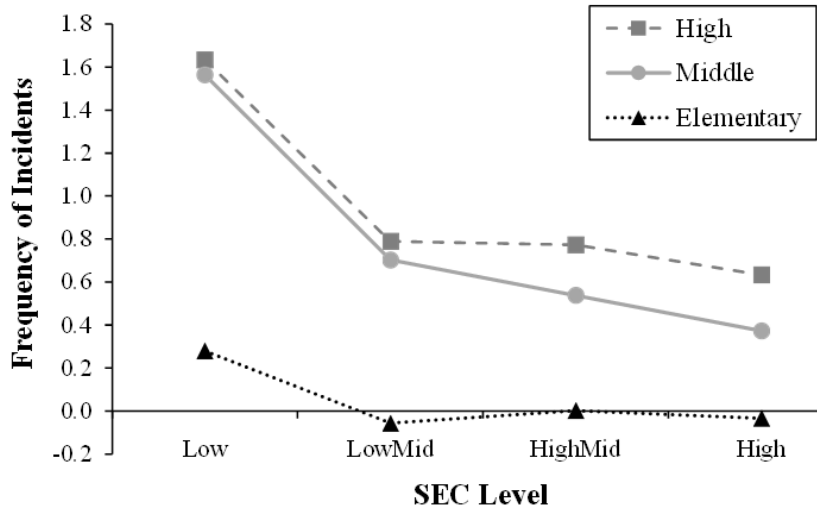
Why School Context Matters: Urban Youth's Social-Emotional Competencies and Community
Violence

Youjin Chung, Maury Nation, Caroline Christopher, Ben Fisher, Caroline Marks

Abstract

This study examines schools' exposure to violent crime and its association with students' social-emotional competencies (SECs). Using crime and school data from Nashville, Tennessee, we found that schools are located in the hotspots of violent crimes. In 2019, there were on average nine violent crime incidents within a two-block boundary of a school. Some schools experienced as many as 171 violent crimes within their two-block radius. Schools with high violence exposure were more likely to be elementary schools and serve disproportionately more Black, economically disadvantaged, or homeless students than schools with lower violence exposure. Students' self-awareness and relationship skills were significantly associated with their schools' exposure to violence. Students in moderate-violence schools reported lower self-awareness and relationship skills than those in low-violence schools. In contrast, students in high-violence schools reported higher self-awareness than those in low-violence schools. Implications for future research, policy, and practices were discussed.

Introduction

Violent crime is a prevalent and destructive social issue in the United States. In 2018, the rate of violent crime was 368.9 offenses per 100,000 population with 1.2 million incidents reported to law enforcement (Federal Bureau of Investigation, 2019). Those statistics are likely to be underestimated by approximately 2.1 million unreported incidents (Bureau of Justice Statistics, 2019). The impact of violent crime is costly to both victims and communities. In

addition to physical and economic harm from crime incidents, exposure to violence is a significant predictor of physical illness, mental disorders, decreased neighborhood activities, reduction in business growth, and negative educational outcomes (American Public Health Association, 2018; National Center for Injury Prevention and Control, 2022).

Schools play a critical role in understanding violent crime and its impact. Studies find that the areas around schools are associated with higher rates of violent crime (Astor, Benbenishty, & Meyer, 2004; Gouvis-Roman, 2002; Hellman & Beaton, 1986; Kautt & Roncek, 2007; LaGrange, 1999; Omega Group, 1999; Roncek, 2000; Roncek & Faggiani, 1985; Roncek & Lobosco, 1983). Youths' exposure to violence is linked to an increased risk for mental health problems (Cooley-Strickland et al., 2009; Cuartas & Leventhal, 2020; McFarlane, 2010; McLaughlin et al., 2013), which puts them at a greater risk for violent behaviors (Cooley-Strickland et al., 2009; Vermeiren et al., 2002; Vermeiren et al., 2003). Social-emotional competencies (SECs) mediate and/or moderate the impact of violence exposure on youth mental health and behavior (Harding et al., 2013; Katz et al., 2007; Zarling et al., 2013). To prevent and improve violent behaviors, schools have implemented social-emotional learning programs with state and district support (O'Conner et al., 2017).

This study examined school-level exposure to violent crime and its association with social-emotional competencies. Using datasets from local police and school district, we first analyzed the distribution of violent crime in close proximity to schools in Nashville, Tennessee. We then categorized schools by levels of violence exposure and identified demographic differences across school-level violence exposure. Linear regression models were used to estimate the effect of violence exposure on youths' social-emotional competencies. The findings were discussed with potential policy and practice implications.

Literature review

Violent crimes are not randomly distributed in the United States. Violent crimes are concentrated in "hotspots" within large cities (Anthony et al., 2009; Andresen et al., 2017; Schnell et al., 2019; Weisburd et al., 2009). These hotspots are clusters of street blocks, intersections, and segments in which the majority of crime incidents occur within a city. Understanding why violent crime occurs in those hotspots is challenging because crime events often depend on specific contexts. However, several studies have identified spatial correlations between violent crime and public housing (Fagan & Davies, 2000; Griffiths & Tita, 2009; Suresh & Vito, 2009), alcohol outlets (Gorman et al., 2001; Scribner et al., 1999; Zhu et al., 2004), and schools (Harth et al.,2022; Murray & Swatt, 2013; Wilcox et al., 2005).

While alarming, it is not very surprising that schools are spatially correlated with violent crime. In criminology literature, school is considered among many public places that create crime opportunities by gathering potential perpetrators and victims (Murray & Swatt, 2013; Schnell et al., 2019; Wang et al., 2019; Wilcox et al., 2005). Schools are also small communities within larger neighborhoods that disproportionately suffer from high population density, poverty, turnover, and violence (Burdick-Will, 2018; MacDonald, 2015; Welsh et al., 2000). Interactions within schools may promote or inhibit violence outside of school (Mateu-Gelabert & Lune, 2003). As a meso-level force, schools shape and are shaped by the dynamics between their members (e.g., students, teachers, administrators, support staff) and neighborhoods. Therefore, schools have become an important unit of analysis for understanding violent crime and its impact.

School-age youths are highly exposed to violence in urban areas. In their meta-analysis of community violence exposure, Fowler et al. (2009) found that 50-96% of children and

adolescents in US cities are exposed to some form of violence in their neighborhoods. Koposov et al. (2021) found that over 40% of students aged 12-17 in New Haven, Connecticut reported witnessing violent incidents (i.e., being threatened with serious physical harm, beaten up or mugged, shot or shot at with a gun, attacked with a knife, chased by gangs, or seriously wounded in a violent incident) within a year prior to taking the survey. Higher levels of serious violence exposure were observed in school among elementary (56-64 %), middle (79-83%), and high (72-87%) school youth in Denver, Colorado and Cleveland, Ohio (Flannery et al, 2004). Rates of violence exposure seem constant across years, indicating that inner-city youths are chronically exposed to violence while they attend school in high-violence neighborhoods (Gorman-Smith et al., 2004; Lambert et al., 2005; Lynch & Cicchetti, 1998).

Exposure to violence negatively impacts youths' mental and behavioral health. Studies show that violence exposure is associated with increased risks of deviant and aggressive behaviors (Gorman-Smith et al., 2004; Gorman-Smith & Tolan, 1998; Lynch & Cicchetti, 1998; Miller et al., 1999; Schwab-Stone et al., 1999), symptoms of posttraumatic stress disorder (Fitzpatrick & Boldizar, 1993; Horowitz et al., 1995; Lynch & Cicchetti, 1998) and depression and anxiety (Cooley-Quille et al., 2001; Kliewer et al., 1998; Lynch & Cicchetti, 1998). Youths' violence exposure is also likely to damage long-term health, educational, and economic outcomes, as one of the adverse childhood experiences (Centers for Disease Control and Prevention, 2022). Social-emotional competencies (SECs) may mediate the impact of violence exposure on youths' behavior. SECs consists of five intra- and inter-personal skills that inversely predict problem behaviors, including aggression, delinquency, and substance, among school-aged youth (Domitrovich et al., 2017). While there is ample evidence for SECs, when in deficit, as risk factor for behavioral problems (Arsenio et al., 2009; Cook et al., 2010; Moffitt et al.,

2011; Trentacosta & Fine, 2010), few studies have documented a mediating effect of SECs on certain types of violence, often in family settings (Bender et al., 2022; De Boo & Prins, 2007; Hong et al., 2012; Kantz et al., 2007).

This study addresses several gaps in the extant literature. First, the study examines exposure to violence using police-reported data. Most studies that examined violence exposure have used surveys from students who reported their experience for the past year. This method is subject to several biases as the data relies on the students' long-term memory and interpretation of the survey items. Second, we examine violence exposure at school and its impact through geospatial analyses. The surveys used in the violence exposure studies could not distinguish where students were exposed to violent crimes. By using proximity between school and violent crime, this study enables us to separate violence exposure at school from other places (e.g., home, work, friend's place, local stores, parks). Third, to our knowledge, this is the first study that investigates the relationship between violence exposure and SECs in school setting. The study aims to provide researchers, educators, and policymakers with analytic methods and practical information through large-scale data from local government agencies.

Research questions

The study examines the extent to which schools are exposed to violent crime and school-level violence exposure is associated with SECs in Nashville, Tennessee. Specifically, we explore the following research questions:

1) To what extent are schools exposed to violent crime?

2) How do school characteristics vary by different levels of violence exposure?

3) To what extent are SECs associated with school-level violence exposure?

Methods

Data

We used three longitudinal datasets from the Metropolitan Nashville Public Schools (MNPS) and crime data from the Metropolitan Nashville Police Department (MNPD). MNPS datasets include administrative data on student demographic characteristics (e.g., age, gender, race, disability, economic disadvantage, homelessness) and school characteristics (e.g., school tier, location), for the school years (SY) 2009-2021. We also used the MNPS survey data on students' social-emotional competencies. The survey data was collected from students in grades 3-12 with their parent/guardian's consent from SY 2019-2021. The survey response rates were 75% in SY 2019, 62% in SY 2020, and 42% in SY 2021. MNPD data contains information about police-reported crime incidents, including their date, location, offense type, involved weapon, and victim's demographic information. The crime data covers the fiscal years 2015-2022.

Sample

Selecting the study sample involved a three-step process. First, we used the data with the most restricted sample (i.e., MNPS survey data) to select our sample population. We further restricted our sample to the year 2019 due to the low survey response rates in 2020-2021 and potential confounding effect from COVID19. The same selection criteria were applied to the administrative data, which limited the sample to the schools whose students responded to the survey in SY 2019. Lastly, the crime data was restricted to violent crimes that occurred in SY2019. We defined violent crime based on the Federal Bureau of Investigation (FBI)'s Uniform Crime Reporting Program and included crime incidents of murder and nonnegligent manslaughter, rape, robbery, and aggravated assault (FBI, 2019). The final sample included

31,500 students in 131 public schools from the MNPS datasets and 7,434 violent crime incidents for SY 2019.

Analysis

We estimated schools' exposure to violence using buffer analysis. Buffer analysis involves creating a zone around a geographical feature within a specified distance from the feature. For this study, the geographical feature of interest was individual schools, and the zone was the area in which schools would be exposed to violence. Schools' exposure to violence was measured by the number of violent crime incidents within a two-block radius of a school. Community psychology literature suggests that violence exposure is often operationalized as a two-block radius and that Chicago's block measure (i.e., two-block is approximated to 1,320 feet) is a standard measure for U.S. cities when a local block measure is not available (DaViera & Roy, 2019). After measuring violence exposure for each school, descriptive statistics were estimated to understand the patterns of violence exposure across Nashville schools. Then, schools were classified by their levels of violence exposure. "Low-violence" schools are those that had one violent crime within their two-block radius. "Moderate-violence" schools experienced between the median (2) and mean (8.88) number of violent crime, and "high-violence" schools had nine or more violent crime. We compared school-level characteristics, including school tier (i.e., elementary, middle, and high school) and student demographic information (i.e., percentages of each racial group, students with disability, economic disadvantaged students, and homeless students) across the three levels of violence exposure.

Next, we examined the association between violence exposure and SECs, using ordinary least-squares models. Five SECs – self-awareness, self-management, social awareness, relationship skills, and responsible decision-making – are tested in the analysis. For each SEC,

we first tested its association with violence exposure without any control variables. We
introduced school tier and individual student characteristics as control variables in the
subsequent model. The full model looked like the following:

$$SEC_{ij} = Individual_{ij} + School_j + Exposure_j + e_{ij}$$

The dependent variable is a SEC for an individual student i in school j. The *Individual* variables
include the student's gender, race, economic disadvantage status, disability status, English
language learning status, and homelessness. The *School* variable indicates whether the school is
an elementary, middle, or high school, and the *Exposure* variable refers to whether the school
has low, moderate, or high exposure to violence. e indicates an error term for the student i in
school j.

Missing data

In the survey data, we found that more than 30% of the SEC information was missing.
After assessing the patterns of missing data, we found that students' grade and English language
learning status were statistically associated with missing data across all SECs. However, the
difference between missing and non-missing data were minimal (e.g., their means and standard
deviations were identical to the first decimal point; their percentage point differences were 5
points or less). Following guidance from statistical literature, we applied a multiple imputation
method to mitigate potential bias that may stem from missing data (Schafer & Olsen, 1998). In
the imputation model, we included students' school, grade, and English language learning status
as well as the other variables used in our analytic model (i.e., students' demographic information,
school tier, survey version, and exposure to violence). We also included individual survey items
that were used to estimate SEC composite scores in the imputation model, as those items were
likely to predict SEC information.

Results

Figure 1 shows the map of violent crime and school locations in Nashville, TN for SY 2019. In SY 2019, there were 7,434 violent crime incidents, which are marked in red dots in Figure 1. We see that violent crime incidents are concentrated in the central area and on the east side of the city, and that most schools are located in those hotspots of violent crime. Descriptive statistics confirm this geographical pattern (see Table 1). On average, Nashville schools were exposed to nine violent crime incidents. Exposure to violence varied substantially across schools. While half of the schools were exposed to one or two violent crimes, some schools experienced as many as 171.

Table 1. Summary statistics of Nashville schools' exposure to violence in 2019.

Total number of schools	131
Number of violent crimes in 2-block radius	
- Mean	8.89
- Standard deviation	20.92
- Minimum	1
- Median	2
- Maximum	171

Violent Crimes and Public Schools in Nashville, TN (2019)
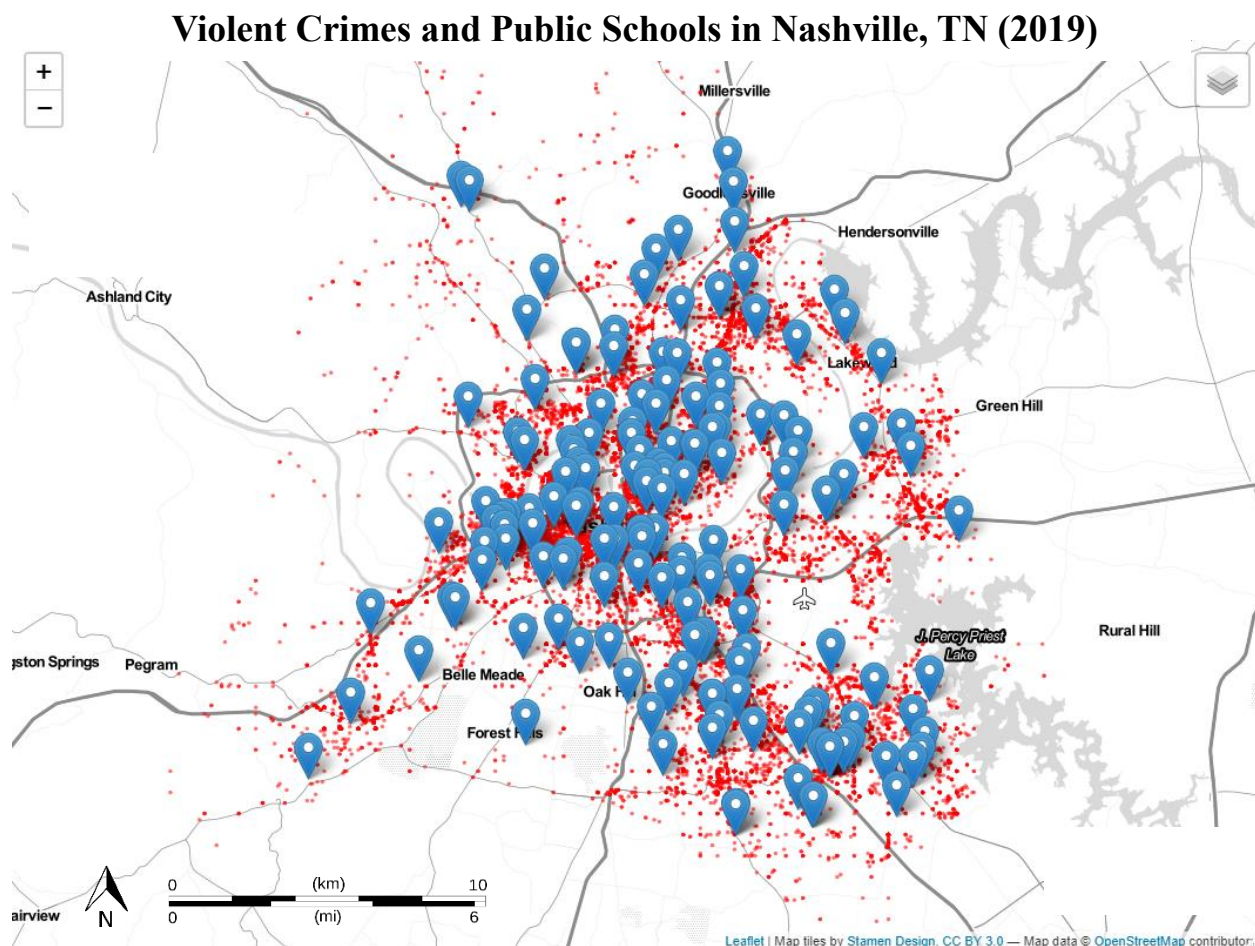
Figure1. Map of violent crimes and public schools in Nashville, TN (SY 2019)

Student demographic characteristics differed based on schools' exposure to violence (see Table 2). Elementary schools were more likely to have higher violence exposure than middle and high schools. The proportion of elementary schools increases as violence exposure increases (50% of low-violence schools, 54% for moderate, and 63% for high). Black students were more likely to attend schools with higher exposure to violence, whereas White and Asian students were less likely to attend those schools. On average, 63% of students in high-violence schools were Black. Relatively fewer Black students attended low (33%) and moderate (42%) violence schools. The opposite was true for White and Asian students whose representation grew as

schools' violence exposure decreased. Economically disadvantaged or homeless students were also more likely to attend schools with higher violence exposure. On average 58% of students in high-violence schools were economically disadvantaged, and 5% were homeless. Those statistics are lower in low (35% economically disadvantaged, 2% homeless) and moderate (50% economically disadvantaged and 4% homeless) violence schools.

Table 2. School and student characteristics by levels of violence exposure

	Exposure to violence		
	Low	Moderate	High
Number of schools	47	57	27
School level			
Elementary	50%	54%	63%
Middle	28%	25%	19%
High	22%	21%	18%
Proportion of students (mean)			
Male	0.49 (0.08)	0.52 (0.01)	0.47 (0.07)
Female	0.51 (0.08)	0.48 (0.10)	0.53 (0.07)
Black	0.33 (0.21)	0.42 (0.24)	0.63 (0.31)
Hispanic	0.19 (0.15)	0.28 (0.21)	0.15 (0.20)
White	0.41 (0.22)	0.24 (0.17)	0.17 (0.19)
Asian	0.06 (0.04)	0.03 (0.02)	0.02 (0.04)
American Indian/Alaska Native (AIAN)	0 (0)	0 (0)	0 (0)
Native Hawaiian/Pacific Islander (NHPI)	0 (0)	0 (0)	0 (0)
Multi-race	0.02 (0.02)	0.03 (0.02)	0.02 (0.02)
Economically disadvantaged (ED)	0.35 (0.18)	0.50 (0.17)	0.58 (0.27)
Students with disability (SWD)	0.13 (0.14)	0.14 (0.13)	0.12 (0.06)
English language learner (ELL)	0.11 (0.10)	0.17 (0.15)	0.11 (0.16)

Homeless	0.02	0.04	0.05
	(0.02)	(0.04)	(0.07)

Note: standard deviations are noted in the parenthesis.

The regression analyses showed significant relationships between schools' violence exposure and students' self-awareness (see Table 3). On average, students in high-violence schools had higher self-awareness scores than those in low-violence schools. Students in moderate-violence schools had lower self-awareness scores than those in low-violence schools. There was a significant difference in relationship skills between low-violence and moderate-violence schools. Students in moderate-violence schools had lower relationship skill scores than low-violence schools.

Table 3. Pooled OLS regression estimates of violence exposure on student SECs

	Self-awareness	Self-management	Social awareness	Relationship skills	Responsible decision-making
Exposure to violence (reference = low)					
Moderate	-0.018**	0.012	-0.034	-0.046*	-0.015
	(0.004)	(0.012)	(0.034)	(0.070)	(0.023)
High	0.029**	0.071	-0.033	-0.013	0.035
	(0.008)	(0.092)	(0.132)	(0.078)	(0.097)
N	31,432	31,433	31,437	31,436	31,437

*p-value <0.05, ** p-value < 0.01
Note: the regression analysis was conducted in each imputed dataset and these estimates were pooled across 10 imputed datasets.

After controlling for school and demographic characteristics, the effect of violence exposure remained significant only for relationship skills. This indicates that student SECs were more likely to be explained by school level and student demographic information. For example, middle school students on average had lower self-management, social awareness, relationship skills and higher self-awareness and responsible decision-making than elementary school

students. High school students reported higher relationship skills and responsible decision-making than elementary school students. Race was also a significant predictor of several SECs. Black students had higher self-awareness and self-management, and lower social awareness and relationship skills than White students. Hispanic and Asian students reported lower self-awareness, social-awareness, and responsible decision-making than White students. Economic disadvantage, disability, and English language learning status also negatively predicted multiple SECs.

Table 3. Pooled effects of violence exposure on student SECs and control variables

	Self-awareness	Self-management	Social awareness	Relationship skills	Responsible decision-making
Exposure to violence (reference = low)					
Moderate	-0.011	0.000	-0.023	-0.047*	-0.012
	(0.006)	(0.011)	(0.034)	(0.016)	(0.022)
High	0.013	0.044	-0.036	-0.013	0.008
	(0.008)	(0.092)	(0.133)	(0.079)	(0.098)
School levels (reference= elementary)					
Middle	0.022**	-0.035**	-0.036**	-0.044**	0.075**
	(0.007)	(0.010)	(0.010)	(0.008)	(0.011)
High	0.014	-0.008	-0.023	0.059**	0.179**
	(0.008)	(0.011)	(0.013)	(0.009)	(0.013)
Gender (reference = male)					
Female	-0.016**	-0.044**	0.047**	0.015	0.030**
	(0.005)	(0.011)	(0.007)	(0.008)	(0.010)
Race (reference= White)					
Black	0.023**	0.089**	-0.051**	-0.069**	0.019
	(0.007)	(0.009)	(0.009)	(0.010)	(0.011)
Hispanic	-0.033**	0.008	-0.029**	0.014	-0.035**
	(0.008)	(0.011)	(0.009)	(0.009)	(0.011)
Asian	-0.064**	-0.015	-0.054**	-0.012	-0.090**
	(0.015)	(0.018)	(0.015)	(0.015)	(0.018)
AIAN	-0.034	0.055	-0.032	-0.105	-0.099
	(0.073)	(0.108)	(0.077)	(0.095)	(0.094)
NHPI	-0.077	-0.034	-0.076	-0.143	0.008
	(0.079)	(0.114)	(0.083)	(0.095)	(0.102)
Multi-race	-0.004	0.009	-0.021	-0.062**	-0.025
	(0.018)	(0.029)	(0.019)	(0.023)	(0.026)
ED	-0.009	0.013	-0.021**	-0.020**	-0.026**

	(0.006)	(0.008)	(0.007)	(0.008)	(0.008)
SWD	-0.092**	-0.016**	-0.092**	-0.077**	-0.109**
	(0.009)	(0.011)	(0.012)	(0.010)	(0.012)
ELL	-0.121**	-0.016	-0.110**	-0.086**	-0.184**
	(0.010)	(0.020)	(0.014)	(0.014)	(0.014)
Homeless	-0.006	-0.026	-0.018	-0.006**	0.003
	(0.021)	(0.029)	(0.018)	(0.022)	(0.023)
N	31,431	31,432	31,436	31,435	31,436

*p-value <0.05, ** p-value < 0.01

Note: the regression analysis was conducted in each imputed dataset and these estimates were pooled across 10 imputed datasets.

Discussion

Overall, the study confirms that schools are located in hotspots of violent crime. It also found a substantial variation in violence exposure across schools. Elementary schools were more likely to be exposed to violent crime than middle and high schools. Black, economically disadvantaged, or homeless students were more likely to attend schools with high violence exposure, whereas White or Asian students were less likely to attend those schools. The first finding aligns with urban planning literature that crime does not randomly occur in many cities (Taylor 2001; Sampson 2012; Weisburd et al., 2012). Cities have been designed to affect human interactions, and many social problems (e.g., poverty, crime, illness, substance use) are concentrated in small areas (MacDonald, 2015). We also know that there are disparities across racial/ethnic groups in income, health, and education (Beech et al., 2021) and that racial minority groups have experienced unequal and unjust treatment through spatial segregation (Lichter et al., 2012). Findings from this study further support racial inequity in aspects of school safety.

This study also found significant associations between students' self-awareness and relationship skills and their schools' violence exposure. Students in moderate-violence schools reported lower self-awareness than those in low-violence schools, whereas students in high-

violence schools showed higher self-awareness than students in low-violence schools. This finding may look paradoxical to some people. Developmental psychology literature suggests that violence exposure is negatively associated mental and behavioral problems among children and adolescents (Fowler et al., 2009), and we may hypothesize that the same negative association would exist between violence exposure and SECs. However, we found that the association between violence exposure and self-awareness was not linear and that students in high-violence schools may think about themselves and behave differently from those in low- and/or moderate-violence schools. One factor that may explain this finding is the chronicity of violence exposure. Studies have shown that students who were chronically exposed to violence reported fewer depressive symptoms and that they may have developed coping mechanisms to protect themselves from frequent and long-term exposure to external stimuli (Fitzpatrick, 1993; Gump & Matthews, 1999; Susman, 2006). While this study does not examine the effect of chronic exposure to violence, crime is spatially concentrated in certain locations over time (Lee et al., 2017) and most students stay in one school until graduation (Swanson & Schneider, 1999). Consequently, students in high-violence schools may have been frequently exposed to violence over a long period of time and they have become less sensitive to violent incidents that occur around their school. On the other hand, students in moderate-violence schools may have not been as exposed to violence as those in high-violence schools and feel more unsafe and uncertain about how they should react to violence.

Other SECs (i.e., self-management, social awareness, and responsible decision-making) were not significantly associated with exposure to violence. This, however, does not necessarily indicate that schools' violence exposure does not affect student SECs. One limitation of this study is that we have not examined a causal relationship between violence exposure and SECs.

While we hypothesized that a close proximity from violent crime to school may influence students' SECs, it was unclear precisely how students experience violence (e.g., direct involvement, witnessing, words of mouth) and change their thoughts and behaviors based on the experience. It is possible that students who were directly involved in or witnessed violent crime incidents express difficulty managing emotions, empathizing with their peers, and making sensible decisions, and that those students represent a small group of students who does not share their experience of violence with peers within schools. It is also possible that schools with higher exposure to violence have supported students' social-emotional development through their curriculum, counseling services, and collaboration with community health clinics. We were not able to examine those hypotheses in this study and could benefit from future analyses on the impact of school interventions on students who struggle to cope with traumatic experiences.

Another limitation of this study comes from using surveys to collect students' SEC information. The study is subject to a non-response bias as more than 30% of SEC composite scores were missing. We tried to mitigate this issue through multiple imputation. Multiple imputation has been a widely used strategy for handling missing data, and it corrects for potential non-response bias when data is missing at random (Schafer & Olsen, 1998). Two variables – grade and English language learning status – were minimally associated with missing data and we have incorporated those variables as well as other variables in the analytic model in our imputation model. However, whether data is missing at random cannot be verified through statistical tests (Little, 2021). If our data were not missing at random, multiple imputation may have not adequately corrected for non-response bias. The survey data may also be subject to acquiescence bias (i.e., students could have responded more positively about themselves than what they truly believe). While it is difficult to verify the presence of this bias, we have asked

students whether they have honestly answered the survey and excluded those who reported dishonest responses.

The study provides important implications for research, policy, and practice. Future studies on causal effects of violence exposure on SECs could inform how students process violence and change their thoughts and behaviors in response. Longitudinal studies can also help us better understand the impact of chronic vs. acute exposure to violence on SECs. For policymakers, this study showed that violent crime is prevalent in school surroundings and that schools may need additional support to reduce violence exposure. Furthermore, violence exposure may not be the only or primary issue for schools with higher exposure to violence as there are other structural problems in those schools (e.g., disproportionately more Black, economically disadvantaged, or homeless students in high-violence schools). Policymakers should identify concerns and priorities of the schools exposed to higher violence and allocate adequate resources based on school needs. Although educators have limited capacity to prevent or reduce violence exposure around their school, they may have greater capabilities to improve students' SECs. SECs seem to be more associated with individual student characteristics (i.e., gender, race, poverty, disability, English language learner) than violence exposure. Teachers and school support staff can tailor their instruction and services based on student needs, which may increase SECs more effectively than district-wide or municipal policies.

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School Policies as Mediators of the Impacts of Community Violence on Student Outcomes

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Note: Tables and formatting will be finalized in a Word doc later. They are currently screenshots of auto-generated outputs.

Introduction

A student's zip code has an impact on educational outcomes, but there is nothing inherent to an address that impacts students. There are other factors in how families and schools are distributed that need to be understood to examine geographic disparity that manifests in schools. Various solutions have been proposed to address this long-acknowledged disparity by transcending local school boundaries, including bussing students to and from segregated schools, magnet programs, and charter schools that exist outside traditional structures. These policy-level approaches all seek to address geographic disparities in education by attempting to remove the student's zip code as a factor in where they are educated. Much less emphasis has been placed on understanding how educational structures engage unique geographic disparities in the context of individual schools. There is complexity in how where a student lives travels with them into the classroom that is not as clear cut as presented in these solutions.

It is important to understand the ways in which historic disparities are perpetuated by existing systems, but this line of research often focuses on extrapolating individual characteristics with the implicit assumption that the student is translating external disadvantages into the classroom (Gregory et al., 2010). The presumption that students from disadvantaged neighborhoods have innate issues that need to be addressed by schools can shape how interventions are applied. Schools' efforts to implement interventions and policies to interrupt and alleviate the impacts of neighborhood disadvantages on academic outcomes can be countered by restrictive policies that produce the very outcomes the interventions seek to avoid.

Discipline policies, for example, have disparate impacts on students from marginalized communities (Skiba et al., 2011), but it is underexplored how these disparities are produced. Mechanisms within schools can respond to disadvantage in ways that reinforce vicious patterns. Externalizing behaviors, especially aggressive behaviors (Pittman, 2022), are prominent in many discipline systems implemented at schools. How common externalizing behaviors are addressed in schools has a targeted impact on the school experience for students from disadvantaged neighborhoods who are often the recipients of school sanctions..

Various characteristics of a neighborhood, like physical disorder (Smart et al., 2020), violent crime (McCoy et al., 2013), and social cohesion (Maurizi et al., 2013), are often explored as predictors of academic outcomes. Exposure to violence in this context is of particular interest because of its acute impacts on victims and the stigma it creates around certain neighborhoods. Violent offenses at school are typically sanctioned more severely (Bell, 2015). Students implicitly or explicitly associated with violence because of where they live may see this impact in the frequency and type of discipline they receive. The most concerning outcome is when students receive sanctions that remove them from the learning environment and compound the chronic absenteeism associated with marginalized communities (Rosenfeld et al., 2006). Schools more often exposed to community violence through students' at-home experiences may have different structures orientations toward externalizing behaviors associated with exposure to violence that lead to increases in the use of Out of School Suspension (OSS) as a sanction and chronic absenteeism among students. This study seeks to better understand how school discipline policies can mediate the academic outcomes associated with neighborhoods that experience a high amount of violence through two research questions:

1. Are non-severe offenders more likely to be sanctioned with OSS if the student lives in a high-violence neighborhood?

2. Do schools that make more use of OSS have higher rates of chronic absenteeism?

a. Alt: Is there an interaction between OSS and HVN that leads to increased rates of chronic absenteeism?

High-Violence Neighborhoods

Violent crime is not randomly distributed and tends to concentrate in specific neighborhoods and streets (O'Brien et al., 2022). In these contexts, Community Violence Exposure (CVE) is virtually unavoidable. CVE is often measured by witnessing or being personally victimized by violent crime (Martin et al., 2013). Using geo-coded crime reports from a large southeastern city, the concentration of violent crimes in neighborhood block groups is used to identify high-violence neighborhoods across the city. In these communities, it is highly unlikely that adolescents have not been exposed to violence.

Various mechanisms have been explored in understanding how CVE creates disparities that are distinct from neighborhood disadvantage generally. Studies have linked higher neighborhood crime to lower standardized test scores (O'Brien et al., 2021), but it is unclear which mechanisms produce these disparities. There is a confluence of influences that can lead to students living in high-violence neighborhoods that are not captured when examining CVE. These underlying characteristics are all mapped onto the perceptions of communities that experience a high amount of violent crime. Cultural biases against Blackness and poverty manifest from this association with violent neighborhoods as a result of decades of discriminatory housing policy and segregation. Violent neighborhoods are a socialized concept and not necessarily a practical one (Swart et al., 2022) and it could be expected that academic outcomes for students in violent neighborhoods would align with other marginalized groups. For example, the same mechanisms that produce racial disparities are related to the mechanisms that produce neighborhood disparities.

A distinct feature of CVE amongst other neighborhood disadvantages is the impact it has on students' attendance. Factors within a student's neighborhood that interfere with their access to schooling have rippling consequences. Chronic absenteeism has been tied to neighborhood

disadvantage and the violence students are exposed to on the way to and from school (Burdick-Will et al., 2019). Perceptions of the lack of safety traveling for school increases the likelihood that students will miss school, and therefore critical content in their coursework. Time missed in the classroom can be difficult to recover, and its consequences are well studied (Ansari & Gottfried, 2020). There is a clear and direct link between living in high-violence neighborhoods and chronic absenteeism, but it is less clear how this informs school-based approaches for addressing how students bring their neighborhood contexts into the classroom.

School Discipline Policies

Mechanisms within schools also produce disparities separately from the neighborhood context. Research in education has long studied how discipline policies in particular can shape a student's relationship with their school and perpetuate existing inequities. Students who receive Out of School Suspensions (OSS) face a host of challenges throughout their schooling and into their adult lives. Severe sanctions can represent a turning point for at-risk students.This can be especially problematic when OSS is applied to offenses where it isn't warranted (Wang et al., 2023). Disproportionate use of OSS based on students' characteristics is already well documented (Skiba et al., 2008; Gregory et al., 2010; Skiba et al., 2011), and Perry and Morris (2014) have identified collateral consequences of a culture of control even for students who don't receive sanctions.

Schools take different approaches to discipline for several reasons, but it needs to be better understood how proximity to violence can lead to use of policies that are known to generate or exacerbate existing disparities. The interaction between neighborhoods, schools, and disadvantage is not well explained by literature that focus on a single pathway of producing disparities. There are additional factors at the neighborhood and school level that contribute to the compounding of disparities through increased OSS for those from high-violence neighborhoods. Prior studies have linked adverse childhood experiences, like exposure to community violence, to disparate outcomes following OSS (Leban & Masterson, 2015). Cultural

biases in the use of OSS seen in racial disparities (Yaluma et al., 2022) relate to biases toward the neighborhood a student lives in.

Schools that wield OSS as the sanction of choice are particularly problematic in contexts where violence is already producing disparities in the community. Being removed from the learning environment is consequential for students, but that is especially true when students are returned to high-violence neighborhoods where they may be exposed to violence. Restrictive policies create more behavior reports (Wilkerson & African, 2015) that are increasingly associated with specific communities, leading to self-fulfilling expectations of problematic behavior. Sanction severity that is more closely connected to the student's characteristics than to the offense they commit reveals a pathway for school policies to inadvertently create the disparities seen in community-level analyses of academic outcomes.The two stages of this analysis provide a basis for understanding just one mechanism for how these cultural and geographic biases can create disparate outcomes.

Methods

Data and Sample

From July 2018 to June 2019, there were [###] reported crimes. Using the universal crime reporting definition of violent crime (FBI, 2019a), the data were reduced to include only reports of aggravated assault, murder and nonnegligent manslaughter, forcible rape, and robbery. These totaled [###] and made up [%%] of the crime reported during the year. Violent crimes were mapped using QGIS and assigned to neighborhood block groups by counting the number of points within each polygon. High-violence neighborhoods were designated using the 75th percentile of 13.67 violent crimes per person as a threshold. This indicates that 115 of 460 neighborhoods are seeing more than one violent crime every four weeks on average. It should be noted that this threshold is relative to crime within the studied area and not the country as a whole. As is often the case with large cities, the rate of violent crime is much higher than the country average of 3.66 violent crimes per 1,000 people (FBI, 2019b). Across the city, 281

(61%) neighborhood block groups surpassed the nationwide average. The median number of violent crimes in a given neighborhood is more than one and a half times the national average at 5.68 violent crimes per 1,000 people. Table 1 identifies the demographic breakdown of these neighborhoods.

Table 1: Descriptive Statistics by Neighborhood Violence (N = 18177)

	Non-viol		High-viol		Total	
	Mean/Prop.	n	Mean/Prop.	n	Mean/Prop.	n
Neighborhood Population	2501.46	-	1699.57	-	2259.13	-
Neighborhood Proportion Black	.31	-	.45	-	.35	-
Neighborhood Crimes per 1000 People	5.59	-	32.03	-	13.58	-
Total Students	-	12,684	-	5,493	-	18,177
Student Proportion Black	.39	4,924	.54	2,979	.43	7,903
Student Econ. Disadvantaged Flag	.41	5,164	.58	3,173	.46	8,337
Student Disability Flag	.13	1,643	.16	856	.14	2,499
Student Received OSS	.18	2,245	.24	1,298	.19	3,543
Out-of-school Suspensions	.42	5,324	.59	3,239	.47	8,563
Student Committed Serious Offense	.07	950	.11	585	.08	1,535
Serious Offenses (per student)	.10	1,289	.14	789	.11	2,078
Student Missanctioned	.11	1,383	.14	786	.12	2,169
Chronically Absent	.31	3,977	.40	2,194	.34	6,171
Absences	13.26	168,231	15.76	86,556	14.02	254,787

The partner school district provided student administrative data for the 2018-19 school year, including demographic data, where the student lives, and whether or not they attend their zoned school. There are 12 traditional high schools in the district that are examined in this study, covering 18,177 students. Non-traditional and charter schools are excluded from the analysis. Each school has a catchment area that assigns which high schools students attend based on where they live. This naturally organizes students into schools geographically, but they are not sorted perfectly for a variety of reasons. Students have the option to attend non-zoned schools and other schools outside the traditional school system (e.g., magnet programs),

but there are requirements students must meet in order to be eligible. Relevant demographic characteristics for all schools are captured in Table 2.

Dependent Variables

Pulling from provided school data, students with at least one OSS were coded as having been suspended (1 = suspended, 0 = never suspended) and students with at least one serious offense reported were coded as serious offenders (1 = serious offender, 0 = no serious offenses). Serious offenses are summed from reports of physical violence, threat, weapon, and gang offenses. The primary population of interest is students who received OSS (suspended = 1) during the school year without committing a serious offense (serious offender = 0). These students are coded as *missanctioned*. Offenses and sanctions are not temporally linked in the

Table 2: Descriptive Statistics by School (N = 18177)

	School 1		School 2		School 3		School 4		School 5		School 6		School 7		School 8		School 9		School 10		School 11		School 12	
	Mean/Prop.	n	Mean/Prop.	n	Mean/Prop.	n	Mean/Prop.	n	Mean/Prop.	n	Mean/Prop.	n	Mean/Prop.	n	Mean/Prop.	n	Mean/Prop.	n	Mean/Prop.	n	Mean/Prop.	n	Mean/Prop.	n
Total Students	-	2,204	-	2,568	-	1,450	-	1,202	-	725	-	2,225	-	1,280	-	932	-	782	-	1,243	-	1,584	-	1,982
Student Proportion Black	.19	422	.39	1,007	.21	305	.69	828	.93	672	.36	795	.52	661	.71	661	.83	646	.34	428	.45	713	.39	765
Student Econ. Disadvantaged Flag	.38	846	.42	1,090	.45	648	.66	793	.75	542	.40	882	.30	385	.67	621	.63	490	.37	464	.51	813	.38	763
Student Disability Flag	.09	200	.14	358	.10	147	.17	210	.24	173	.12	256	.16	199	.19	179	.20	160	.16	202	.13	198	.11	217
HVN	.35	780	.28	731	.40	587	.30	363	.63	460	.22	497	.26	333	.43	402	.40	315	.15	186	.30	478	.18	361
Student Received OSS	.08	174	.17	445	.24	350	.31	375	.23	170	.27	606	.17	217	.27	250	.36	281	.11	140	.19	302	.12	233
Out-of-school Suspensions	.16	357	.49	1,249	.67	967	.80	961	.40	289	.65	1,438	.49	622	.64	596	1.01	786	.20	244	.41	642	.21	412
Student Committed Serious Offense	.04	79	.06	153	.08	116	.16	197	.15	108	.08	170	.06	80	.12	113	.15	118	.08	98	.11	179	.06	124
Serious Offenses (per student)	.05	103	.08	199	.12	168	.24	291	.18	130	.10	229	.08	106	.17	154	.19	151	.11	135	.16	252	.08	160
Student Missanctioned	.05	114	.12	305	.17	243	.16	195	.11	80	.20	445	.11	143	.16	148	.23	179	.05	60	.09	141	.06	116
Chronically Absent	.30	658	.28	720	.37	535	.44	524	.46	337	.31	688	.27	340	.52	487	.48	372	.30	373	.36	571	.29	566
Absences	13.31	29,346	11.44	29,372	14.42	20,911	17.82	21,420	16.34	11,850	13.59	30,243	12.90	16,509	20.36	18,979	18.28	14,294	13.00	16,165	13.95	22,098	11.91	23,600

data, so a more conservative calculation is made for a missanctioned student; Students are only considered missanctioned if they never commit a serious offense during the school year. The 2,169 students identified as missanctioned Table 1 received 2,748 (32%) suspensions, totaling 4,585 days out of school.

The second stage of the analysis focuses on how living in a high-violence neighborhood and being missanctioned interact to increase the rate that students are flagged as chronically absent. Students are considered chronically absent in the partner district if they are absent for more than 10% of the days for which they are enrolled. Both unexcused and excused absences (including OSS) contribute to the chronic absence calculation. A binary variable is provided by the district to indicate which students they consider to be chronically absent.

Independent Variables

The primary relationship of interest is the effect that living in a high-violence neighborhood has on if a student is missanctioned. It is important to include factors at the student level known to influence the use of suspension separately from offense severity. Variables of interest to the partner school district include whether or not the student is Black, economically disadvantaged, or is a student with disability. These variables all are known to have a relationship with OSS (Gregory et al., 2010; Skiba et al., 2011) and will serve as moderators. Students who commit a serious offense would be expected to receive suspensions regardless of where they live, but they are disincluded in this analysis due to the method of calculating the dependent variable. In the second stage of analysis, student missanctions serve as a predictor of absenteeism in addition to the previous covariates.

Analytic Strategy

A logit model was used to examine the overall effect of living in a high-violence neighborhood on being missanctioned with student race, economically disadvantaged flags, and student with disability flags included as covariates. Although neighborhoods are technically zoned to a specific school, students have the option of attending another school in the district under certain circumstances. This means that neighborhoods are not perfectly nested within schools, making it impractical to use a hierarchical model. Sensitivity analyses followed to evaluate the effect size and statistical significance within each of the 12 high schools individually. For the second stage of analysis, the interaction of being missanctioned and living in a high-violence neighborhood on the likelihood of being chronically absent during the school year was examined using a logit model. The same covariates are included as moderators and sensitivity analyses were repeated for each of the 12 high schools.

<div align="center">

Results

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Table 1 describes the characteristics of the population examined in the study in addition to some contextual information about the neighborhoods. Tests of proportions and t-tests

demonstrate statistically significant differences between high-violence neighborhoods and relatively non-violent neighborhoods across all statistics with p-values less than 0.001. Of particular note are the moderators that will be used in the following analyses. Students from high-violence neighborhoods are more likely to be Black, economically disadvantaged, and have a disability. Students who were missanctioned also are a distinct population from students who were not missanctioned at the district level. Table [6] identifies the characteristics of both groups.

Table 6: Descriptive Statistics for Missanctioned Students (N = 18177)

	Mean/Prop.	n	Mean/Prop.	n
Total Students	-	16,008	-	2,169
Student Proportion Black	.42	6,703	.55	1,200
Student Econ. Disadvantaged Flag	.44	7,048	.59	1,289
Student Disability Flag	.13	2,098	.18	401
High-Violence Neighborhood	.29	4,707	.36	786
Chronically Absent	.30	4,849	.61	1,322
Absences	12.60	201,705	24.47	53,082

Across the district, living in a high-violence neighborhood has a significant impact on if a student was missanctioned in the 2018-2019 school year (OR = 1.179, p <0.001). This is smaller than the relative effects of student race (OR = 1.149), economic disadvantage (OR = 1.624), and disability (OR =1.304), but still represents a meaningful effect. Table [5] captures the effect size and significance of this effect at each of the 12 schools. School 8 and School 9 are the only schools with a statistically and substantively significant effect (b = 0.057 and b = 0.061, respectively).

Table 5: School-level effects of main interactions

	Neighborhood on Missanction	Missanction X Neighborhood Interaction on Chronic Absenteeism
District	**0.017***	**0.044***
School 1	-0.008	0.086
School 2	0.024	0.057
School 3	0.023	-0.056
School 4	-0.022	0.151*
School 5	0.044	0.054
School 6	0.014	-0.069
School 7	0.036	-0.118
School 8	0.057*	0.027
School 9	0.061*	0.142*
School 10	-0.009	0.078
School 11	-0.016	0.003
School 12	-0.001	0.168

$^*p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

A similar pattern is reflected in the second stage of the analysis. The population of students who are deemed chronically absent are distinct from students who are not chronically absent on each of the included demographic characteristics. Notably, over one in five chronically absent students were missanctioned during the 2018-2019 school year.

Table 7: Descriptive Statistics for Chronically Absent Students (N = 18177)

	Mean/Prop.	n	Mean/Prop.	n
Total Students	-	12006	-	6171
Student Proportion Black	.41	4898	.49	3005
Student Econ. Disadvantaged Flag	.38	4573	.61	3764
Student Disability Flag	.12	1465	.17	1034
High-Violence Neighborhood	.27	3299	.36	2194
Student Missanctioned	.07	847	.21	1322

{Might combine tables 6+7…}

In the district, students from high-violence neighborhoods who are missanctioned are most likely to be chronically absent (OR = 1.838, p < 0.001). For missanctioned students, the effect of high-violence neighborhoods is statistically significant (b = 0.044, p < 0.05). This effect is only replicated in School 4 (b = 0.151, p < 0.05) and School 9 (b = 0.146, p < 0.05). Table [5] provides context for the size of effect detected in other schools. [Although a causal link cannot

be established with these analyses, it would not be unreasonable to assume being missanctioned is a driver of chronic absence, as the days of OSS contribute to a student's total absences. Chronic absence would not be expected to increase missanctioning of students.]

Discussion

Neighborhoods that experience a high amount of violent crime are markedly different from neighborhoods that don't. This is an important context to keep in mind in regards to how the concentration of disadvantage disproportionately impacts a subset of students. These neighborhoods host a confluence of factors that are all detected in school outcomes, ranging from test scores to graduation rates. A critical perspective illuminates the relationship between these neighborhood factors and the experiences of students who live in them (Lee, 2023; Nolan, 2021), but they are not explored here. Community violence is the emphasis, as violence exposure manifests in unique ways that can provide insight into how disciplinary processes in schools adapt and respond to violence within schools.

Neighborhood effects are typically examined broadly, as large sample sizes make it easier to discern what can be generally small effects. When analyzing data at the district and city-wide level as is done in many comparative analyses, it appears that living in a high-violence neighborhood predicts if a student will be missanctioned. Students from high-violence neighborhoods are 1.7% more likely to be missanctioned on average. This appears to be a fairly modest effect size, as it can be difficult to distinguish what factors are impactful due to the way students are organized into neighborhoods. The included covariates are all significantly overrepresented in high-violence neighborhoods and in school sanctions. Gregory et al. (2010) provides a thorough explanation of how schools and researchers have tried to tease apart these effects and the disproportionate discipline experienced by all of these groups. The findings of this study prompt further exploration how the detected neighborhood effects may interact with a student's race.

The school-level breakdown presented in Table [3] reveals that this overall effect is only seen in a small subset of schools. School 8 and School 9 are the only schools in which the effect of living in a high-violence neighborhood predicts being missanctioned, and these effect sizes are much larger than the district average. These schools are not unique in the broader context of the district when examining the demographic and community factors that typically predict disciplinary outcomes. Other schools face similar degrees of violence in their communities, yet students from high-violence neighborhoods do not see significant missanctioning across the district. This indicates that the disparity is produced by a school-level process that is not captured in these analyses. School climate, amongst other structures and supports (Gregory et al., 2011), is a likely factor in the way schools produce disproportionate outcomes.

This analysis demonstrates the need for caution in interpreting connections between community violence exposure and school outcomes. In many studies, neighborhood effects are examined separately from school effects and assume that the role a school plays is fixed across the context of a district or city (O'Brien et al., 2021). It is clear here that there are factors within the school's approach to discipline that are not just disproportionately applied to the most vulnerable populations, but to great negative effect. In line with other findings, this analysis found that use of OSS is discriminatory across multiple dimensions and is used frequently in some schools more so than others. Schools that make more use of OSS were more likely to suspend a student who ostensibly did not deserve it.

The school-level factors that exacerbate what already exists in neighborhood effects contribute to cumulative disadvantage for students who live in high-violence neighborhoods. OSS is a particularly stigmatizing sanction (Sanders et al., 2022) that feeds into future negative outcomes for students (Noltemeyer et al., 2015). Cholewa et al. (2018) found similar disparities in in-school suspensions, although these comparisons are not made within these data as OSS is expected to have a stronger impact relative to a student's neighborhood. A pernicious

consequence of removing students from the school as a sanction is that it contributes to absenteeism. Suspended days count against students' enrolled days, remove their access to the learning environment, and create additional challenges for students' families. For families with limited economic and housing opportunities in the neighborhoods, unexpected childcare responsibilities represent an additional burden. Students who are not in schools lose access to the wraparound supports that are available there.

In School 4 and School 9, the impact of being missanctioned on chronic absenteeism is augmented by living in a high-violence neighborhood. A 15% increase in being chronically absent exemplifies how school effects and neighborhood effects interact to increase harm to a student. Due to the nature of absence calculation, receiving multiple days of suspension has a large effect on chronic absenteeism. Being suspended and from a high-violence neighborhood all but guarantees a student will be chronically absent in these schools. Less than one in three students in this category were not chronically absent for the school year. More research is needed here to understand the mechanisms by which this disparity is produced, and the compounding of harms identified here justifies further consideration.

Absenteeism is a worrisome predictor of dropout amongst other issues (Ansari et al., 2021). Absenteeism is a critical outcome to examine in tandem with the community violence that students experience in their neighborhoods. Beyond being actively ostracized from their peers through OSS, removing students from the relative safety of the school can sour students' relationships with their schools. Exclusionary discipline that creates circumstances in which students can potentially be exposed to violence introduces an urgency for understanding how school discipline policies mediate neighborhood effects.

Limitations

There are a few assumptions behind this analysis that impose important limitations for understanding how these results reflect lived realities and apply to school interventions. First and foremost, there is no temporal data for offenses and sanctions, and they are not linked to

one another in the data. This study used a more conservative approach of focusing only on students who never committed a serious offense during the 2018-2019 school year in calculating students who were missanctioned. This approach does not capture frequent and repeat offenders of any of the offenses that are not linked to violence exposure. The effects of OSS still hold true for these students, but more sensitive analysis might provide more insight.

There is considerable variance between schools in terms of enrollment. Using the proportion of the school body can obscure the impacts at larger schools. Populations of high-violence neighborhoods don't scale with the size of the school they attend, so the absolute numbers may be similar but look different because of the size of the student body.

Lastly, findings need to be weighted with the understanding that these data rely on *reported* offenses. There is a risk of analyzing the same thing twice when comparing areas with higher incidents of police activity and higher rates of being written up at school. Since many characteristics of high-violence neighborhoods are already prone to discrimination, it cannot be said that violent crime is the primary factor in stigmatizing students from high-violence neighborhoods.

Conclusion

Community-level effects influence schools in ways that can be hard to capture or expect in district-level analyses. Popular interventions for addressing achievement gaps are focused on the individual student, opening the door for biases to influence the policy and practice regarding when and how these interventions are applied. How schools orient themselves toward community factors is contextualized by the outcomes their students see. Racial and geographic disparities are linked with more complexity than current literature explores. Multiple forms of marginalization interact in schools, and current systems and approaches to discipline can perpetuate systemic barriers and magnify the trauma of living in high-violence neighborhoods. Restrictive discipline policies can have cascading outcomes for students in marginalized communities, reinforcing disparities by limiting access to education in very literal terms. Future

research will explore how school interventions like PBIS impact chronic absenteeism and

student wellbeing in schools..

- Understanding the ways that schools respond to the challenges facing the communities they serve is critical for designing and implementing effective interventions.
- It is clear that broader community-level disparities are replicated and exacerbated by school's discipline practices, but not in every case.
- Schools' implicit discipline orientations play an essential role in understanding how these effects are produced.

Table 3. Logit Regression of High-Violence
Neighborhoods on Missanctions

	OR/(s.e.)
missanction	
stud_black=1	1.449***
	(0.070)
studED=1	1.624***
	(0.079)
studWD=1	1.304***
	(0.080)
High-viol	1.179***
	(0.058)
Observations	18177

Exponentiated coefficients; Standard errors in parentheses
$^{*} p < 0.05$, $^{**} p < 0.01$, $^{***} p < 0.001$

Table 4. Interaction of High-Violence Neighborhoods
and Missanctions on Chronic Absenteeism

	(1) OR/(s.e.)
1._at	1.340***
	(0.006)
2. at	1.401***
	(0.009)
3._at	1.759***
	(0.023)
4._at	1.838***
	(0.032)
Observations	18177

Exponentiated coefficients; Standard errors in parentheses
$^{*} p < 0.05$, $^{**} p < 0.01$, $^{***} p < 0.001$

1. Not missanctioned, not HVN
2. Not missanctioned, HVN
3. Missanction, not HVN
4. Missanctioned, HVN

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Maptivist: A community geographic model for youth participatory action research

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Maptivist: A community geographic model for youth participatory action research

Introduction

Combating Nashville's most pressing challenges and their subsequent impacts on well-being necessitates the full participation of our youth. The purpose of the Nashville Longitudinal Study of Youth Safety and Well-being was to develop a dataset that would permit research on the relationships between student, school, neighborhood risk and protections related to youth safety and well-being. This research project, funded through a 5-year research grant from the National Institute of Justice, consisted of multiple community partners with different focus areas. Under the area of youth engagement, Oasis Center, Vanderbilt University, and Tennessee State University proposed to produce a community asset map of spaces and resources that youth felt impacted their safety and wellbeing within Nashville.

From the beginning of this project, we intended this youth participatory action research project that would lead to new avenues of scholarly research and improved institutional practices. To do this, we created a research advisor board of Nashville youth called the Maptivists. We trained them in various mapping methods and respected their guidance and perspective on their lived experiences within the city. Throughout the length of the grant, this body of youth led and assisted with forming and implementing research agendas. Although community-based participatory research (CBPR) (i.e., centering the research process around the needs and decision-making of community members) is now widely recognized as an effective model to address and reduce health disparities time (Wallerstein & Duran, 2006), CBPR practices that value the full participation of youth remain an area of growth. One review of 399 youth-involved CBPR studies found that only 15% actually incorporated youth as decision makers and leaders within community health research (Jacquez, Vaughn, & Wagner, 2013). To ensure we captured youth's perspectives, we needed an approach that combined our prioritization of local knowledge (i.e., youth's perspectives on their lived experience) with geographical methods. Thus, we decided to take a community geographic approach to participatory action research. In this paper, we

describe community geography as an area of study with a rich array of epistemic approaches to evaluate space while centering participants' ways of seeing and being in the world, and we show how we deployed these tactics throughout the formative phases of the research project. We believe community geography and this paper to be a useful scholarly contribution to not only the CBPR literature but also to those who are interested in a detailed accounting of forming a research agenda that honors the work and expertise of participants.

The Importance of Community Geography

Community Expertise: A Look at Roles and Goals

Like CBPR, Community Geography is a field and an approach to research that centers the knowledge of a community throughout the research process (i.e., research question formation, project implementation, external validation, and decisions for action and dissemination). Put differently, both approaches prioritize and value local knowledge. CBRP has its origin in many grassroots movements of the 1960 and 1970s across the globe but especially within the Global South. For a history of CBPR, interested readers should review the following readers for a thorough introduction (see, Brydon-Miller, 2001; Kindon, Pain, & Kesby, 2007). However, one scholar of note whose text *Pedagogy of the Oppressed (1970)* has continued to influence the field is Paulo Freire. "He was particularly interested in the processes of conscientização (conscientization) through which poor and marginalised groups developed a heightened awareness of the forces affecting their lives, and then used this greater awareness as a catalyst to inform their political action" (Kindon, Pain, & Kesby, 2007, p. 9).

Feminist researchers also speak to the importance of local knowledge from the standpoint of objectivity. Haraway (1988) is a treatise on objectivity in science especially as it pertains to feminist epistemology and methodology. Starting with the two poles of feminist thought around this issue, Haraway (1988) makes a case that both radical constructivism and feminist critical empiricism fail to hold up their charge of putting "stakes in a successor science project that offers a more adequate, richer, better account of a world" because they either privilege no standpoint or

maintain that a "God trick" objectivity is possible (p.579). Putting forth a new form of objectivity becomes Haraway's (1988) primary objective for the rest of the piece. She suggests that situated knowledges, a form of objectivity centered on acknowledging one's location, its multiplicity, and its connections with others with humility and accountability, to be a form of objectivity capable of enabling a viable feminist project. In contrast to the "conquering gaze from nowhere" that discovers, imagines, marks, and plans the other's existence, Haraway's (1988) situated knowledges necessitates the splitting of oneself to recognize, appreciate, and envision others' fractures — the result of which is partial perspective (p.581). The goal of CBPR and Community Geography is to work toward expanding perspectives by including the voices of those who are often excluded in areas of knowledge production and institutional power.

Unlike CBPR, Community Geography has tailored this human-centered approach to the study of mapping. As a discipline, physical and human geographies have a diverse set of ways to conceptualize and research the world. More specifically, nuanced and essential questions regarding the difference between space and place, understanding GIS as a social tool within a cultural context, and techniques for centering lived experiences considering all of the above. Below in Table 1, I provide a framework for thinking through these critical aspects of spatial research. While the definitions of space and place are not as discrete or stable as the table below suggests within the broader discipline of Human Geography, they are useful for highlighting and communicating a few core distinctions especially across the social sciences.

Table 1. Differences in Space and Place in Community Geography Mapping: An Archetype			
Spatial Concept	**Definition and Approach**	**Typical Community Goals**	**Example Research**
Space	Landscape best visualized through techniques involving Euclidean geometry and often understood through human claims such as territory, human demands such as urban planning, and human desires	Emphasis on democratizing access to GIS technologies and data

Encourage consensus building within the community to arrive at an | Accessibility research (e.g., deciding where to build a bus stop)

Asset mapping (i.e., identifying features in the built environment |

	such as surveillance GIS Science	answer about the physical, material environment Focus on integrating the community's opinions in decision making about infrastructure or processes (e.g., policy making)	that are and are not resources)
Place	Interpretive and symbolic aspects of an environment played out through human-human and human-material interactions and relationships inclusive of issues of culture and power Qualitative GIS	Explore more informal, often invisible cultural and social systems from the community's point of view Understand meaning within a set of lived experiences Contribute to epistemic justice by recognizing taken for granted, erased, or marginalized knowledge Promotion of practices informed by this knowledge	Social climate (e.g., defining belonging and acceptance)

Epistemology Meets Mapping Methodology

Community Geography has wide array of approaches to mapping due to the rich debate with the broader field of Human Geography. As the use of GIS became more widely distributed, not just a tool for the military, urban planners, and other expert specialties, critical geographers of the 1990s began to critique it as a limited and often obfuscating representation of space that could be easily manipulated for political ends. Additionally, the creation of the tool and data was tied to practices of capitalist accumulation of land and resources. For critical geographers, the tool could only function as a mechanism for reinscribing these spatial imaginations. For example, Crampton (1995) writes to demonstrate the struggle of thinking through GIS as an ethical practice. Thinking through GIS and its embeddedness within social relationships, Crampton (1995) is concerned about what he calls "external" pressures of information commodification, in particular, around surveillance, "internal" methods of spatial documentation by GIS scientists, and how these two perspectives (i.e., social context and technical practice) must be held in conversation with each

other. He advocates for flexible ethical code capable of meeting the pressures of a context and for answering once and for all if GIS is restricted to positivist engagement. GIS scientists within geography maintained that the use of GIS was to represent the Cartesian understanding of space and that it gave them great analytic power. They affirmed the necessity and use of positivism.

In the mid-1990s and early 2000s, feminist geographers responded to the hostile science wars between critical geographers and GIS scientists. Lake (2003) establishes what's at stake with a positivist perspective of GIS and delineates the planning-geography divide (i.e., positivist vs. critical social theory). A clear example, if Lake's (2003) illustration of what a feminist GIS project would entail. It goes beyond including gender as a data category to be mapped and to using mapping techniques to visualize or challenge the social use and lived experience of gender across space(s) and time(s). Essentially, for Lake (2003), it is not just about adding data but making sure that different data representations are available. These barriers are not easily overcome or reconciled. Lake (2003) provides a clear and cogent picture of the differences of a positivist and social theory orientation to cartography. Aitken & Michel (1995) dissect the logics of GIS within city planning to make the case that GIS is socially constructed. Both rational and instrumental planning assume a linear, progressive, objective approach to development. These approaches thus use GIS as a tool for representing spatial truths. Alternatively, Aiken & Michel (1995) argue for a discursive, community approaches in which GIS technicians and stakeholders can use GIS iteratively to work toward collaborative understandings of space. A positivist approach to GIS, in this context, endangers community voice and reinscribes power asymmetries.

Pickles (1999) summarizes the contributions that social theory debate on GIS have brought to bear. These advances include: the recognition that GIS is a social embedded tool with its own institutions, discourses, and practices, that there is a need for sustained critical reflexivity of these socio-technical engagements, and that GIS theory must extend beyond empiricism. For feminist geographers, at stake within this conflict was the state and destiny of GIS - to be a tool that could be opened up for various approaches and users or to be relegated as the property of

empiricists. In many ways the argument excluded the work that feminist geographers were doing with GIS to understand gender. Building off of feminist approaches to research, researchers developed more qualitative means of mapping. These mixed method approaches aimed to provide much needed context to points placed in space by allowing individuals to share how they made meaning in rich ways.

Establishing the Maptivists Program

From 2017-2021, Oasis Center, a positive youth development non-profit, and faculty and students within Tennessee State University's Geography Department, and Vanderbilt University's Department of Community Research and Action collaborated on a community-based participatory action research project with youth (i.e., YPAR). Our project, Maptivists, empowered high school students to become community wellness activists through the use of geographic information systems (GIS) based research. By providing youth with the skills and opportunities to shape research on the issues they face daily, we aimed to improve the quality of data gathered on youth wellbeing in Nashville and to create meaningful avenues for youth's civic engagement. Within this youth-driven framework, community health concerns and research questions emerged through the interplay of mapping and storytelling.

Throughout the lifetime of the Maptivists Program, a yearly cohort of eight to ten high school students across Nashville met bi-weekly to discuss youth's experiences of safety, experiment with different mapping approaches and methods, and co-create research protocols for data collection. For their work, youth received a small monthly stipend provided by a grant from the Meharry-Vanderbilt Partnership Development Grant and the Vanderbilt Curb Center Public Scholars Research Grant during the school year and a summer salary for internship work from a program within the Mayor's Office called Opportunity Now. As the creators and managers of Maptivists, Oasis Center hosted the program as part of their after school services, hired a full-time coordinator to recruit youth and implement the program, and provided a means to recruit both Maptivists and youth research participants from their vast networks across Davidson County.

While Tennessee State University researchers contributed to youth's GIS Science education by leading several mapping exercises during the early stages of the project, Vanderbilt University researchers contributed by supporting participatory research efforts, qualitative GIS approaches, and data archival. Together, our partnership created a space dedicated to support the Maptivists program and its inquiries into youth well-being. Below is a year-by-year summary of our activities and accomplishments during the implementation of the youth action research project (see Table 2).

Table 2: Youth Participatory Action Research Activities Across Time			
Year	**Activities**	**Accomplishments**	**Research Outcomes**
2017 - 2018	Built trusted relationships Experimented with different mapping methods and approaches Collected exploratory data from youth outside of Maptivists Youth presented their work at local research conferences	Developed a process for building youth voice into research protocols that involved providing a working example of a mapping exercise, testing it with youth, soliciting feedback from youth, editing the exercise, and repeating the process until youth approved	Learned multiple mapping methods Developed a spatial orientation (i.e., social emotional, embodied standpoint) Moved away from neighborhood research and toward a city focus
2019	Evaluated past data against common concepts of neighborhood and/or spatial safety through thematic coding	Developed a Nashville youth informed concept of safety and wellness from past exploratory data	Pivoted away from standardized academic concepts of climate

The Maptivists Approach

Exploratory Phase: The First Two Years

Our initial goal for this YPAR project was to understand how youth experienced and perceived life in Nashville. To understand youth's perspectives and their preferred research orientation, we experimented with multiple research approaches: GIS Science and qualitative

mapping. Through this process of geographic immersion, Maptivists became an incubator for learning about Nashville and debriefing personal experiences.

Within the areas of GIS Science, students learned basic mapping principles and used various mapping technologies (i.e., GPS, Esri's Survey 123, Policy Maps, ArcGIS Online, and Google Maps) to do neighborhood asset mapping both virtually and in the field through tours of the city and neighborhood walks. Our first asset mapping exercise involved students and staff walking around a neighborhood in midtown Nashville and using GPS devices to pin aspects of the built environment that they considered to be useful and detrimental to health and wellness. Students would then take a picture of their findings to accompany their geographic points (see Figure 1). In our debrief, we unpacked the labels of 'asset' and 'risk' and discussed the


Figure 1: Photo of construction-lined street in a gentrifying neighborhood.

subjective nature of these terms and their usefulness for describing neighborhoods. Youth pointed to the fact that they all identified different aspects of the built environment and had varied interpretations of these features. We concluded that we all bring our own perspectives and

judgements to the process of identification and classification of space. Within these conversations, we were not only able to discuss space an a nuanced way but also solidified the point that, although we might take spatial knowledge and values for granted, we have different ways of seeing and being (i.e., a point-of-view) that impacts our findings (i.e., objectivity). Furthering this conversation, we hypothesized how the features we captured actually impacted the day-to-day lives of residents in the neighborhood. Gentrification was one of the most salient topics that emerged, and this discussion invited youth to talk about their own experiences with this phenomena within their neighborhoods.

In a separate session, we introduced youth to PolicyMap's Open Map, a publicly accessible tool that provides ready-made maps by visualizing census data and other sources of open data at the state, county, and city level (see Figure 2). Youth explored these maps in a

Figure 2: Screenshot of Policy Map's public website.
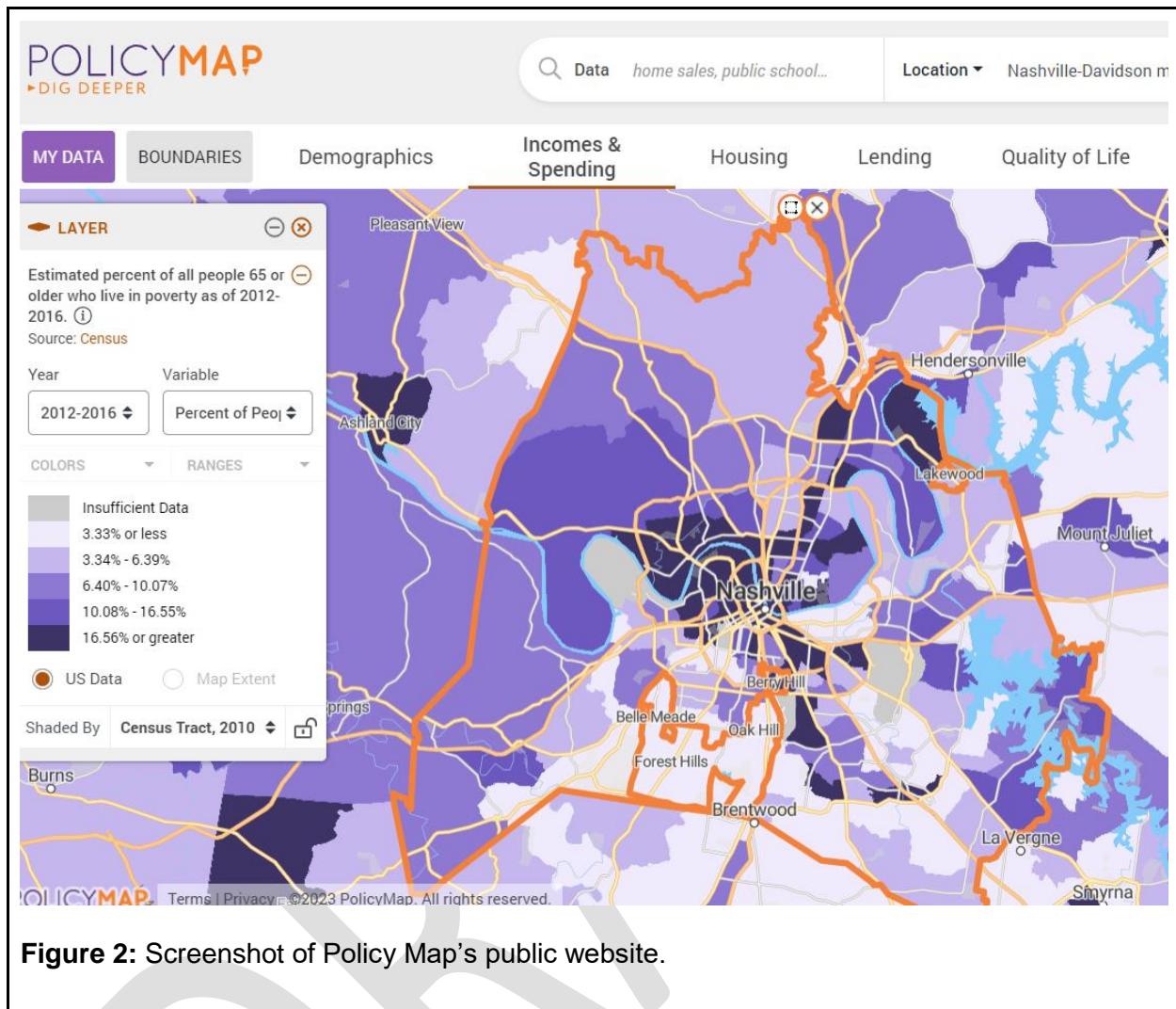
self-directed manner. Through this process, youth began to identify social issues that impacted

their neighborhood and that interested them from a research perspective. Most individuals were

interested in different types of inequality by age, race/ethnicity, or geography. By exploring the

Cartesian aspects of space, youth began to think about the relationships between neighborhood,

socioeconomic class, community disruption, and access to resources.

We built on these experiences during the summer of 2018 by touring other areas of the

city. This time youth used Google Maps to record the addresses and coordinates of neighborhood

features (see Figure 3). Youth, then, used Esri's ArcGIS Online to map their

Figure 3: Field notes from one of a series of tours.

collected points and to learn how to construct digital maps for public consumption. Subsequently, youth interns conceptualized their own individual research projects aimed at improving the built environment for residents using publicly available data and ArcGIS Online. While one youth researcher used publically available data to map the correlation of fast food saturation and incidences of type 2 diabetes (see Figure 4), another high school student explored the relationship between bus stops without proper seating and shelter and areas where the concentration of individuals over age 55 was highest (see Figure 5). GIS Science approaches to understanding Nashville facilitated group discussions on important social issues such as violence, transportation access, food insecurity, and gentrification, especially for youth without such lived experiences, and allowed youth to voice their vision for the city's future at several local conferences.

ECONOMIC STATUS AND PEOPLE'S HEALTH IN DAVIDSON COUNTY

- According to Esri's Health & Personal Care Data Collection and Esri's 2017 median household income, lower income neighborhoods have more Diabetic medication users (non-insulin)
- Higher income neighborhoods have fewer Diabetic medication users.
- There are more red circles in the Downtown area and North Nashville, indicating that these areas have more diabetic medication users.
- In the United States, 95% of Type 2 Diabetes cases are due to overweight, obesity, lack of physical activity according to CDC (Centers for Disease Control).

USA Counties

2017 USA Diabetes Medication Users (Non-Insulin)
Tract
- > 175 – 228
- > 123 – 175
- > 96 – 123
- > 67 – 96
- 0 – 67

2017 USA Median Household Income
Tract
- > 140,661 – 200,001
- > 95,688 – 140,661
- > 65,305 – 95,688
- > 40,895 – 65,305
- 0 – 40,895

FAST FOOD RESTAURANTS AND DAVIDSON COUNTY'S HEALTH DATA

- The map below shows fast food restaurants that are mostly located in lower income neighborhoods and with the most Diabetic medication users (non-insulin).
- According to CDC (Centers for Disease Control), the adult obesity rate in Nashville is 24% (34% are considered overweight)
- In many cases, fast food is highly processed and contains large amounts of unhealthy substances. When people eat fast food they tend to replace nutritious whole foods in their diet, in most cases this leads to many bad health outcomes such as diabetes, heart disease, etc.

Legend
Restaurants
*

USA Counties

2017 USA Diabetes Medication Users (Non-insulin)
Tract
- > 175 – 228
- > 123 – 175
- > 96 – 123
- > 67 – 96
- 0 – 67

2017 USA Median Household Income
Tract
- > 150,376 – 200,001
- > 100,336 – 150,376
- > 65,020 – 100,536
- > 40,121 – 65,020
- 0 – 40,121

Fast Food Restaurants

- SUBWAY RESTAURANTS
- WENDY'S
- JIMMY JOHN'S
- SONIC DRIVE-IN
- MCDONALD'S
- CHICK-FIL-A
- BURGER KING
- FIVE GUYS
- HARDEE'S
- JERSEY MIKE'S SUBS

NASHVILLE'S SUPER MARKET ACCESS

- Having access to a local supermarket is important in a neighborhood as these stores provide easy access to healthier food options.
- The red dots on the map show that most areas in poverty have low access to grocery stores.
- According to the data collected, neighborhoods with low access to grocery stores have larger circles indicating the area has more diabetic medication users.

Legend

USA Counties

USA Supermarket Access
Supermarkets included in analysis
- T = Supermarket, included

People in Poverty with Low Access
- 10 or more people

Supermarkets within 1 Mile Walk
- 11 or more supermarkets
- 3 to 10 supermarkets
- 2 supermarkets
- 1 supermarket
- No supermarkets with 1 mile walk

Supermarkets within 10 Minute Drive
- 2 or more supermarkets
- 1 supermarket
- No supermarkets with 1 mile walk

References: CDC (Center for Disease Control), Esri's, Gfk MRI, U.S. Department of Commerce, U.S. Census Bureau.

Figure 4: The relationship between fast food placement and type 2 diabetes concentration.
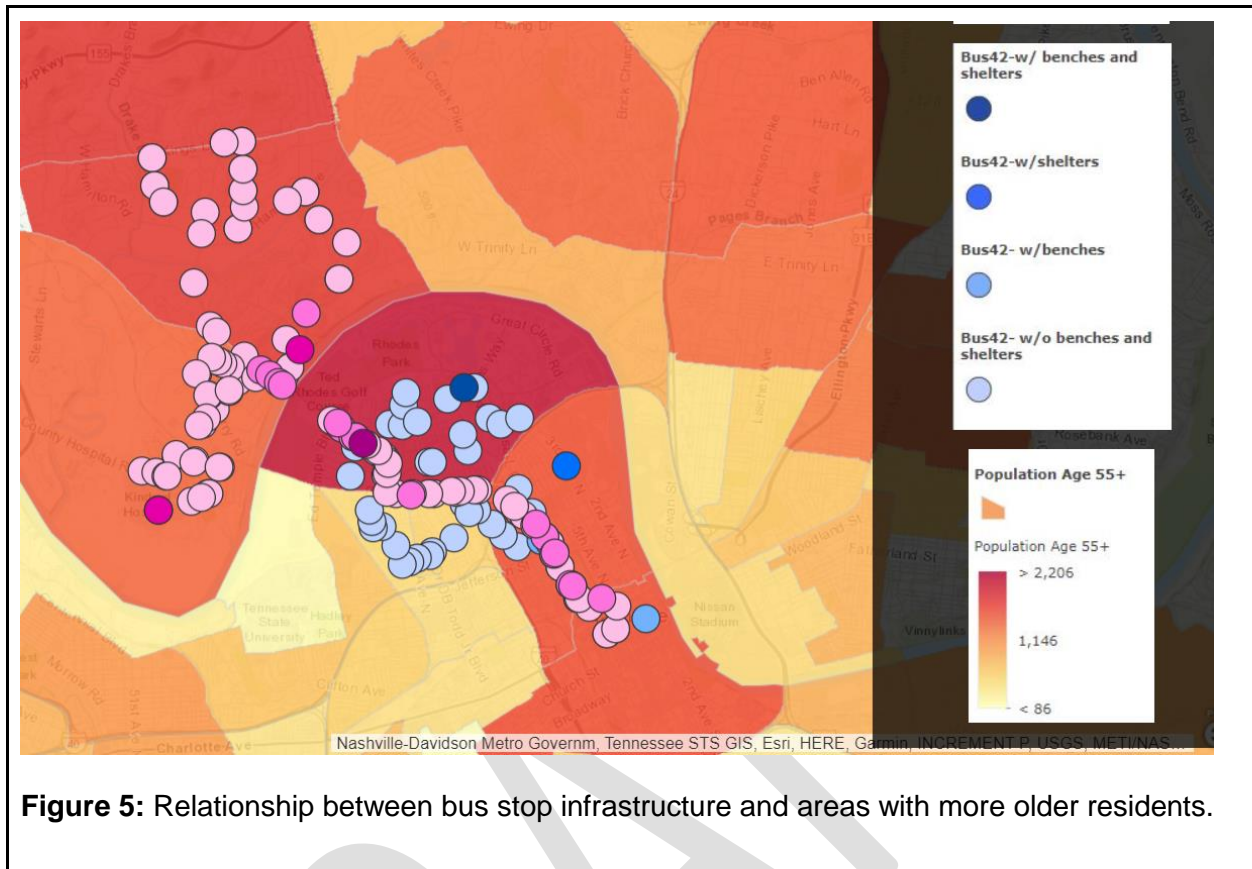
Figure 5: Relationship between bus stop infrastructure and areas with more older residents.

To make sense of their everyday, social-emotional lives, we utilized qualitative mapping approaches to understand the self within different places in Nashville. By asking youth to describe their lived experiences through open-ended or semi-structured qualitative activities (i.e., storytelling, mental mapping, emotion mapping, photo voice), we asked youth to reflect on their unique, embodied experiences navigating Nashville and to focus on non-material aspects of place. With this approach, we often used multiple methods during the course of one session. For instance, we would start with a blank map of Nashville and have youth label how they felt about and when in different locations (see Figure 6). After creating their own legend to code
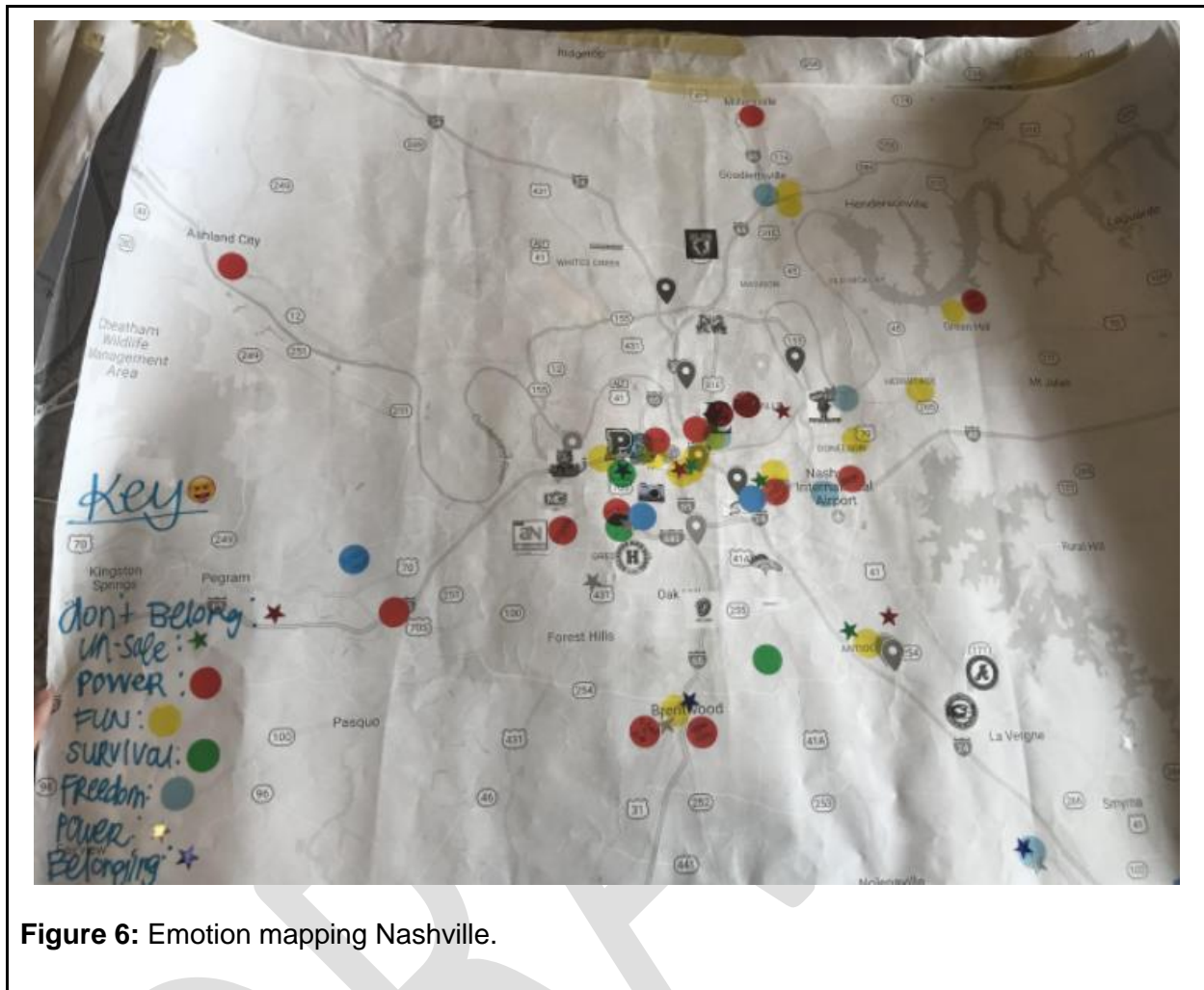
14

Figure 6: Emotion mapping Nashville.

their experiences, they would share how they encountered different places throughout the city and discuss emergent themes like belonging through exchanging personal narratives. Similar to the macro-level conversations that sprang from our GIS Science approaches, youth discussed social issues such as discrimination and assimilation within this context. Again, by comparing experiences, youth developed nuanced understandings of how their peers experienced places differently and where their peers had similar encounters. From a logistics standpoint, it is important to note that while we separate GIS Science and qualitative mapping in this paper to underscore the differences in approaches we intermingled them throughout the project's lifespan.

For example, work initially done during a qualitative mapping exercise (see Figure 7) could be further explored using a GIS Science approach such as Policy Map's Open Map.
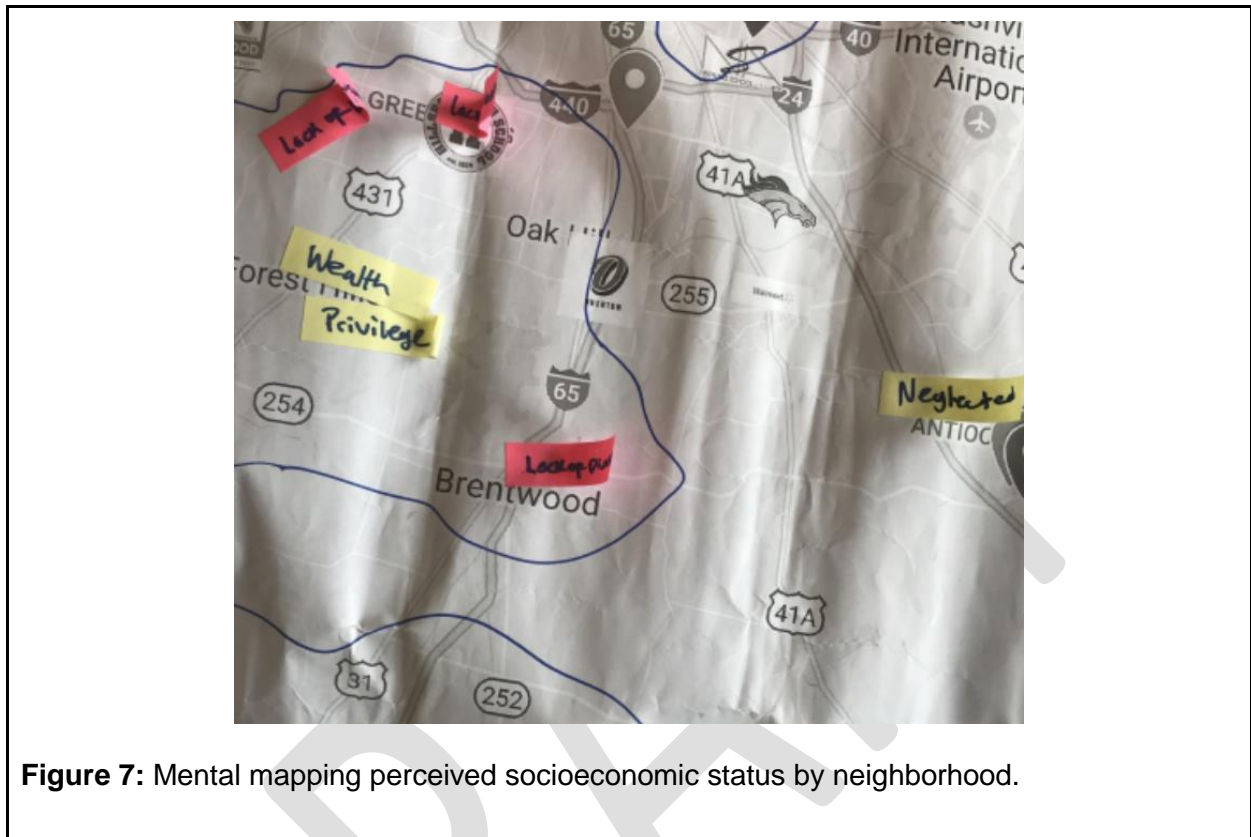

Figure 7: Mental mapping perceived socioeconomic status by neighborhood.

Through these contrasting mapping approaches, youth developed a diverse set of research skills and a deeper appreciation for the complexity of the material and social-emotional aspects of space and place. This process challenged youth to consider the advantages and disadvantages of representing experiences in Nashville through different forms of mapping and the ethical implications of representing another person's neighborhood or experience in ways devoid of context. From these immersive research experiences, students formed perspectives on how best to engage other youth in spatial research and how best to guide the research process (e.g., question formation, research approach, language accessibility, and data interpretation).

With feedback from Maptivists youth and with their direct facilitation, whenever logistically possible, our research team developed two research protocols for over 200 non-Maptivists youth and implemented five mapping workshops both during and outside of school hours. The goal was to gather exploratory data from youth participants outside of the Maptivists program (i.e., external validity) and to understand how they viewed and encountered safety and wellbeing in Nashville. Our MapOut workshops in 2018 and 2019 gathered both quantitative and qualitative data about Nashville via a paper survey from approximately 180 youth across over 20 different high schools and 40 distinct neighborhoods. Each time, Maptivist facilitators instructed respondents to pick four or more survey prompts to answer about their experiences in Nashville. Figure 8 displays all prompts available to participants (e.g., places I like to hang out with friends; places I know I am cared for, supported, and respected). Once a prompt was chosen, youth researchers asked participants to name the place or places that matched the description from their lived experience, to assign an address to their selection using the internet, and to provide an explanation for why that particular place fit the description.
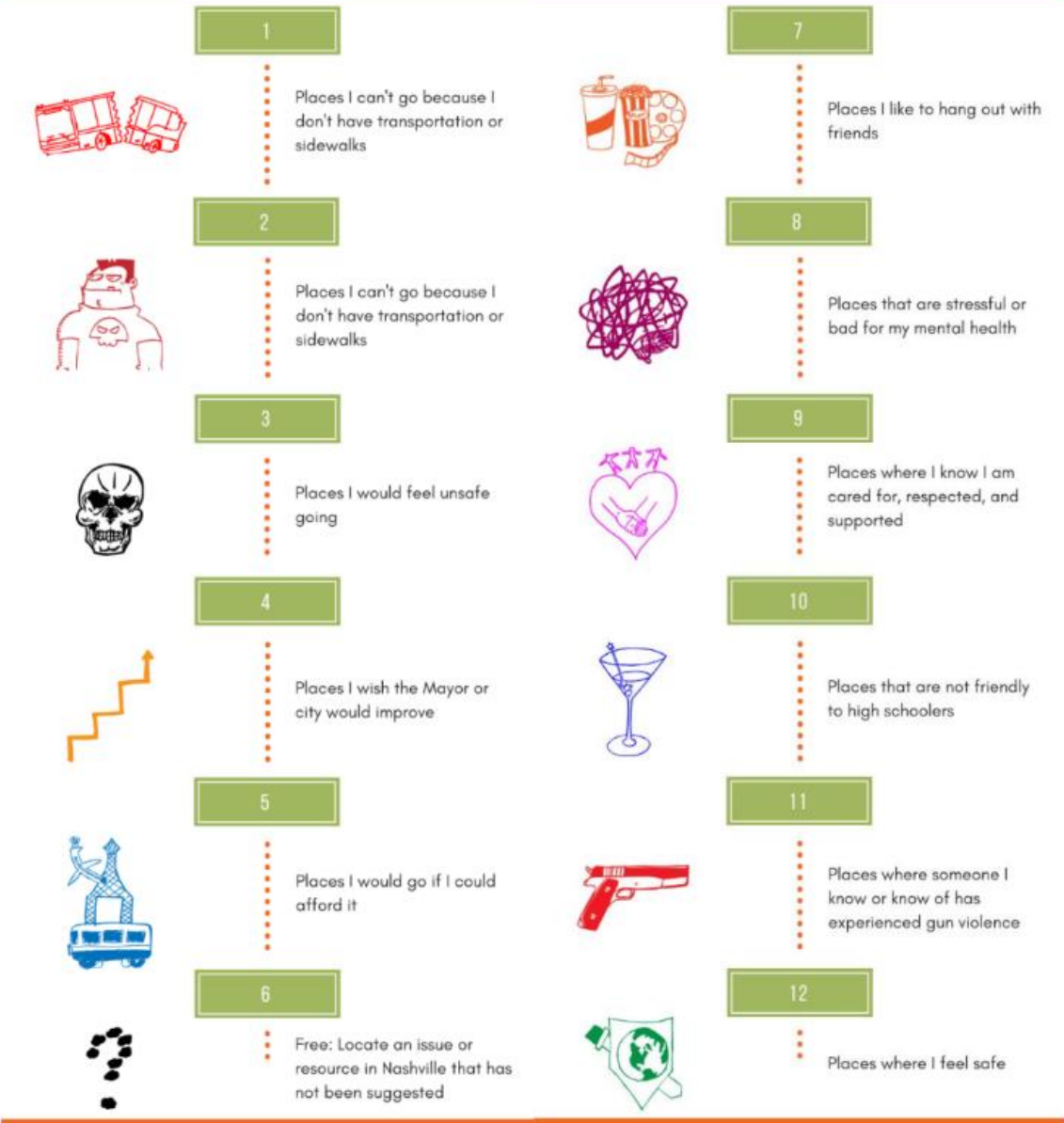
Figure 8: MapOut survey items with legend illustrated by a Maptivist youth.

To complement this mixed method survey protocol, we conducted three storytelling workshops that encouraged non-Maptivist youth to share their stories of life in Nashville through semi-structured qualitative methods that included emotion mapping and a scaffolded narration worksheet that asked youth to identity the places that made up their daily and weekly activities. Youth worked in pairs with their peers to elaborate on their stories of their lives learning, playing, working, and traveling across Nashville. Finally, they would share their stories with the group.

Through debriefings, we recorded topics of interest that emerged and transformed them into themes related to experiences of safety in Nashville. Overall, three outcomes emerged that informed our final methodological approach and research topic. Youth were less interested in neighborhood safety and preferred to think about their experiences across the city as mobile individuals. As adolescents with increasing levels of independence, much of their experiences going out with friends and traveling for work and school were outside of their neighborhoods. Next, they understood safety largely in terms of treatment by adults. Places that respected youth were considered safe and those that discriminated were not. While youth acknowledged the importance of physical safety in theirs and their peers' lives, it was not the defining theme across youth. Lastly, Maptivists enjoyed narrative, interpretative approaches for understanding space over narrowly-defined empiricist approaches captured under the GIScience umbrella.

Synthesis Phase: Year Three

Having narrowed the focus of our research on safety and wellness to public encounters with adults across Nashville, it was important to review the scholarly literature for possible pertinent constructs on place-based climate. Comparing our exploratory data to three psychometric scales, youth evaluated whether our emerging theme on wellness fit descriptions found broadly in the social science literature or if our findings appeared to be more novel. If the former, we would adapt our research to these more standardized ways of operationalizing space. If the latter, we would create our own cursory construct and work toward operationalizing it further as part of our official data collection phase. The three scales youth reviewed were Neighborhood

Cohesion (i.e., the presence of community trust and mutual assistance; Sampson, 2008), Everyday Discrimination (i.e., persistent experiences of discrimination and microaggressions; Williams, Yu, Jackson & Anderson, 1997), and Place Attachment (i.e., a place being integral to one's personal identity; Stewart, Liebert, & Larkin, 2004).

To execute this evaluation, three Maptivists interns reviewed survey responses from 150 youth captured in our 2018 MapOut data (see survey items in Figure 8). They then thematically coded the open-response explanations youth provided by deciding if youth's statements seemed consistent with each construct's itemization (see Table 3). If a response fell neatly within a psychometric scale, they wrote the name of the scale beside the response. For disparate responses, they wrote the word "other" and described their reason for this designation. If unsure, they indicated their uncertainty instead.

Table 3: Comparative Psychometric Scales		
Neighborhood Cohesion (Sampson, 2008)	Everyday Discrimination (Williams, Yu, Jackson & Anderson, 1997)	Place Attachment (Stewart, Liebert & Larkin, 2004)
People around here are willing to help their neighbors

People in this neighborhood can be trusted

This is a close-knit neighborhood

People in this neighborhood generally don't get along with each other (reverse scored)

People in this neighborhood do not share the same values (reverse scored). | You are followed around in stores.

You are treated with less courtesy than other people.

You are treated with less respect than other people.

You receive poorer service than others at restaurants or stores.

People act as if they think you are not smart.

People act as if they are afraid of you.

People act as if they think you are dishonest.

People act as if they're better than you are. | I miss the neighborhood/place when absent

I feel like I belong within the neighborhood/place

I am rooted or have a sense of history to the neighborhood/place

I desire to move from a neighborhood/place (reverse coded)

I feel foreign in the neighborhood/place (reverse coded)

I am proud of the neighborhood/place

I have an appreciation for a neighborhood/place |

	You are called names or insulted.	I wish that close persons continued to live in the neighborhood/place
	You are threatened or harassed.	
	Your [teachers] treat you with less respect than other students.	I wish things were like they used to be in this neighborhood/place
	Your [teachers] act as if they think you are not smart.	
	Your [teachers] act as if they are afraid of you.	

By comparing the survey items for each of these scales to youth's descriptions of their experiences, interns decided against using Neighborhood Cohesion (Sampson, 2008), Everyday Discrimination (Williams, Yu, Jackson & Anderson, 1997) and Place Attachment (Stewart, Liebert & Larkin, 2004) to describe Nashville youth's understanding of safety and wellbeing. Unlike these scales, their definition of safety described a climate of social acceptance when interacting with adults across the city. Although this safety can include deep connections to both people and places like place attachment, it is meant to accommodate casual acquaintances and strangers. Places with this type of social climate enables a teenager to share his opinions openly, to be fully heard without judgment, and to experience mutual respect and empathy. These environments are reliably comfortable. Youth's definition of safety includes not only the absence of harassment and both formal and informal surveillance (i.e., the absence of everyday discrimination) but also meaningful representation of diverse identities and perspectives (i.e., a description of what inclusion would look and feel like). Distinct from neighborhood cohesion, cultural safety emphasizes acceptance of differing opinions, identities, and life circumstances over shared values.

Discussion

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Balancing student privacy with data utility: A practical guide on de-identifying student microdata from a large school district

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Data shared by schools outside a FERPA exemption must be properly de-identified. Data de-identification methods protect against disclosure of personally identifying information. A disclosure occurs when a data intruder, one who is trying to identify a participant, can identify an individual in the dataset. In order to protect against these disclosures, researchers developed statistical disclosure control (SDC) methods to reduce the risk of disclosing confidential or identifiable information to an acceptable level. This acceptable level depends on the type of data needing protected, relevant legislation, and the complete data environment. The best SDC methods involve finding a balance between protecting individual privacy and maintaining the usefulness of the data for end users. Collaboration among school personnel and researchers is especially helpful when trying to find that ideal balance.

While current literature and legislation provides guidelines around statistical disclosure control, there is no tried and true standard or method detailed enough for researchers to apply for school data. This paper details one application for protecting student data by determining what information is potentially identifiable, selecting a SDC method, and applying the SDC method to de-identify the data.

First, how to determine what information is potentially identifiable and needs to be protected. Under FERPA, all personally identifiable information (PII) needs to be adequately protected. This includes direct identifiers, such as names, addresses, student IDs, and social security numbers. It also includes indirect identifiers which is information that could be linked to

a student that would allow a reasonable person to identify the student with reasonable certainty. This definition is purposely vague because what is considered potentially identifiable is subjective and context-dependent. It creates a challenge for figuring out how to classify variables as indirect identifiers.

In order to address this challenge, first the definition of a reasonable person is provided. Under FERPA, a reasonable person is defined as a person in the school community who does not have personal knowledge or the context of the data, so this would be a typical community member and not a school administrator or teacher who would have more in depth knowledge about student data. Furthermore in this study to help determine which variables should be considered PII, contextual information is provided by a few subject matter experts familiar with the data topic. These experts answered several subject questions about the potential risk of identification of each variable by asking experts to imagine different scenarios that could potentially lead to an identification. Next the study examined the distributions in the data to help determine if those variables did have identifiable responses. This allowed measurement of the actual re-identification risk in the data.

To streamline and document the classification of variables as indirect identifiers, a decision tree was created (Figure 1). The light blue boxes are questions for subject matter experts to answer, and the dark blue boxes are the objective questions to be assessed using data. The starting question asks about whether there are public datasets available that could be linked to the data since that could pose a re-identification risk. If there are linkable public data available and subject matter experts believe it could be linked and identifiable, then it is automatically classified as an indirect identifier. However, if the expert does not think it is identifiable, then examining the pattern of responses in the data helps determine if the responses are unique or

identifiable. Moreover, if there are not linkable public data, but the experts or the date present rare or unique responses, the variable is considered an indirect identifier.

After classifying all variables in the data, the next step is selecting a SDC method to protect student privacy within the data. There are two main types of SDC methods. The first are perturbative methods which are used to modify responses to create uncertainty around the true values. These methods include things like noise addition, shuffling and swapping, and creating synthetic datasets. These methods were not applied to the project data due to the desire to maintain the truthfulness of the data as much as possible. Instead the second set of methods, called non-perturbative methods, were applied to data. These methods reduce the detail of responses, but keep the true data values. The non-perturbative methods applied included sampling, recoding variables (such as aggregating response options), and suppression.

For this study, the first method applied was sampling. A random sample introduces some uncertainty around who is actually included in the dataset. A 40% random sample was drawn from the full population of students. The parameters for population inclusion were students in grades 4-10 during the 2018-19 school year. The random sample was stratified on gender and race/ethnicity. Once the sample was taken, a full dataset was created to obtain full record of each student's tenure from 2008-09 school year until 2021-22 school year.

The second method applied to protect data was the k-anonymity privacy model. K-anonymity requires that there are at least *k* number of individuals in the data that have the same responses on all indirect identifiers for all possible combinations of identifiers. This method is only relevant for categorical variables. To meet k-anonymity in this study, a balance of generalization and suppression was applied. All variables were transformed to categorical variables. Determining a k-value is based on the acceptable level of risk depending on the data

structure and type of release. Recommended k values for publicly released data range from 3 to 10. A *k* of 3 was set and was agreed upon with our school collaborators. For statistical programming, this project used the sdcMicro package in R to apply the k-anonymity methods.

This last section goes over implementation of the statistical disclosure control methods. Once the indirect identifiers are known, the sample dataset is ready, and the privacy model along with its parameters were determined, applying the model to de-identify the data takes place. Taking into account the data are longitudinal, the first step examined if any of the indirect identifiers were relatively time-invariant and applied the k-anonymity method to this set of variables first. These variables included items like gender and race/ethnicity over the years. This step allows for these types of variables to be set across all years before applying the k-anonymity method to time-varying attributes. One consideration before including all remaining indirect identifiers in the model is variables in the data that are study markers, such as time in order to capture the nature of this longitudinal dataset. If values for these markers of time are missing, the data are less usable for analysis. In these data, year and grade are important components for the end user. These types of variables can be set in the model as strata. Setting variables as strata prevents any suppression. Lastly, creating an importance ranking of the variables is needed. The importance ranking indicates the order of suppression. The most important variable ranks, indicated by lower values, experience the least amount of suppression, therefore preserving as much as possible, whereas the least important variable ranks, indicated by higher values, experience the most amount of suppression, therefore more suppression of values than the more important variables. Once the model is applied and completed, a review of suppression results with collaborators ensures satisfaction in the output dataset. Data utility measures also help

determine usability of the data by end users. Adjustments to input parameters of the model may be necessary to reach a final dataset.

In conclusion, this paper provides one example of a plan for statistical disclosure control methods. This plan is suitable for schools, in consultation with researchers as needed.

Figure 1. Decision Tree