RESEARCH REPORT

Institute of Transportation Studies | UNIVERSITY OF CALIFORNIA

Reimagining Transportation as a Social Service to Build Resilience and Support Community Power

Jeannine Marie Pearce, Ph.D. Student, Department of Urban Planning and Public Policy, University of California, Irvine
Elisa Borowski, Ph.D., Department of Civil and Environmental Engineering, University of California, Irvine

October 2025

ITS·IRVINE Institute of Transportation Studies

Report No.: 2024-31-4T | DOI: 10.7922/G24Q7SCW

Technical Report Documentation Page

1. Report No. 2024-31-4T	**2. Government Accession No.** N/A	**3. Recipient's Catalog No.** N/A
4. Title and Subtitle Reimagining Transportation as a Social Service to Build Resilience and Support Community Power		**5. Report Date** October 2025 **6. Performing Organization Code** ITS-Irvine
7. Author(s) Jeannine Marie Pearce, http://orcid.org/0009-0002-0741-5359 Elisa Borowski, Ph.D., http://orcid.org/0000-0001-8365-7849		**8. Performing Organization Report No.** N/A
9. Performing Organization Name and Address Institute of Transportation Studies, Irvine 4000 Anteater Instruction and Research Building Irvine, CA 92697		**10. Work Unit No.** N/A **11. Contract or Grant No.** 2024-31-4T
12. Sponsoring Agency Name and Address The University of California Institute of Transportation Studies www.ucits.org		**13. Type of Report and Period Covered** Final Report (October 2023 – March 2025) **14. Sponsoring Agency Code** UC ITS
15. Supplementary Notes DOI:10.7922/G24Q7SCW		

16. Abstract

This study develops guidance for public transit agencies in Los Angeles, California to better prepare for hazards and address challenges, including climate and safety concerns. Using a community-based participatory research methodology in partnership with the local non-profit organization Climate Resolve, we conducted three listening sessions with 26 community members involved with the Boyle Heights Arts Conservatory, a community-serving resilience hub that supports residents in accessing resources both during everyday conditions and extreme events, to explore their experiences related to public transit and how it could be better integrated with existing social systems to increase systems' resilience to extreme weather disruptions. Based on several recurring themes drawn from the participants' statements, we developed a framework named *Cascading Vulnerabilities, Ascending Strengths* to explore the connections between infrastructure systems' vulnerabilities and strengths. We conclude with a reexamination of the traditional Four Rs of resilience framework, expanding these measures to include both physical and social infrastructure through a multisystemic resilience lens.

17. Key Words Disaster resilience, Climate change, Community action programs, Public transit, Transportation equity, Risk assessment		**18. Distribution Statement** No restrictions.	
19. Security Classification (of this report) Unclassified	**20. Security Classification (of this page)** Unclassified	**21. No. of Pages** 65	**22. Price** N/A

Form Dot F 1700.7 (8-72)

Reproduction of completed page authorized

About the UC Institute of Transportation Studies

The University of California Institute of Transportation Studies (UC ITS) is a network of faculty, research and administrative staff, and students dedicated to advancing the state of the art in transportation engineering, planning, and policy for the people of California. Established by the Legislature in 1947, ITS has branches at UC Berkeley, UC Davis, UC Irvine, and UCLA.

The California Resilient and Innovative Mobility Initiative

The California Resilient and Innovative Mobility Initiative (RIMI) serves as a living laboratory – bringing together university experts from across the four UC ITS campuses, policymakers, public agencies, industry stakeholders, and community leaders – to inform the state transportation system's immediate COVID-19 response and recovery needs, while establishing a long-term vision and pathway for directing innovative mobility to develop sustainable and resilient transportation in California. RIMI is organized around three core research pillars: Carbon Neutral Transportation, Emerging Transportation Technology, and Public Transit and Shared Mobility. Equity and high-road jobs serve as cross-cutting themes that are integrated across the three pillars.

Acknowledgments

This study was made possible with funding received by the University of California Institute of Transportation Studies from the State of California through a one-time General Fund allocation in the 2021 State Budget Act for the Resilient and Innovative Mobility Initiative. The authors would like to thank the State of California for its support of university-based research, and especially for the funding received for this project. The authors would also like to express our deepest gratitude to our collaborators at Climate Resolve and the Boyle Heights Arts Conservatory for their extensive efforts and support, as well as our study participants whose generous sharing of their experiences and insights served as the foundation of this project.

Disclaimer

Reimagining Transportation as a Social Service to Build Resilience and Support Community Power

Jeannine Marie Pearce, Ph.D. Student, Department of Urban Planning and Public Policy, University of California, Irvine
Elisa Borowski, Ph.D., Department of Civil and Environmental Engineering, University of California, Irvine

October 2025

ITS·IRVINE
INSTITUTE of TRANSPORTATION STUDIES

Report No.: 2024-31-4T | DOI: 10.7922/G24Q7SCW

Table of Contents

Table of Contents

List of Tables

List of Figures

Executive Summary

Executive Summary

This report addresses the need for improved public transit planning for hazard preparedness by expanding the notion of resilience beyond physical infrastructure to include the role of social infrastructure in transit operations. We conducted a series of listening sessions through one of Los Angeles' first resilience hubs, the **Boyle Heights Arts Conservatory** (or the "BHAC", as it was known among participants). A ***resilience hub*** is a community-serving facility that supports residents in accessing resources both during everyday conditions and extreme events. By gaining a better understanding of how these hubs facilitate resilience and mobility through their users' lived experiences, this study provides lessons for local transit agencies that are aiming to become safer and more resilient.

In collaboration with the Los Angeles (LA)-based non-profit organization Climate Resolve and the BHAC, we conducted a series of listening sessions with a total of 26 residents of the Boyle Heights neighborhood in Los Angeles. The interview guide was co-designed with our partners at Climate Resolve using an ***Appreciative Inquiry*** framework, which is a strengths-based approach that focuses on community assets. Conducting a hybrid inductive-and-deductive content analysis, we identified twelve overarching themes related to resilience: transportation, extreme events, (dis)investment, (dis)empowerment, harm/safety, (dis)trust, and despair/hope. From these conversations, a powerful counternarrative emerged to contrast the notion of 'climate despair', one that we have summarized as 'climate hope', which is encompassed in our final theme of 'hope'. ***Climate hope*** reflects the ways in which communities are navigating uncertainty and reclaiming agency amidst the often-overwhelming realities of climate change. Weaving together the latter ten themes, we developed a framework called *Cascading Vulnerabilities, Ascending Strengths* to explore the connections between each theme regarding infrastructure systems' vulnerabilities and strengths.

The *Cascading Vulnerabilities, Ascending Strengths* framework offers a collaborative approach for policymakers, planners, and communities to transform public transport from a mere mode of conveyance into a social service that supports equity and resilience. ***Cascading vulnerabilities*** is when vulnerabilities intersect and compound, triggering escalation points that lead to cascading effects, often surpassing the impact of the initial incident. We apply this concept to the relationship of transportation and social vulnerabilities. This approach involves connecting built transportation infrastructure with social infrastructure to mitigate cascading vulnerabilities and to build community capacity. The goal is to create a more resilient, equitable, and sustainable public transport system that not only facilitates mobility but also strengthens social resilience and collective well-being, particularly in the face of increasing climate extremes and social inequities.

In our sessions, residents of Boyle Heights reported significant transportation challenges, including inadequate public transit options, lack of on-demand microtransit and micromobility services, and parking difficulties. While some participants expressed appreciation for public transit when accessible, major concerns were highlighted such as overcrowding, unreliability, and poor infrastructure at transit stops, including lack of shade, coverage, and seating. Parking shortages, safety issues for cyclists, limited green spaces, flooding, and other

street and roadway disruptions further complicated their transportation access, all of which were exacerbated by ongoing gentrification in the area. Top climate vulnerabilities included extreme heat, flooding, and air pollution, which significantly intersected with transportation challenges and financial instability. These climate-related issues impacted residents' daily lives, highlighting the complex interconnections between climate resilience, socioeconomic factors, and community well-being.

These transportation and climate vulnerabilities coincided with a lack of investment in neighborhood infrastructure, including inadequate lighting, insufficient green spaces, poor pavement conditions, and flooding issues. Decisions and actions by transit agencies, such as infrastructure designed to deter the unhoused from riding transit and ineffective community engagement practices, worsened issues. The community's experiences with uncomfortable infrastructure, harassment on public transit, unsafe ridehailing services, and excessive policing have led to increased vulnerability and transportation barriers, particularly among marginalized groups. Participants expressed deep-seated distrust of law enforcement and government institutions stemming from negative experiences with over-policing on public transit, criminalization of poverty, and skepticism about the government's ability to respond effectively to disasters. Respondents experienced climate anxiety through acts of aggression, feelings of helplessness, and mental health concerns, which were exacerbated by visible climate change impacts, distrust of government disaster responses, and a sense of individual powerlessness in the face of global environmental challenges.

Despite infrastructure system vulnerabilities, the Boyle Heights community demonstrated significant resilience through community-driven solutions and collective care, which has fostered a sense of safety, community trust, and empowerment. The BHAC was highly valued by community members for providing essential resources such as food, cooling, Wi-Fi, and restrooms, as well as offering free educational programming and cultural events, demonstrating a strong investment in the community's well-being. These services assisted with workforce development, mentorship, and leadership opportunities that fostered personal growth, self-sufficiency, and a sense of purpose. The BHAC provided a profound sense of safety, security, and protection, serving as a trusted refuge during emergencies and everyday challenges. The LA Metro's Unarmed Transit Ambassador program and community-based transportation alternatives have also fostered a sense of safety and trust among community members, particularly those from marginalized backgrounds, by providing welcoming spaces, non-threatening assistance, and personalized services that prioritize community connections. The Boyle Heights community expressed resilience though a sense of hope, with community members creatively envisioning and working collaboratively towards a better future.

Despite significant challenges with public transit, such as reliability and safety concerns, residents viewed it as a vital component of the community's resilience network. Participants' top recommendations to transit agencies were for better collaboration between communities and policymakers and for affordable or free public transit. Participants also proposed innovative ideas for public transport infrastructure to serve as community hubs, offering social services beyond transportation to reduce stress and foster collective care.

Finally, we synthesize and present our findings on physical and social infrastructure using the Four Rs framework of resilience (i.e., Robustness, Resourcefulness, Redundancy, and Rapidity) to guide transit agencies in developing greater resilience during both ordinary times and emergencies, as follows:

To enhance the Robustness of their service, transit agencies could:

- Prioritize safety, trust, and inclusivity by expanding programs like LA Metro's Unarmed Transit Ambassadors
- Ensure empathetic interactions with all riders by implementing trauma-informed training for staff
- Address both physical safety concerns and climate anxiety by installing shaded bus stops and seating to protect riders from extreme weather.

To support their Resourcefulness and that of the communities they serve, transit agencies could:

- Provide access to telehealth services, cooling centers, and emergency resources by collaborating with community organizations to integrate resilience hub concepts into transit systems
- Ensure transit solutions align with residents' needs and lived realities by engaging them in participatory planning processes
- Reimagine public safety by replacing policing with non-punitive safety measures, such as Transit Ambassadors equipped with de-escalation training.

To achieve Redundancy of social services, transit agencies could:

- Develop multifunctional transport hubs that serve as cooling centers, information-sharing nodes, and resource distribution sites during crises
- Support grassroots organizations in growing local networks, such as phone trees and emergency communication systems
- Ensure access to critical destinations, such as healthcare facilities and resilience hubs, by investing in microtransit options.

To improve Rapidity of their services, transit agencies could:

- Provide accurate updates on delays and service disruptions by enhancing real-time communication tools, such as apps and electronic signs
- Ensure swift, empathetic engagement during emergencies by training Transit Ambassadors in trauma-informed crisis response
- Create integrated service networks that address transportation, healthcare, and social needs simultaneously by strengthening partnerships with local organizations.

This study highlights the need for integrated planning between physical and social infrastructure systems that leverages community assets. The findings highlight the need for a strengths-based approach to transit resilience planning that leverages existing assets and is founded in community knowledge and grassroots initiatives to build more robust, resourceful, redundant, and rapid response systems.

Contents

Introduction

In an era of increasing environmental and social challenges, communities face growing vulnerabilities to hazards. Climate change is no longer a distant threat for California; its effects are already being felt across the state. Over the past ten years, Californians have faced a range of extreme weather events and environmental challenges, all exacerbated by climate change. These include severe droughts, devastating floods, unprecedented wildfires, rising sea levels, and record-breaking temperatures. The impacts of climate change are far-reaching and indiscriminate, affecting coastal areas, forests, and urban centers alike. They do not selectively target specific demographics based on race, gender, or socioeconomic status. However, the ability to withstand and recover from these impacts — known as ***resilience*** — is not equally distributed across communities.

Traditionally, physical infrastructure resilience has been prioritized in transportation planning and measured using a Four Rs framework (namely Robustness, Redundancy, Resourcefulness, and Rapidity). However, this approach typically overlooks the importance of social infrastructure in resilience planning. ***Social infrastructure*** describes a combination of physical spaces and social systems that support community cohesion and shared access to essential services, which play a crucial role in building resilient communities, while ***safety infrastructure*** describes systems designed to protect people and property from harm and to ensure a safe environment, including both physical systems (e.g., buildings, roads, and utilities) and organizational systems (e.g., emergency response and communication networks) that are essential for public safety. Resilience hubs exemplify these concepts of social infrastructure and safety infrastructure, serving as trusted and environmentally sustainable spaces that provide year-round services, as well as emergency resources during extreme events. Public transit systems, which are designed to connect people to services and opportunities, while commonly thought of as physical infrastructure, can also be viewed as a form of social infrastructure. This study is rooted in the idea that better integrating public transit systems with other forms of social infrastructure (specifically, resilience hubs) could create a synergy that enhances both systems' abilities to increase community resilience, resource access, and hazard preparedness, and has the potential to increase communities' abilities to navigate uncertainty by supporting them in reclaiming their agency, a phenomenon our participants referred to as ***climate hope***.

To explore this potential, we focus on the Boyle Heights Arts Conservatory (known among community members as the "BHAC"), one of the first official resilience hubs in Los Angeles. A ***resilience hub*** is a community-serving facility that supports residents in accessing resources both during everyday conditions and extreme events. By centering community voices, particularly those from historically marginalized groups, this study outlines recommended improvements for hazard preparedness in public transit planning through better integration with social and safety infrastructure. This report identifies actionable ways to build stronger, more resilient transportation systems and communities through physical-social infrastructure integration.

Research Questions

This study examines the following three research questions:

1. How do residents of Boyle Heights experience and understand cascading vulnerabilities, both in terms of physical and social infrastructure?
2. How do residents of Boyle Heights experience and understand urban resilience, both in terms of physical and social infrastructure?
3. How do residents of Boyle Heights envision integrating public transit with other forms of social infrastructure in ways that enhance the multisystemic resilience of both engineered systems and social systems?

Background

History of Transit Resilience

Historically, resilience planning for public transit has prioritized physical infrastructure, focusing on hardening assets, improving system redundancy, and enhancing the ability of structures to recover from disruptions. While these efforts are essential, they often neglect the social dimensions of resilience, which are deeply tied to the inequitable histories of urban planning, capitalism, and democracy (Anguelovski, 2015; Pulido, 2000). The roots of these inequities trace back to redlining in the 20th century. Redlining systematically denied Black and Brown communities' access to mortgages, investments, and public infrastructure by marking their neighborhoods as 'high risk' for economic development (Jackson, 1985; Rothstein, 2017). This exclusion not only entrenched racial segregation but also ensured that communities of color received limited infrastructure investments, leaving them more vulnerable to shocks — whether economic, environmental, or transit-related (Bullard, 2000; Jackson, 1985).

By the 1980s, neoliberal economic restructuring intensified these inequities. Under neoliberal policies, the state shifted away from direct public investment and instead relied heavily on private capital to fund infrastructure and urban development (Harvey, 2005). Transit-oriented projects, like Los Angeles Metro's Crenshaw Line, illustrate this shift. Framed as a collective good to improve connectivity for historically Black and Brown neighborhoods, the project ultimately allowed private developers to control land near transit stations. This drove up property values and rents, displacing the very communities the project was intended to serve (Rothstein, 2017; Zuk and Chapple, 2016). Gentrification, spurred by increased private investment, moved long-term residents further from transit access, undercutting the goal of improving mobility and opportunity for these populations (Jackson, 1985).

This brings into focus what urban planners Foglesong and Stein (2019) identify as a fundamental contradiction in land use planning: the tension between the "social character of land" as a collective resource and its privatization for economic profit. Transit-oriented development initiatives aim to connect public transit with land use planning for the collective benefit. However, under neoliberal frameworks, land around transit hubs often becomes commodified, serving private developers' interests at the expense of long-term residents (Harvey, 2005).

This contradiction places planners and policymakers in a difficult position: they must manage, rather than resolve, the inherent conflict between collective needs and private ownership. As Stein (2019) notes, planners are tasked with determining "who goes where, under what conditions, and for whose benefit." By prioritizing physical infrastructure investments over the lived impacts these changes have on people, this urban planning practice (which operates at the intersection of political, economic, and spatial dynamics) reinforces patterns of exclusion. For instance, gentrification not only increases rents but also limits the day-to-day mobility of people

by pushing marginalized communities further from transit hubs, reducing access to critical resources like resilience centers during crises, and worsening inequities (Bullard et al., 2007; Marcuse, 1985).

Ultimately, the prioritization of physical infrastructure under neoliberal planning deepens inequities instead of addressing them. A truly resilient system must consider social resilience alongside physical investments, centering equity, accessibility, and the right of communities to remain in place (Harvey, 2005; Vale, 2014).

Vulnerabilities and Resilience

Social Vulnerability

Social vulnerability encompasses demographic and socioeconomic factors (e.g., poverty, limited access to transportation, overcrowded housing, etc.) that impact communities negatively when they encounter hazards or stressors (Flanagan et al., 2018). These stressors can arise from natural or human-induced disasters, like tornadoes or chemical spills, or health crises like disease outbreaks.

To address these inequities, the Centers for Disease Control and Prevention, along with the Agency for Toxic Substances and Disease Registry, developed the CDC/ATSDR Social Vulnerability Index (SVI). Designed collaboratively with healthcare and emergency preparedness practitioners, the SVI serves as a place-based index, database, and mapping tool to identify and quantify social vulnerability within communities. Its intent is to help public health officials and planners improve emergency preparedness and response, ultimately reducing human suffering, economic loss, and health inequities (CDC, 2010).

Cascading Vulnerabilities

Cascading vulnerabilities refer to how social factors, such as economic status, disability, race, gender, and age, interact to increase risks for individuals or communities. While social identity alone does not make one more or less vulnerable, social context and systemic injustices interact with identity to create vulnerabilities. These vulnerabilities in social and physical infrastructure can exacerbate each other, leading to situations where the failure or inadequacy of one element (like a transit system) exacerbates other social inequities (like poverty or health conditions). These cascading vulnerabilities extend beyond initial disruptions, like severe flooding, in ways that disproportionately affect socially vulnerable populations (City of Long Beach, 2022; County of Los Angeles, 2021).

The Centers for Disease Control's focus on systemic socioeconomic disparities highlights how intersecting factors, such as poverty, housing quality, and access to transportation, exacerbate disaster risks. These vulnerabilities are particularly acute for housing-insecure individuals, older adults, those without access to personal transportation, and non-English speakers, who often face heightened risks during emergencies (Flanagan et al., 2011). Regardless of these efforts, many climate action, hazard preparedness, and transportation plans remain primarily focused on the resilience of the built environment at the expense of social resilience. For example, the first Los Angeles County Climate Vulnerability Assessment (2021), which

examines the risks and challenges to Los Angeles County from climate change, refers to this concept of cascading vulnerabilities, but it does so without fully integrating social vulnerability into its analysis; rather, it focuses on the built and natural environment. We recognize this multisystemic consideration as key to the framing and understanding of the lived experiences of cascading vulnerabilities. This LA County Climate Vulnerability Assessment (2021) is a baseline tool that could inform all future County planning processes, like the County's 2045 Climate Action Plan and transportation plans. When these plans fail to recognize the social impacts of climate change, the result is only a modest attempt at bridging lived experiences with the physical infrastructure planning process.

Interdependence of Physical and Social Resilience

Cascading vulnerabilities arise from the interdependence between social and physical transportation infrastructure systems. Recognizing the interconnectedness of physical infrastructure vulnerabilities and social vulnerabilities to climate impacts is essential, as these interdependencies give rise to cascading vulnerabilities across systems. Social identity can interact with the impacts of climate change in unique ways. Social factors and interactions between them (e.g., health conditions, age, and income) can indicate a higher likelihood of social vulnerability during climate hazards, like extreme heat and flooding. Climate Action Planning documents typically identify geographic areas where communities may struggle more to adapt to climate change due to unequal access to resources, which can in turn affect their ability to recover or rebound from hazardous events.

Los Angeles has experienced heat waves resulting in fatalities, particularly among vulnerable populations. A study analyzing data from Los Angeles County found that major or extreme heat days were associated with a 59.3 percent increase in deaths among unhoused individuals and a 91.4 percent increase in deaths among those in care facilities. These statistics underscore the significant impact of heat events on mortality, especially among vulnerable groups (Rand, 2024).

During extreme heat events, individuals in low-income neighborhoods may lack access to air conditioning or cooling centers due to financial constraints and poor infrastructure. Simultaneously, bus stops in these neighborhoods often have minimal infrastructure (e.g., seating or protection from heat and sun). Without sufficient cooling resources, vulnerable populations, particularly older adults and those with preexisting health conditions, face higher risks of heat-related illnesses and fatalities. This illustrates how extreme heat interacts with physical infrastructure vulnerabilities (e.g., lack of physical heat protection at transit stations) and social vulnerabilities (e.g., preexisting health conditions) to generate cascading vulnerabilities (e.g., greater chances of heat stroke).

Similarly, in the case of flooding, socially vulnerable communities (e.g., lower-income individuals) may reside in poorly maintained or flood-prone housing areas (e.g., physical infrastructure vulnerability). Limited access to reliable transportation in these areas may hinder evacuation efforts, trapping low-income residents in hazardous situations and increasing their exposure to harm.

Some vulnerabilities are exacerbated by insufficient disaster response strategies. For people who are unhoused, living in care facilities, or otherwise dependent on social support systems, disaster response

protocols that assume everyone can shelter in private homes or relocate by personal vehicle may leave people without a safe destination or means of transport. In care facilities, rigid evacuation timetables or general relocation requirements can disrupt life-sustaining medical care, separate residents from trained staff, or move them to environments ill-equipped for their needs.

Some transportation infrastructure and specific disaster response strategies (e.g., evacuation plans, transit-based evacuations, contraflow, relief distribution, etc.) may have life or death consequences (Ciriaco and Wong, 2022). For this reason, reliable, safe, and accessible transportation for all, including those who are unhoused and in care facilities, must be planned for both daily use and during extreme events (Ciriaco and Wong, 2022). As transit agencies work to make their physical infrastructure more resilient, they must consider the interactions between the social vulnerabilities of their riders and the communities through which transit lines run. Solutions should contribute to both the physical infrastructure and social resilience of these communities.

While these interdependencies between social and physical infrastructure systems can contribute to cascading vulnerabilities, they can also be leveraged to strengthen the resilience of both systems, such as by better supporting the livelihoods of current riders and improving the flow of resources through a network, including social and informational resources. Enhancing transit stations with Wi-Fi, public bulletin boards, charging stations, water refill stations, and co-working spaces can better support the daily needs and livelihoods of transit riders while improving the flow of vital information and services throughout a community, benefiting riders and nonriders alike. By providing consistent and reliable access to workplaces and healthcare facilities during everyday conditions, the baseline resilience of the community will increase, enhancing the ability to better withstand challenges when they occur. Thus, viewing public transit and transit-dependent communities as systems worthy of investment can transform current conditions and build greater resilience.

Resilience Hubs as Social Infrastructure

California's Community Resilience Centers Program

In recognition of the intersection of disaster planning, transportation, and resilience, California has formally acknowledged the importance of resilience hubs through Senate Bill 155 (California Senate Bill 155, Chapter 258, 2021). This bill established the Community Resilience Centers (CRC) Program, defining ***resilience hubs*** as critical nodes that assist communities in recovering from acute shocks or chronic stressors that could lead to cascading social vulnerabilities. These hubs are designated facilities that provide shelter, resources, and support during emergencies, particularly climate-related events like extreme heat and poor air quality days. Typically located in community-serving spaces, such as schools, libraries, health clinics, and places of worship, these centers offer both immediate assistance during crises and long-term community strengthening through year-round services. These services include resource distribution, educational programs, and workforce development, all aimed at enhancing community resilience.

As of 2023, the state of California had allocated $98.6 million in funding for the CRC Program, which included upgrades to areas surrounding resilience hubs to support their accessibility and functioning. This initiative also incorporated low-carbon transportation options with resilience hubs to enhance connectivity (California Strategic Growth Council, 2023). While the state provided funding, the responsibility for implementation remained with local and regional agencies.

CRCs (a term used interchangeably with 'resilience hubs') have emerged as critical components of social infrastructure in their capacity to serve as spaces where communities can pool local assets, share knowledge, and connect with institutional resources. By leveraging existing strengths, such as community networks, personal relationships, and local expertise, CRCs embody the core tenets of ***Asset-Based Community Development*** (ABCD). Rather than addressing problems through external interventions, ABCD fosters change by mobilizing the skills, networks, and cultural resources that communities already have and know (Harrison et al., 2019; Lunt, 2019). ABCD asserts that communities inherently possess the knowledge, capacity, and local assets necessary for resilient solutions, which planners and decision-makers must recognize and nurture. This contrasts with deficit-based planning, which focuses on what is wrong or lacking, such as viewing a low-income neighborhood as "high risk" because of low-valued homes or underfunded schools without recognizing its strengths, such as cultural networks, civic engagement, or local expertise.

Thus, CRCs transform assets into actionable strategies for resilience planning and fostering sustainable, community-driven solutions. CRCs shift power to communities as active agents in addressing slow-onset vulnerabilities, like rising temperatures, drought, or chronic underinvestment in public services. For example, these Centers provide daily support through cooling centers, internet access, and food distribution, while transforming into emergency hubs during extreme events, such as heat waves or flooding. However, the realization of their full potential depends on reliable connections to surrounding infrastructure (particularly transportation systems) to ensure equitable access to the resources these CRCs provide. Thus, the success of CRCs depends on their integration with reliable transportation systems, further highlighting the interdependence of physical and social infrastructure for resilience.

Resilience hubs assist vulnerable populations by providing support for both immediate needs and long-term recovery (Georgetown Climate Center, n.d.; Urban Sustainability Directors Network, 2019). When equity principles are included in the planning process for resilience hubs and transportation systems, transit becomes more accessible and effective, strengthening community resilience by ensuring everyone has access to the resources and support they need during crises and in everyday life (Greenlining Institute, 2024; Wan and Wong, 2024).

Prior Research on Resilience Hubs

The concept of resilience hubs was first introduced in 2012 by Kristin Baja, a climate and resilience planner at the City of Baltimore's Office of Sustainability (Aoun, 2022). The concept reflects an understanding that autonomy and self-determination are key to resilience, especially for members of historically underserved

communities (Baja and Urban Sustainability Directors Network, 2021). Thus, having a space where people experience a personal sense of ownership and belonging is crucial.

The synergy between resilience hubs and public transit systems is essential for addressing cascading vulnerabilities. Transportation resilience scholars contend that reliable, accessible, and safe transit connections need to be planned for both business-as-usual and extreme event conditions (Ciriaco and Wong, 2022). Void of planning for transit network integration with resilience resources, the layout of the built infrastructure can instead exacerbate cascading vulnerabilities (Wan and Wong, 2024), because such planning can result in immobility and inaccessibility of resources for people living in vulnerable situations. This recognition highlights the need for a framework that can speak to the multidisciplinary fields engaged in transit resilience planning and equitable urban planning, which is what this study seeks to achieve.

While research on the connections between transportation barriers and the accessibility of resilience hubs remains limited, Ciriaco and Wong (2022; 2024) have begun to explore this critical intersection in Canada. Their findings emphasize that resilience hubs are more effective when paired with equitable and accessible transportation systems. They explain that gaps in transit integration exacerbate vulnerabilities, underscoring the need for integrated planning. Their research shows that aligning resilience hubs with community-specific travel behaviors and mobility needs, such as by locating them along transit routes, is essential for ensuring equitable access and effective service, particularly for transit-dependent and vulnerable populations. Participants in their study highlighted the importance of locating hubs along transit corridors or within their own neighborhoods to improve accessibility (Ciriaco and Wong, 2024).

Similarly, Sundling and Ceccato's (2022) research underscores the importance of safe, well-maintained transit routes in connecting communities to key locations (which may include resilience hubs), emphasizing how perceptions of safety influence transit access. Resilience planning must address these transit needs to ensure CRCs achieve their full potential.

Our Contribution: Assets-Based Participatory Research

Further research is needed to understand the relationship between transportation systems resilience and accessibility of resilience hubs in the United States, where historic and systemic inequities deeply shape community vulnerabilities. Our study begins to address this need by applying a strengths-based, ***Appreciative Inquiry*** research methodology, which promotes positive change by uncovering what is already working well in a community and building on those successes, using a set of questions designed to discover and dream about a best-case outcome. It follows a five-phase cycle – *Define*, *Discover*, *Dream*, *Design*, and *Deliver* (sometimes referred to as *Destiny*) – that encourages inclusive, forward-thinking conversations and collaborative innovation (Center for Appreciative Inquiry, n.d.). Appreciative Inquiry exemplifies a strengths-based approach to community engagement that utilizes questions and dialogue to generate social change (Cooperrider and Whitney, 2001). This approach shifts the focus from problems and deficits to community assets, relationships, and shared visions, thereby shifting more power to participants as active co-creators of their futures. In sum,

this methodology illustrates how resilience planning can leverage community assets, such as local knowledge, networks, and adaptive capacities, to create equitable, sustainable, and community-centered solutions to integrate transportation systems and resilience hubs in ways that can enhance the resilience of both forms of infrastructure.

Theoretical Framing

Equity in Transit Resilience Planning: Environmental Justice Framework

There is increasing acknowledgment and recognition in both academic and institutional spheres of the detrimental impacts that historic planning practices and the resultant design of the built environment have had on vulnerable communities. This growing awareness has prompted many planning agencies to adopt frameworks that align with their political and institutional priorities, with a particular emphasis on promoting racial and economic equity.

Historic planning practices have played a significant role in dividing communities and creating both physical and socioeconomic distance from essential resources, such as employment opportunities, quality education, healthcare, and government services. Practices like redlining and unequal investments in transportation infrastructure have compounded social vulnerabilities, disproportionately affecting people of color, women, immigrants, and economically disadvantaged populations (Rothstein, 2017).

The intersection of transportation planning, critical race theory, and environmental justice literature reveals the enduring impact of historic planning practices on marginalized communities. The Environmental Justice Movement emerged in response to the unequal exposure of low-income communities and communities of color to environmental hazards (Bullard, 1990; Cutter, 1995). Scholars such as Bullard (1990, 1998), Jacobs (2018), and Mendez (2020) document how discriminatory urban planning and zoning policies have entrenched racial and socioeconomic disparities in transportation systems. These scholars identify three pillars of environmental justice – namely recognition, procedural, and distributive justice – as essential for addressing these inequities and the impacts of ***environmental racism***, defined by Bullard (1994) as policies or practices that disproportionately harm communities based on race or color. This harm often occurs through the siting of polluting facilities or infrastructure projects disproportionately in or near these communities, leading to cumulative negative impacts on residents' health and overall quality of life. For example, the Los Angeles 710-Freeway is one case where a coalition of Environmental Justice organizations highlighted the compounding effects of polluting freeways near low-income communities. Heavy truck traffic along this corridor has contributed to elevated levels of air pollution, particularly diesel particulate matter, leading to higher rates of asthma, respiratory illnesses, and cardiovascular disease among residents. Additionally, schools report poorer air quality being positively correlated with increased missed school days.

The first pillar of Environmental Justice planning, ***recognition justice***, involves acknowledging how planning has historically contributed to social and economic disparities, particularly in marginalized communities separated by infrastructure, like freeways (Bullard, 1993; Davis, 1990; Jacobs, 2018). In transportation and hazard planning, it is crucial to recognize the connections between physical infrastructure vulnerability and social vulnerability with regard to climate impacts, because cascading vulnerabilities extend beyond initial

disruptions, disproportionately affecting socially vulnerable populations (County of Los Angeles, 2021). Without recognition, historic harms may be repeated, and these interdependencies may be overlooked.

The second pillar, ***procedural justice***, emphasizes the importance of including marginalized communities in governance and planning processes (Schlosberg and Collins, 2014; Ulibarri et al., 2022). Radical planning advocates suggest that ***embodied knowledge*** – which is information obtained by community members through their lived experiences – can help address historic injustices and inform policy decisions, especially when these policies are implemented collaboratively with Environmental Justice leaders (Jacobs, 2018; Mendez, 2020). Procedural justice moves beyond mere representation of community members to actively involving them in advisory boards, steering committees, and task forces created with the goal of reducing social vulnerabilities. Resilience hubs typically exemplify the practice of procedural justice by shifting more power to community members to shape and influence the programming they offer. LA Metro's Unarmed Transit Ambassadors Program is another example of procedural justice in the way it removes violence and provides processes of safety, thereby fostering more trust and supporting better access to transit systems through consistent, community-centered engagement (Turner et al., 2010).

The third pillar, ***distributive justice***, focuses on the fair geographical spread of environmental benefits and harms. It seeks to address how polluting industries often disproportionately affect low-income, minority, and other marginalized communities (Bullard, 1994; Ulibarri et al., 2022; Woo et al., 2019). In transportation, distributive justice calls for equitable access to safe and affordable mobility, prioritizing those who have been made most vulnerable to the harmful impacts of goods movement networks and barriers to mobility (Bullard, 2021). Achieving distributive justice requires integrating recognition and procedural justice – especially through the application of embodied knowledge – into planning processes to ensure that marginalized groups experience the full benefits of equitable planning (Schlosberg and Collins, 2014; Whyte, 2011).

In sum, addressing social vulnerabilities requires more than just acknowledgment (e.g., recognition); it demands the proactive integration (e.g., just procedures) of transit system resilience solutions designed to actively reduce them (e.g., fair distribution), rather than merely account for their presence. Pearce et al. (2025) applied these principles in an evaluation of 16 Los Angeles County planning documents, revealing that while many of the evaluated transportation and emergency preparedness planning documents exhibited equity integration and engagement with diverse communities, they rarely provided evidence that this engagement resulted in changes to policy or implementation that aligned with community input. Although many plans mentioned public engagement or offered mechanisms like surveys and comment periods, they failed to document whether or how these efforts resulted in meaningful inclusion or responsive policy change. This gap between participation and its resultant impact weakens a plan's overall equity framework, particularly for communities that have long been excluded from infrastructure decision-making.

Recent studies on climate resilience, transportation, and emergency planning have highlighted progress in integrating sustainability and disaster preparedness into transportation systems. For example, Cutter et al. (2020) and Pearce et al. (2025) demonstrate how increasing urbanization and climate challenges demand a holistic approach to planning. These studies acknowledge advances in emergency preparedness and resilience

building; however, they also expose persistent gaps in recognition and procedural justice, particularly for marginalized communities. These findings point to the need for more inclusive and equitable planning processes that prioritize the voices, needs, and histories of underserved populations.

These studies underscore the need for adaptive, equity-centered approaches to resilience planning that address both physical and social dimensions of slow-onset hazards. By focusing on institutional mechanisms to reallocate resources equitably, researchers have called for transformative changes to prevent the deepening of inequities. Such approaches emphasize the integration of Environmental Justice and community-driven solutions into resilience planning to foster long-term stability and equity (Bullard et al., 2007; Chapple and Loukaitou-Sideris, 2019; Marcuse, 1985). Ulibarri and Scott's (2017) findings further support these conclusions, highlighting how institutional structures must evolve to prevent the gradual erosion of resilience.

The present study fills a gap that exists when applying Environmental Justice principles to transit resilience planning by using a strengths-based approach to directly address the legacies of racialized planning practices. By prioritizing *recognition justice* (acknowledging historic inequities), *procedural justice* (inclusive participation), and *distributive justice* (equitable resource access), our conceptual approach: (1) leverages community strengths to advance bottom-up resilience building, (2) emphasizes public transit integration with other forms of social infrastructure, like resilience hubs, for overcoming systemic barriers to resource access, and (3) proposes strategies to mitigate cascading vulnerabilities that disproportionately impact marginalized communities during climate-related disruptions. We anticipate that this integration of public transit systems with social infrastructure will generate a positive feedback loop that strengthens both systems' ability to enhance community resilience, improve resource access, and prepare for future hazards.

Multisystemic Resilience Framework

Resilience is not limited to a single system; rather, it emerges from interactions and dependencies between multiple networks. ***Multisystemic resilience*** in transportation accounts for the interconnected physical and social networks that ensure stability and adaptability across multiple sectors. It refers to the ability of interdependent systems (e.g., transportation, housing, social services, and telecommunications) to withstand, adapt to, and recover from disruptions while maintaining essential functions. A multisystemic approach ensures that when one system faces stress, others can help mitigate the impact and support recovery. This concept is crucial for sustaining interdependent systems in the face of evolving challenges.

Considering both physical infrastructure and social infrastructure when measuring resilience is crucial because they are deeply interconnected. Physical infrastructure (e.g., roads, bridges, power grids, and telecommunications networks) provides the foundational structures necessary for daily operations and emergency response. However, these systems alone cannot function effectively without social infrastructure, which includes community networks, governance, public services, and social cohesion.

For example, a well-built transit system (i.e., physical infrastructure) only contributes to resilience if it is equitably accessible, supported by strong policies, and integrated with emergency planning systems (i.e., social

infrastructure). During crises like climate disasters or pandemics, social infrastructure (e.g., local organizations, public health agencies, and emergency response teams) ensures that populations – especially those that have been made vulnerable – receive necessary support, thereby preventing systemic failures. By accounting for both physical and social infrastructure, resilience assessments can capture not only a given system's ability to withstand shocks but also its capacity to adapt, recover, and continue serving communities.

Given this context, our research is timely and critical. Here we provide a qualitative analysis of the physical and social interdependencies that need to be supported to ensure the success of California's Community Resilience Centers Program. We then apply these lessons of interdependency to resilience planning for transit agencies. As traditional planning methods have often failed to recognize and accommodate the needs of diverse communities, including undocumented people, Indigenous communities, youth, and those living in areas burdened by intersecting social vulnerabilities, this research underscores the need for resilience frameworks that address structural barriers and prioritize inclusivity.

The Four Rs of Resilience Framework

A common resilience framework applied in infrastructure resilience analysis is known as the 'Four Rs', namely Robustness, Redundancy, Resourcefulness, and Rapidity. These four metrics are often used to evaluate and enhance the capacity of infrastructure systems to withstand, adapt to, and recover from shocks or disruptions (Borowski et al., 2023; Bruneau et al., 2003). Collectively, these principles capture a system's ability to withstand stress without failure (i.e., robustness), provide backup to maintain functionality (i.e., redundancy), mobilize resources (i.e., resourcefulness), and return quickly to normal operations (i.e., rapidity).

Interdisciplinary scholars have implemented political, social, and technical perspectives to examine the sustainability of environmental planning and decision-making practices to enhance resilience. For example, extensive research has been conducted on the resilience of infrastructure systems' ability to withstand climate impacts, like drought (Hui et al., 2020; Scott, 2019). By evaluating the shortcomings of existing regulatory frameworks (e.g., the National Environmental Policy Act and hydropower licensing processes), Ulibarri and Scott (2017) highlight gaps in system *robustness* (or ability to withstand stress), particularly in adapting to slow-onset hazards, showing that it may be harder to use slow-onset hazards to shift institutional norms compared to fast-onset hazards. This finding is critical when considering the resilience of communities where inequitable access to transportation or other public resources can gradually erode resilience over time without significant changes to institutional responses.

Additionally, Ulibarri and Scott (2017) emphasize the importance of *resourcefulness* and *redundancy* in resilience planning. Communities dependent on a single water source or outdated infrastructure face heightened risks when systems cannot adapt to prolonged stresses. For example, transit systems serving low-income neighborhoods in Los Angeles often rely on outdated infrastructure and offer limited redundancy in bus or rail lines. When extreme heat events (exacerbated by climate change) stress these systems, transit-dependent communities are disproportionately affected if plans lack *resourcefulness* (such as reallocating

cooling infrastructure to bus shelters or air-conditioned vehicles) or *redundancy* (like providing alternative transit routes to bypass buckled road surfaces or railway tracks). These findings highlight the necessity for institutional mechanisms that prioritize *distributive justice* in resilience planning, ensuring resources are reallocated equitably to address systemic disparities (Ulibarri and Scott, 2017).

Research on the social dimensions of resilience has highlighted how institutional rigidity exacerbates the vulnerabilities of marginalized communities, particularly those with inequitable access to critical systems, like transportation, housing, and public health resources. This gradual erosion of social resilience mirrors the impacts of slow-onset environmental hazards: without transformative changes to infrastructure and planning practices, systemic inequities deepen over time. For instance, prolonged disruptions to transit systems in underserved neighborhoods restrict access to jobs, education, and healthcare, compounding vulnerabilities and weakening social resilience (Anguelovski, 2015; Vale, 2014).

While resilience frameworks like the 'Four Rs' have been effective in evaluating physical infrastructure resilience, they have often failed to account for social infrastructure, which is equally critical for community well-being and adaptability. Scholars such as Rothstein (2017) and Jacobs (2018) argue that resilience cannot be measured solely through the durability of assets but must also consider the social dimensions of vulnerability: community networks, economic stability, and local knowledge.

By considering the interdependencies between physical and social resilience and integrating Environmental Justice principles, here we expand the 'Four Rs' framework to apply to both systems simultaneously. A *robust* system (one that can withstand stress without failure), in this context, is not just infrastructure that can withstand physical shocks but one that ensures community resilience by equitably distributing resources to people. *Redundancy* should not just backup physical systems but also provide access to alternative support networks (e.g., public transit, healthcare services, and community-based resilience hubs). *Resourcefulness*, similarly, must include the ability of social institutions to pivot resources toward populations that have been made vulnerable, ensuring their needs are prioritized in times of crisis. Finally, *rapidity* cannot simply refer to the speed of rebuilding physical systems; it must also address the rate of recovery for the social systems that sustain community well-being.

Methods

Community-Based Participatory Research Design

This research report identifies how public transit planning for hazard preparedness can be improved through integration with social and safety infrastructure for resilience, as expressed by community voices. Specifically, this study examines: (1) how residents of Boyle Heights experience and understand *cascading vulnerabilities*, both in terms of physical and social infrastructure; (2) how residents of Boyle Heights experience and understand *urban resilience*, both in terms of physical and social infrastructure; and (3) how residents of Boyle Heights envision improvements to public transit integration with social infrastructure in ways that enhance the multisystemic resilience of both engineered systems and social systems.

Research Team

Using a Community-Based Participatory Research (CBPR) approach, this research was conducted in collaboration with two local community-based organizations: Climate Resolve and the Boyle Heights Arts Conservatory.

Climate Resolve

Climate Resolve is a Los Angeles-based, non-profit organization that collaborates with predominantly Black, Indigenous, and People of Color across California to enact equitable climate solutions that bring society toward a just and resilient future by reducing climate pollution and preparing for climate impacts.

Boyle Heights Arts Conservatory

The Boyle Heights Arts Conservatory (BHAC) is a non-profit organization located east of Downtown Los Angeles with a mission of creating inclusive pathways to careers in film, television, and digital media. The BHAC is dedicated to removing barriers that have historically excluded communities of color from the arts and entertainment. It began as a multicultural gathering place in 1925 and expanded to a resilience hub in 2021 through the Los Angeles' U.S. Green Building Council Legacy Project. With a rich history of collaboration, it stands as a trusted space that is deeply rooted in community and disaster preparedness.

Appreciative Inquiry: A Strengths-Based Approach

Our research process was developed in collaboration with Climate Resolve and the Boyle Heights Arts Conservatory to reflect the perspectives of historically marginalized populations. First, initial planning meetings were held with stakeholders from Climate Resolve, the Boyle Heights Arts Conservatory, and LA Metro. Through these meetings, listening session questions, along with recruitment strategies and materials, were designed and revised. The final semi-structured interview guide consisted of 23 questions divided into five sections, following the format of the 5 Ds of *Appreciative Inquiry*, namely *Define*, *Discover*, *Dream*, *Design*, and *Deliver*. This participatory methodology, coupled with our planning document analysis described in Pearce

et al. (2025), contributed to our conceptual approach of leveraging community-driven assets to mitigate cascading vulnerabilities and foster resilience.

Listening Sessions

Following approval from the Institutional Review Board at the University of California, Irvine, our partners from Climate Resolve and the Boyle Heights Arts Conservatory recruited listening session participants through a combination of convenience and snowball sampling approaches, such as word-of-mouth and mailing lists. Empirical data was collected through three semi-structured listening sessions with a total of 26 participants, all of whom were adult residents of Boyle Heights with direct or indirect ties to the Boyle Heights Arts Conservatory.

Qualitative data on the experiences of cascading vulnerabilities and urban resilience in the Boyle Heights neighborhood were collected using a community listening session format, which is a modified focus group methodology developed by Ardoin et al. (2022) that supports social learning through group interaction. It allows participants to reflect on the shared nature of their experiences and is especially useful for exploring complex ideas that lack clear solutions, examining collective phenomena, witnessing the collective consciousness of a community, and supporting participants in developing a shared understanding of their experiences.

Three listening sessions, each lasting 120 minutes, were held between February and August 2024. All participants were informed about the nature of the research at the time of recruitment and were asked to sign an informed consent form in advance of the listening sessions. A codebook was developed after the second listening session. The information collected in the third listening session produced little change to the codebook. Thus, data collection was terminated after three listening sessions based on data saturation, a number that has been shown to be suitable for identifying the most prevalent themes (Guest et al., 2017).

Group sizes ranged from seven to 10 participants, which is standard for listening sessions and focus groups (Ardoin et al., 2022). One session included Spanish interpretation provided by a for-hire service. Both authors moderated the listening sessions, and each session included at least one community liaison from each of the two partnering organizations to help participants feel more comfortable. Many of the participants were already familiar with each other due to being family members, friends, or knowing each other from the BHAC, which helped to promote dialogue and interaction. All listening sessions were conducted on Zoom, although an in-person option was offered. The Zoom setting enabled participants to further engage through the group chat feature. Emojis were used by participants to react to what was being shared, both in the chat and through the video screen. At the end of each listening session, an optional demographics questionnaire was distributed to participants. Following each session, participants were compensated with a gift card to a local merchant.

Coding and Identification of Themes

All sessions were audio recorded and transcribed verbatim with manual verification by both authors. Each participant was labeled with a unique identifier to create anonymity. The transcripts were then uploaded into

NVivo software to perform thematic content analysis using a hybrid deductive-inductive coding strategy, which has been shown to achieve greater rigor and transferability of findings (Fereday and Muir-Cochrane, 2006; Roberts et al., 2019). The *deductive* (top-down) approach was used to develop predetermined categories based on theoretical frameworks identified through a literature review (Boyatzis, 1998), while the *inductive* (bottom-up) approach involved finding patterns in the data through observation (Braun and Clarke, 2006), which provided additional layers of insight into how participants described their experiences of vulnerability and resilience. The partnering organization, Climate Resolve, provided final approval of the identified themes.

Results

Descriptive Statistics

The sociodemographic breakdown of the listening sessions is displayed in **Table 1**. Of the 26 participants, at least half were 34 years of age or younger and 46 percent identified as female. Everyone who provided sociodemographic information identified as either Hispanic/Latino or non-white; one participant identified as both Hispanic/Latino and white.

Table 1. Listening Session Participant Sociodemographics.

	Session 1 *9-Feb-24*	Session 2 *27-Jun-24*	Session 3 *1-Aug-24*	Total
Researchers	2	2	2	
Community Liaisons	3	2	1	
Participants	10	7	9	26
Age				
18 - 24	20%	43%	33%	31%
25 - 34	10%	0%	44%	19%
35 - 44	20%	0%	0%	8%
45 - 54	0%	14%	11%	8%
55 - 64	0%	14%	0%	4%
Prefer not to answer	50%	29%	11%	31%
Sex				
Male	20%	29%	22%	23%
Female	30%	43%	67%	46%
Other	0%	0%	0%	0%
Prefer not to answer	50%	29%	11%	31%
Race				
American Indian / Alaska Native	0%	0%	0%	0%
Asian	0%	0%	0%	0%
Black / African American	10%	0%	0%	4%
Indigenous Descent of the Americas	10%	14%	0%	8%
Native Hawaiian / Other Pacific Islander	0%	0%	0%	0%
White / Caucasian	0%	0%	11%	4%
Other	30%	29%	67%	42%
Prefer not to answer	50%	57%	11%	38%

	Session 1 *9-Feb-24*	Session 2 *27-Jun-24*	Session 3 *1-Aug-24*	Total
Hispanic/Latino				
Yes	50%	57%	89%	65%
No	0%	14%	0%	4%
Prefer not to answer	50%	29%	11%	31%

Transportation and Climate Vulnerabilities

In the first section, when participants were asked to *Define* issues related to transit resilience, they identified and evaluated current transportation experiences and challenges in Boyle Heights, particularly during extreme weather events. Here, we focus on findings related to existing conditions and gaps in the transportation system.

Transportation Vulnerabilities in Boyle Heights

Participants reported a lack of transportation options and characterized the existing public transit system as having room for improvement. There was disappointment expressed with the lack of on-demand microtransit options in Boyle Heights, in addition to a perception that micromobility, like e-bikes and scooters, were more accessible in wealthier areas outside the community. Some participants associated the introduction of bikeshare and e-scooters with gentrification in Los Angeles.

Many participants articulated their love of public transit when it is accessible and easy to take, explaining that it provides a sense of familiarity and facilitates enjoyable viewing of the buildings, businesses, and people in the neighborhood as they travel. However, the poor quality of existing public transit was a major concern, with participants reporting overcrowding, inaccessibility, and insufficient seating, particularly for those with disabilities. Cleanliness was also an issue, with reports of urine odors and fears of catching illness, which became heightened following the COVID-19 pandemic. One participant recommended changing the seating upholstery to something that would be easier to clean and disinfect regularly, rather than relying on a colorful pattern to hide the dirt. Overall, the participants noted that the light rail system had better ventilation and was equipped with air conditioning.

Timeliness and frequency were some of the biggest issues identified with public transit. Participants reported a large degree of uncertainty about arrival times despite the availability of pamphlets and apps, which were not always accurate or reliable. Some participants relied on the bus to get to work, and its unreliability had resulted in their arriving late. Reliability was especially pressing for some riders, like those experiencing unemployment (e.g., "*One thing that I've been struggling with is getting a job, because I don't have a reliable mode of transportation*") and those who were formerly incarcerated (e.g., *"especially for me, because I'm on parole. If I've got to get to my parole meeting or something, I can't miss it, you know, or I'll go back to jail"*). Noting that the buses frequently ran 45 minutes late on ordinary days, participants emphasized that they could not rely on it in an

emergency. Making matters worse, participants explained that when the bus does arrive, it is often at capacity, preventing additional riders from getting on. They added that an overcrowded bus makes it especially difficult for people with disabilities, older adults, and people with large grocery bags or small children to find seats.

Another concern was the lack of available shelter, seating, and water access at transit stops. This presented a problem both on very sunny days and rainy days. One participant noted that a nearby gas station provided the only protection from the elements while waiting for the bus, while others stated they had no way to take cover. On rainy days, the bus was even further delayed. The streets surrounding the transit stops tended to get very flooded, and drivers would speed past the stops, splashing riders waiting for the bus. These challenges were not only personal concerns but also cited as major issues for older adults (who were not participants in the listening sessions but who participants referenced for their frequent reliance on public transit). Delays and ad hoc schedule changes compounded these public transit problems, especially during extreme weather events. One participant recommended bringing water and a phone charger with a portable battery when taking the bus, because it is common to wait anywhere from 40 minutes to an hour for a single bus to arrive, which participants noted is especially difficult for older adults and people with disabilities.

> *I think they need more covered bus stops, because I see that mostly the ones that suffer a lot are the seniors. They still want to come out and go shopping. They want to have the food ready for their family, or they have to go to their appointments, and they're using walkers, and they have to wait in the sun.*

Several participants expressed interest in cycling but that the poor-quality infrastructure makes it unsafe. They reported a need for more bike lanes and better lighting along the bridges, especially where the bike lanes end abruptly. They explained that Boyle Heights is an old neighborhood, and the streets are very narrow; they are shared by drivers, cyclists, and parked cars, which is a source of stress and danger, especially due to drivers not showing respect for cyclists. One participant recommended having a bike-dedicated street raised above street level instead of a bike lane.

Another common theme regarding transportation barriers in Boyle Heights was parking. Participants explained that as an older neighborhood, it was designed to accommodate smaller homes. Over the years, the city has transitioned to housing predominantly multi-generational families in which every working adult has a car, contributing to parking shortages. Furthermore, they explained, new developers are not concerned about parking availability. More apartment complexes are being built with reduced parking requirements which – paired with the barriers to public transit – contributes to ongoing transportation challenges. The absence of on-site parking forces many residents to spend significant time searching for street parking, often delaying commutes and daily responsibilities. As neighborhoods densify, more residents bring in more cars, intensifying competition for limited space. In theory, this shift could encourage greater use of public transit or micromobility options. However, while parking availability has decreased, investments in transit and alternative mobility infrastructure have not kept pace, leaving residents with fewer reliable options for getting around. Participants further noted that with gentrification, while newer residents are able to afford to live in more upscale apartment complexes that provide parking spaces or to rent private driveways or garages to meet their parking needs, long-time residents in low-income community apartments spend around 30 minutes per

day looking for parking. Numerous participants acknowledged turning down invitations to visit friends because there would be no parking available or because they did not want to give up their current parking spot. Double parking was also cited as a common occurrence in the neighborhood, as well as having to park very far from their desired destination. One participant commented that they always worried about their car getting broken into if they park in Boyle Heights.

Climate Vulnerabilities in Boyle Heights

The top climate vulnerabilities and extreme events that participants discussed included extreme heat, flooding, power outages, and air pollution. These environmental challenges were often cited as intersecting with transportation vulnerabilities, financial impacts, and the housing crisis.

Extreme weather played a role in deciding what mode of transportation to take. Some participants noted they were more likely to take the bus when it was very hot due to having unreliable air conditioning in their car. Other participants mentioned a lower likelihood of walking (including to a bus stop) during extreme heat, especially in the middle of the day so long as they have a reliable vehicle with air conditioning. One participant recounted an experience of having to walk and take public transit during an extended heat wave. Due to the heat generated by their clothes and long hair, they wanted to carry as little as possible, which meant forgoing a water bottle; thus, having water available for public transit riders would be helpful for adapting to increasingly common challenges like these.

Participants reported that heavy rainfall caused significant delays in public transit, widespread street flooding, and water intrusion particularly in rental units. Although not explicitly explained in the listening sessions, rental units are especially vulnerable to climate impacts, as they are often less well-maintained than owner-occupied homes due to absentee landlords or tenants' fear of rent increases when reporting maintenance issues, leaving tenants more vulnerable to climate events. Participants noted that unreliable transit systems and extreme weather events, such as heavy rain and flooding, often resulted in missed workdays and financial instability. As one participant explained: "*Closures like we had in the last couple of days [with] a lot of heavy rain [is] a day of lost income for a lot of folks, and it makes a big impact at the end of the month.*"

The intersection of climate resilience and financial constraints was further described by another participant in the same session:

> *I am somewhat prepared, but it just costs a good amount of money to have a "go bag" or a "stay box". So, you just have to set aside some money on a month-to-month basis to buy things here and there. It takes time to go through your food and make sure it hasn't expired yet. So, there's an accessibility issue there, too.*

Participants also acknowledged the complicated intersection between extreme weather, the housing crisis, and public transit:

> *For extreme weather events like heat, for example, a transportation challenge I know people experience, especially homeless people, is that they want to be on the train when it's hot, because it's air conditioned....*

> *People are trying to live, people are trying to survive, people are trying to stay [cool]. And it's not fair that the two aren't able to intertwine, like people just trying to take public transportation and people are just trying to stay cool, you know?*

Overall, these discussions brought up a number of climate vulnerabilities and their intersections with transportation issues. Power outages created anxiety about food spoilage, while air pollution was visibly noticeable near freeways. One participant described their experience of working outdoors at a local park: *"Then I'll come back, and my forehead, it'll be burnt through. And I'm just like, oh my God, because of the ozone.... And then there's so many dead fishes right there."* These observations emphasize the interconnected nature of climate vulnerabilities and their wide-ranging impacts on daily life.

Cascading Vulnerabilities

Boyle Heights residents face a complex interplay of unreliable public transportation, extreme weather events, and socioeconomic challenges. These factors collectively amplify anxiety, reduce mobility options, and otherwise compound existing inequities, particularly for populations that have been made vulnerable, such as older adults, low-income individuals, and those with limited transportation choices.

Disinvestment

In general, there was an awareness of a lack of investment in neighborhood amenities, such as lighting, green infrastructure, and pavement conditions, in addition to public transit infrastructure. The lack of lighting infrastructure contributed to safety concerns:

> *Right now, you'll see a lot of the streetlights are out. People are taking the copper. My block is all out, and I've put in my request to get them fixed. I feel like people don't feel safe just walking around without the streetlights on.*

Numerous participants mentioned issues with potholes. In terms of flooding, participants noted that "*our infrastructure with the water here in LA is really bad, and the potholes don't get covered, and our cars get messed up. There's always flooding.*"

A lack of green infrastructure and tree canopy further heightened these vulnerabilities and fueled mistrust of the government. Discussion in the Zoom chat noted that the neighborhood officials had cut down many trees in Boyle Heights over the years and planned to cut down more, which residents were protesting.

> *We really don't have many trees.... We've lost a lot of our green spaces here in Boyle Heights. Even in the surrounding areas, we just don't have many green spaces.... We need to invest in our parks and making more green spaces, because even when it's hot, I can go sit...under a tree, and I'm good.*

Participants discussed a variety of infrastructure and environmental challenges. These issues collectively highlight participants' concerns about safety, quality of life, and a growing mistrust in local government, prompting community activism and protests against further degradation of the environment.

Disempowerment By Design

A lack of investment in infrastructure maintenance and development in a community can contribute to reduced quality of life, feelings of unsafety, increased stress, and distrust of the government. Low levels of government investment can lead to a sense of having less political support or influence, which can contribute to feelings of disempowerment and disengagement. Addressing disinvestment involves not only upgrading physical infrastructure but also fostering economic opportunities, improving public services, and facilitating active participation in the civic and political life of the community.

Some participants commented on the presence of hostile infrastructure in the neighborhood, which is intended to deter the unhoused from using public transit yet creates a deterrent for all riders:

> *There's no shade [at] the bus [stops] now, because infrastructure hates homeless people. There's no seating. If [there is], they're really uncomfortable. They have those rails.... They just make the waiting for public transit so uncomfortable, because they don't want people to be sitting there for extended periods of time.... They just make it so that it's like, I'm not going to do all that. I'm not going to walk to the bus stop, be uncomfortable, no shade, no seating area when I have a car right outside.*

This participant summarized their statement in the Zoom chat by saying: "*The city, in trying to deter homeless folks from bus stops, makes the experience so much worse for everyone in the community (including homeless folks) by not giving us shade or seating in our notoriously hot and not green city.*"

A similar sentiment was expressed by a participant in another session: "*Metro can continue supporting [our community]... by providing adequate infrastructure so folks that are taking public transportation can be there and feel safe and be comfortable when they're waiting.*"

One participant discussed the community engagement practices of LA Metro and how their meetings are not held at "*hours where most community members can attend. It's like at four or five or six in the afternoon, when most folks, realistically, don't have the availability.*"

This participant further elaborated on this feeling of not being heard by transit agencies:

> *For sure, it feels like because Metro is such a big monolith and there's so many people working there, one never really feels like they're heard when they have complaints about how they feel about safety, or the frequency of bus routes, or why things were changed.*

These excerpts from the listening sessions demonstrate feelings of disempowerment by design, because these experiences are the result of choices made by transit agencies and planning departments. The participants discussed their frustrations with public transit, feeling unheard due to inconvenient meeting times, and a

perceived lack of responsiveness to complaints about safety and service changes. The use of hostile infrastructure at bus stops, intended to deter unhoused individuals, has made waiting for public transit uncomfortable for all users by removing shade and adequate seating. This approach is seen as counterproductive, making public transit less appealing in a city known for its heat and lack of green spaces. Participants expressed a desire for improved infrastructure that prioritizes comfort and safety for all transit users.

Exposure to Harm

The diminishment of an individual's or community's ability to control their own lives and make decisions affecting their well-being (known as disempowerment) can significantly increase their exposure to harm. These cascading vulnerabilities can manifest in several ways, such as higher rates of crime and violence due to neglected infrastructure that contributes to unsafe environments. At the same time, the feeling of having little influence over public policies, paired with the stress of living in unsafe conditions, can have significant psychological impacts.

The infrastructure concerns shared by participants revealed a theme of feeling unsafe and in harm's way. Participants expressed concerns in two safety-related areas: physical safety and institutional safety. Each area reflected heightened levels of anxiety.

One young woman shared personal experiences of harassment on public transit and knowledge of others having shared similar experiences:

> *I was mainly a public transit user for all of middle school and high school.... Over that time, I definitely experienced some funky things on the bus, even as a minor, like I was one time assaulted by a man when I was walking home from a bus stop.... Men exposed themselves to me on the bus when I was a minor... when I was going home from school.*

The narratives shared by participants reflected the compounded and cascading vulnerabilities faced by individuals relying on public transit, particularly women, youth, and those from marginalized backgrounds. When participants shared experiences like that above, the group did not react with shock or dismissal; rather, this open sharing led to additional accounts of situations experienced by others who had felt similarly unsafe or uncomfortable.

Generally, participants had used ridehailing to varying degrees. One woman described carrying pepper spray when using ridehailing to protect herself from assault or harassment. Another woman described three occasions in which Uber or Lyft took her to the wrong destination, a place that was deserted, and she had to get out of the car and ask someone else for a ride: *"It was a very horrible experience, because it was late at night. We were by the bridge, and it was very dark, and I never did it again. That was the last time that I used Uber or Lyft."* One man noted in the Zoom chat: *"Yes Uber and Lyft have become dangerous. I have only taken Uber twice, and due to almost getting robbed, I stop using it."*

Institutional safety concerns further highlighted the vulnerabilities faced by transit riders. Some participants voiced feeling unsafe around people who were unhoused, citing experiences of an off-putting smell or erratic behavior, yet they noted police presence did not provide the sense of safety they desired:

> *And police wasn't doing anything. [The unhoused man] was just there, yelling and threatening…and he was even asking us where else can I get more alcohol? …And the police officers were right there. They didn't say anything. They were just listening to the dialogue, but they didn't really say anything or do anything.*

This sentiment was echoed by a participant in a different session:

> *I do understand that a lot of people think that the Metro, or just public transportation, isn't safe. And I do to an extent understand why. But I can with confidence say that the Metro police force would not help that situation at all. It would create more agitation. It would create more panic. It would create more disturbance.*

Participants' lived experiences directly shape their sense of safety. These experiences include harmful incidents while using public transit or ridehailing, fear of police interactions, and challenges related to their socioeconomic status, particularly for women, youth, and other demographics who may lack the protections and opportunities offered to others. These experiences directly impact mode choice and reflect the compounded vulnerabilities faced by marginalized groups.

Distrust of the Government

Exposure to harm, particularly when it is perceived as preventable or poorly managed by governmental bodies, can significantly erode trust in the government. In communities that have historically been marginalized or treated unjustly by government policies or actions, there may already be a baseline of distrust. Continued exposure to harm without adequate government intervention can reinforce this distrust and lead to a deep-rooted skepticism about government intentions and effectiveness. This erosion of trust in government from exposure to harm can have long-lasting consequences, such as decreased civic engagement and resistance to government initiatives.

Distrust of law enforcement emerged as a recurring theme in the listening sessions. Often without prompting from facilitators, participants shared negative experiences with those who are intended to ensure their safety: the police. When asked specifically about experiences of police presence on public transit, one participant explained:

> *I just don't feel comfortable going up to a Metro police officer, because I feel like they have quarrels with people always…. I would literally look for any other person with a Metro tag or any other type of Metro information rather than a police officer, because you take a risk talking to a police officer. And you won't know if something bad will happen with them because they're in a bad mood.*

This participant further described what they perceived as excessive police focus on the unhoused:

> *At the last stop, there's always at least 10 police officers waiting there to check TAP cards. And if [you] don't [have one], they detain you. They detain you. And the majority of people that are being detained are homeless folk that are just trying to get from one point to another, just trying to stay warm.*

Another participant in the same session echoed these sentiments:

> *I think that when police, like people with guns, are there, at least my perception is that they're there more to police the people who are there rather than to protect me.... Police presence isn't necessarily calming to me.... That happened to me when I was in middle school, you know, where I had someone stop me and check my TAP card when I got off of the bus in Boyle Heights actually.*

This sentiment, which was also expressed in the Zoom chat of another listening session as *"Stop criminalizing poverty,"* underscores a broader apprehension about institutionalized safety measures and the disproportionate risks they present as perceived by the community. At the same time, several older women participants shared stories of seeking or desiring police presence to increase their sense of safety.

A similar sense of distrust prevailed regarding the government at large, especially when it came to disaster preparedness and response. The government's response to the COVID-19 pandemic led one participant to express distrust of government actions, stating:

> *I don't trust that [the government] will be [reliable], so I try to just organize within, especially after the pandemic.... I figured no one's gonna save us but us, so I need to figure it out. If something happens that is worse, I feel like we all need to be prepared.*

For some, this distrust was related to a perception of governmental disorganization:

> *I think there's just a huge disconnect there. Nobody knows, it didn't seem like any agency really knows who's in charge of what during a disaster plan. I've gone through rabbit holes calling people like, hey, who's the designated emergency responder, is FEMA involved, is the Red Cross, or is it the parks [department]? So, there's a lot of miscommunication, and there really, really is no readiness in terms of the government or other agencies.*

Participants also reflected on their fears of being left behind in an evacuation:

> *I feel like if we had to go somewhere, they don't have enough transit for people. I know people have told me that in Cuba they have designated buses when they have hurricanes that ship them to the mountains where they're safe. We don't have that here, like, they would just let you die. And I've seen that, like with Hurricane Katrina, so I'm really scared of relying on the government for things like that.*

This participant further reflected on their experience of a hurricane evacuation in Florida: "*My coworkers were crying, because they thought they were gonna die.... I've seen just terror when it comes to emergency situations, because people know that the government's going to let them die.*"

The listening sessions highlighted a significant theme of distrust in law enforcement and government institutions among community members, particularly with regard to public transportation and disaster response. These sentiments encapsulate the need for transit agencies to rebuild trust by centering community voices and ensuring that resources are equitably accessible.

Despair

Distrust in the government can lead to increased distress and anxiety, especially when people doubt the adequacy and effectiveness of planned emergency responses and feel they must rely solely on their own resources when facing disaster situations.

In the listening sessions, facilitators asked about feelings of *climate anxiety* and participants shared their experiences of observing the impacts of climate change in the behavior of others in the community: *"I believe everybody experiences a climate anxiety. You could see it in the streets, drivers driving crazy, honking like crazy. A lot of people are angry at the world. They want to beat up on each other."*

Another participant in the same session shared a similar sentiment:

> *Sometimes I visit people and just from the beginning, once you enter the building, you can feel the heat. And you know that alters your thoughts.... I guess that's why people are becoming more violent.... This climate change is making everybody violent.... Since I drive a lot, I see it in the people, they're just so angry.*

This question also resulted in descriptions of experiences of distress in daily life felt by participants and others in the community:

> *I work in Boyle Heights providing mental health services, and I interact with young people, and specifically I'm thinking about high school age people that I interact with who have shared these kinds of sentiments with me. So, it definitely exists in younger people, a lot younger people, too, where they have this climate anxiety, and then I also have friends my age who have shared their sentiments specifically about earthquakes, too, and being prepared. So yeah, I feel like it's everywhere.*

A Spanish-speaking participant in a different listening session shared similar reflections on the impacts of climate change on mental wellness:

> *I think that it's very important to know that when there's extreme weather conditions or there's something out of the ordinary or any type of change [where you risk] losing your life, especially because we're focusing on extreme weather, it kind of takes a turn on your mental illness. So, it kind of hops into something else, creates a thunderstorm within yourself. And we all have to make sure that we recognize those symptoms and educate one another, because it could become very drastic and [create] extreme measures [of] our ability.*

Some participants expressed an overwhelming sense of despair regarding climate change. One participant added to the chat: *"Sometimes I feel like I have no control over the situation – companies and the government prioritize profits over the habitability of our planet... it feels kind of hopeless."*

Another participant in the same listening session expressed a similar feeling of hopelessness:

> *I get moments when I get reminded that there's just so much that's happening that's contributing to climate change that I can't really change. Like things that I consume on a daily basis, the companies that make it, the factories that make it, the farms that produce the dairy that I eat, and that's all contributing to climate change. And [those are] all the things that I consume on a daily basis – and not just me, but that everyone around me and everyone in society consumes on a daily basis. So, then I start thinking about [how] I'm contributing to it. And how are we going to stop contributing to climate change? How are we going to reverse all the effects? And then it just starts tumbling into like, what's going to happen? It starts happening. We see the effects so close to all the fires. I go outside to take a walk, and I can see the smoke in the air from the fires. And yeah, definitely it's affecting me.*

The pervasive nature of climate anxiety was evident across all three listening sessions. Participants reported witnessing increased aggression and irritability in their community, attributing it to rising temperatures and climate change. They noted observable changes in behavior, such as aggressive driving and general anger, which they linked to the stress of extreme weather conditions. Participants working in mental health services reported encountering climate-related concerns among their clients, including high school students. There was a recognition that extreme weather events can exacerbate existing mental health issues.

Some participants expressed feelings of helplessness and hopelessness regarding climate change. They acknowledged the difficulty of making significant changes due to the pervasive nature of climate-damaging practices in everyday consumption and industrial processes. Some felt overwhelmed by their personal contributions to climate change and the seemingly insurmountable challenge of reversing its effects.

The proximity of climate change impacts, such as visible smoke from wildfires, has made the issue more tangible and immediate for many, further intensifying their anxiety and concern about the future. Taken together, there was an observable thread of cascading vulnerabilities throughout the listening sessions, beginning with disinvestment and leading to disempowerment, followed by harm, distrust, and ultimately despair.

Ascending Strengths

Despite these cascading infrastructural vulnerabilities, in the second section on *Discovery*, participants explored the strengths and resources of the Boyle Heights Arts Conservatory and the broader community, highlighting elements that contribute to resilience and well-being during both ordinary days and extreme events. Here, the emphasis was on the role of community spaces and relationships in fostering safety, resilience, and coping strategies. Through this process, participants uncovered existing assets that support community resilience, exemplifying a strengths-based resilience approach.

In contrast to the notion of cascading vulnerabilities, a new concept emerged through the listening sessions that encompassed community-driven solutions, collective care, and culturally tailored interventions, which we

have summarized as *Ascending Strengths.* This concept integrates principles of safety, trust, and empowerment, creating spaces where basic needs are met, collective action is fostered, and residents are supported in their aspirations and dreams. It emphasizes trust and reliance on community networks rather than solely government systems, highlighting the power of localized, culturally sensitive solutions. The concept of *Ascending Strengths* is aligned with the guiding principles of the Boyle Heights Arts Conservatory, which include Trauma-Informed, Healing-Centered, Arts-Based Engagement, and in this report, we provide examples of how to apply lessons learned from *Ascending Strengths* to resilient transit planning.

Community Investment

One theme that many participants brought up was an appreciation for the ways in which the Boyle Heights Arts Conservatory invests in their community, which includes material resources and educational programming. For example, participants shared that the BHAC has snacks available daily for visitors to access and that visitors could utilize the refrigerator to store medication or food if their home's electricity was out. Other types of resources that participants reported accessing at the BHAC included cooling, Wi-Fi, restrooms, and filtered water.

Many participants expressed gratitude for the BHAC's free workshops and classes, including art classes (which they noted tend to be an expensive activity) and adult classes (which they emphasized are very rare in the community). One woman shared, *"When I started coming in…I asked for adult classes, and they actually put together an adult class for the folks that I knew, and that was really beautiful, you know? Everybody was from here, women [from here]."* Participants shared that the BHAC has also provided panel discussions, film screenings, and other community events.

Empowerment

Investment in a community can contribute to feelings of empowerment, especially when that investment includes education, skills building, and workforce development, which can help members feel more capable of addressing challenges, improving their lives, and contributing to their community's development. Being involved in decision-making processes and witnessing tangible improvements in their neighborhood can contribute to a stronger sense of ownership and pride in community. Workforce development can also contribute to financial stability and independence. With increased resources and support, communities can develop their own solutions to local challenges. Thus, community investments can create a ripple effect of positive change, leading to a greater sense of empowerment among residents.

Participants who once accessed the resilience center for services, like youth and adult programming, reported receiving opportunities to step into community serving roles themselves, from becoming art teachers and administrative volunteers to their children becoming radio show hosts. For some, these opportunities supported their resilience-building by receiving and providing mentorship and having a place where they felt safe. Additionally, these opportunities opened doors for paid internships and employment both at and beyond the BHAC.

> *I think that the workforce development piece that I know BHAC provides is really important, because that's building resilience, helping people to be self-sufficient and to be able to maintain everything that they need in order to survive and keep going.*

Participants echoed a sense of purpose and a boost to their own self-esteem or that of a family member who relied on the BHAC. This sense of empowerment was nurtured through having an open-door policy, providing a space that offers autonomy to visitors, and presenting opportunities for workforce development.

> *I'm a formerly incarcerated person.... This is really my first job that I actually got on my own terms.... They've given me such a great purpose in my life to be able to work with kids and help build curriculum to foster out to the youth and to other teaching artists. Having a sense of purpose and being accepted has done wonders for my health.*

Participants spoke passionately and with care and appreciation for the various roles that the BHAC had played for them. For example, one participant who had reported a type of youth trauma shared being able to expand a workshop that they had originally started at the BHAC out to incarcerated girls in another formal institution:

> *Now I'm a teaching artist with them. And now I'm in the juvenile halls with the girls. And so, you know, that they truly believe in my work is like the first time that that's ever happened to me in my [many] years of working in a nonprofit. So that's amazing.*

Another participant in a different listening session shared a similar experience of empowerment of family members:

> *I asked if I could get my daughters trained, because they wanted to have a radio show, so [the BHAC] set it up really quick.... I think for my daughters, I feel it has really helped their self-esteem, and that helps a lot in resiliency and overcoming their traumas, and also, we need more healing spaces, collective healing spaces where we can be able to do that.*

The Boyle Heights Arts Conservatory demonstrates a powerful model of community empowerment and resilience-building. By transitioning participants to active contributors in education and healing, the resilience hub fosters personal growth and a sense of purpose. The workforce development and mentorship have supported self-sufficiency and boosted self-esteem. Particularly impactful for formerly incarcerated individuals and youth, the BHAC provides a platform for overcoming trauma. By creating a collective healing space and enabling community members to take on leadership roles, the BHAC has cultivated a cycle of positive change, where individuals not only receive support but also actively contribute to their community's well-being, thereby strengthening overall community resilience.

Safety

A sense of empowerment can contribute to feelings of safety within a community, such as when community members feel they have some control over their environment and circumstances, reducing feelings of vulnerability and increasing perceived security. The development of stronger social bonds can create support

systems and contribute to a shared belief in a community's collective ability to address local issues. This can also help build a sense of cultural pride and community identity, leading to personal investment in the well-being and safety of others in the community. Thus, a sense of empowerment can create a positive feedback loop where increased feelings of safety can lead to better engagement within a community, which in turn can further enhance feelings of safety within the community.

Resoundingly, participants were in agreement that the BHAC was more than a space of respite during a climate emergency. For many, it felt like home, providing a sense of safety, security, and protection. As one woman shared: *"There has been instances where there are folks outside acting out of character and as soon as I walk in, the BHAC takes action and tries to assist in whatever way possible."*

In the same listening session, another participant explained:

> *As a person of color and a woman of color, it's difficult to find safe spaces, and [as] a mom, for our children, too. And I've always thought [the BHAC] was a really safe space in Boyle Heights to be in. And I've also encountered people that have had a violent incident happen in front and have gone in there to decompress and be able to feel safe enough to walk in the streets again.*

Another woman of color in the same listening session expressed a similar sentiment:

> *I definitely feel safer knowing that it's there. If something were to happen, if I were on the block and something would happen, I know I could run there and ask for some help.... You never know if you run into a place how people are going to react; whereas I know if I ran into there, they would do something.*

The BHAC has provided a place of peace and shelter for many participants: *"We have used it [when] we were couch surfing. We didn't have anywhere to stay. And so that was one of our safe spaces."*

A formerly incarcerated participant in the same listening session expressed something similar:

> *When I first came home, I was in a transitional house.... In a transitional house, it can get really hectic. So, the space became a place for me [where] I [would] do homework, because I was pursuing my master's degree.... It definitely helped me out a lot just having the space to be at.*

The BHAC established itself as a vital community resource providing more than a temporary refuge during emergencies. For many participants, it has become a second home, offering a profound sense of safety, security, and protection. The BHAC serves as a safe haven for community members, such as women of color, mothers, and individuals in transitional housing. Participants described it as a place where they could seek help, decompress after traumatic experiences, and find peace during challenging circumstances. Its welcoming atmosphere and proactive approach to addressing safety concerns has created a trusted space where community members feel confident that they will receive assistance when needed. This sense of security extends beyond the physical space, positively impacting participants' overall feeling of safety in the neighborhood and providing a stable environment for personal growth and pursuits like education.

Trust

A sense of safety within a community can significantly contribute to the development of trust among its members. When people feel safe in their environment, it reduces anxiety which can allow for more open and positive interactions. A safe environment tends to encourage increased interactions, which builds relationships and fosters trust. In this type of setting, people are more likely to participate in community events, further strengthening trust. A sense of safety creates an environment where positive interactions, open communication, and shared experiences can flourish, which provides the necessary conditions for trust to develop and grow among community members, leading to a stronger, more cohesive community. In response, as trust builds, it further reinforces the local sense of safety, creating a positive cycle that strengthens community bonds over time.

Several participants commented on the accepting and welcoming nature of the founders of the BHAC: *"There's a lot of empathy and understanding. For me, I'm a formerly incarcerated person, so I was very nervous…. I came home after 20 years, not really knowing how society was going to react to me."*

A participant in a different listening session expressed a similar sentiment:

> *I don't think that there's ever been a place like that, you know, especially with the people that run it, and how they see folks' potential regardless of – you know, maybe I don't speak professionally or something like that, but that they see genuinely that we are invested in our community is really beautiful.*

Participants elaborated on the ways in which the BHAC created a sense of trust:

> *I don't think that I've ever disclosed to them that I suffered from bouts of depression…. I've been in really dark places; beyond the blackout! But I'll go in there and like, automatically, they'll give me a hug or offer me something or they'll just ask me how I am. And that means a lot, especially, like, I'm really system impacted where I was in a group home, and then after that, just like in and out of different institutions. And so, you know, I've never been in a space that's so welcoming like that.*

Other participants commented that the BHAC feels *"very welcoming," "homey,"* and like *"everybody treated me like a friend immediately."*

Another community-based, trusted resource described in the sessions was the LA Metro's Unarmed Transit Ambassador's program. Many participants expressed the view that it improved their sense of safety, especially when compared to the police. Participants shared that transit riders were more likely to trust the Metro's Unarmed Transit Ambassadors, describing them as *"completely polar opposites"* of Metro's police authority.

A man in one listening session stated:

> *Having the ambassadors makes a big difference, because they're not there to police you either, they're not there to check your fare, they're not there to do what the cops and the sheriffs normally do, which comes out*

sometimes [as] border[ing] on harassing behavior. But they're just there to help. They're just there to answer a question, and they're very friendly.

Another man in a different listening session shared a similar sentiment:

I just think that ambassadors are kind of more of a neutral presence where I feel comfortable going up to them. And there's no risk of escalation to something dangerous, right, where they'll, I don't know, shoot someone or shoot me or whatever. Whereas I don't necessarily feel that same sense of security with a police officer.

In addition to the trust that participants expressed for the BHAC, there were nontraditional forms of community-based transportation that they trusted more than formal ridehailing companies. For example, a Spanish-speaking woman described her use of these "personal taxis":

We went to an event, and we met a man…. He stopped driving Uber. He does kind of like personal trips, like a taxi…. So, he's been a safe person. I can call him, and I ask him for that service…. So, from Uber, he became his own personal taxi. And for me, it's a safe option. I've met him. I feel familiar with him for taking a safe and comfortable trip…. I almost see him as family now. I've met his wife. I have a kind of trust in the person. It's not that easily we can find those kinds of personal taxis that are safe.

Similarly, a man in a different listening session explained the concept of an "underground taxi service" that operates in Boyle Heights:

I don't like the name of it, but "gypsy cabs" are still a thing. It's basically just like an underground taxicab service that if you know you know. Most of the time you know, because when we had pay phones that worked, you would see the taxi sticker in a last-minute emergency…. Those services are still around. They're not as prevalent as they used to be. And some of them actually were ahead of their time in terms of being like an Uber. You just call the person directly and sometimes they will even do things for you, like deliver food or groceries.

These community-based forms of transportation were viewed as more trustworthy for many participants over more traditional modes of transportation.

Overall, participants highlighted the welcoming and accepting nature of the BHAC and its founders. Many individuals, including those who were systems impacted, such as by former incarceration or experiences in group homes, felt genuinely accepted and valued at the BHAC. The atmosphere was described as friendly with staff members offering emotional support and recognizing community members' potential regardless of their background.

The LA Metro's Unarmed Transit Ambassador program was also praised for earning riders' trust. Many participants felt more comfortable with these ambassadors compared to traditional police presence, viewing them as helpful and non-threatening. The ambassadors were seen as a neutral presence that reduced the risk of dangerous escalations often associated with law enforcement interactions.

Alternative transportation options were often viewed as more trustworthy than conventional ridehailing services. These included personal taxi services provided by former ridehailing drivers and underground taxi services. Participants valued the familiarity and personal connections they developed with these community-based drivers, considering them to be more trustworthy and reliable alternatives to mainstream transportation options.

Hope

Trust within a community plays a crucial role in fostering hope and encouraging creative problem-solving. Trust creates an atmosphere where people are more willing to work together and share resources, which can lead to innovative solutions. Trust helps community members align their goals toward a common purpose, which can inspire hope for a better future. Often when people feel trusted, they are more likely to believe in their own abilities and take initiative to address community challenges, creating a cycle of hope and creativity that continues to build upon itself. By fostering trust, communities can create an environment where members feel empowered to dream, innovate, and work together in developing creative solutions to shared challenges.

In the third section, participants were invited to *Dream* of innovative possibilities for building upon and improving resilience in Boyle Heights, with questions that focused on information sharing, creative engagement, and resources for health and well-being. Participants spoke of how art, community-powered programs, and medical resources in resilience hubs could enhance disaster preparedness and recovery.

Participants appreciated the role that the BHAC, art, and community have played in helping them become more resilient and build the future they want to see. As one participant noted in the Zoom chat: *"Art allows you the space to think outside the ordinary…towards solutions and reminds us of our ability to create not only art but solutions…. Also, it's meditative…it eases anxiety."*

A participant in another listening session expressed a similar idea:

> *My daughters have that outlet in the radio to imagine and voice the world they want to live in without police, with people that really care [for] and love each other. They talk about that and hopefully encourage other youth to imagine that, as well…and build it.*

Another participant in the same listening session shared a related perspective:

> *Having a creative space and nurturing our creative selves allows us to imagine different solutions – and different futures, too. We're practicing critical thinking and thinking outside of the box and imagining a world outside of the one that we live in. And I think that is so important when thinking about the future, because a lot of us feel that anxiety about the future. Because it's so hard to think [beyond] the constraints of how things are, [how] our society is already functioning that we kind of do need to be creative and flex that muscle in order to imagine a future together.*

A participant in a different listening session shared a similar sentiment in response to the question on climate anxiety, transforming it into a new concept of ***'climate hope'***.

> *We are all – a lot of us are – feeling this climate anxiety, but [we] also need to feel climate hope. We're taking actions, and we can get involved in our local communities. And it feels hopeless sometimes, but just knowing that you have power, too…just trying to reclaim our power [matters]…because so many of these decisions are made for us. And it's just [a matter of] reminding ourselves that although maybe our position of power is not as large, we still have it, and we need to use it.*

Collectively, participants shared their visions for enhancing resilience in Boyle Heights through information sharing, creative engagement, and providing accessible resources for health and well-being in resilience hubs. Participants recognized art as a powerful medium for thinking creatively, finding solutions, and alleviating anxiety. Many highlighted the importance of creative spaces for nurturing critical thinking and imagining alternative futures. They viewed these spaces as crucial for addressing the anxiety many feel about the future and envisioning possibilities beyond current societal constraints.

From the discussion organically emerged the new concept of '*climate hope*' as a counterbalance to climate anxiety. Participants emphasized the importance of recognizing individual and community power to make positive changes, even in the face of larger, systemic challenges. They stressed the value of local community involvement and taking action as ways of reclaiming power and fostering hope, despite the overwhelming nature of climate-related issues. Overall, the conversation underscored the vital role of creativity, community engagement, and local action in building resilience, addressing anxiety, and imagining improved futures.

The listening sessions revealed the ascending strengths that contribute to the resilience of the Boyle Heights community. From community investment from organizations like the BHAC came a sense of empowerment, which led to safety, trust, and ultimately a vision of hope for a better future. To summarize these findings, we have developed a framework called *Cascading Vulnerabilities, Ascending Strengths*, illustrated in **Figure 1**. This framework is designed to address systemic vulnerabilities by leveraging community assets, applying a layered approach to mitigating vulnerabilities that builds on these strengths in a progressive manner. Informed by the urban planning process known as Asset-Based Community Development, this framework aims to cultivate equitable and sustainable resilience rooted in community members' lived experiences.

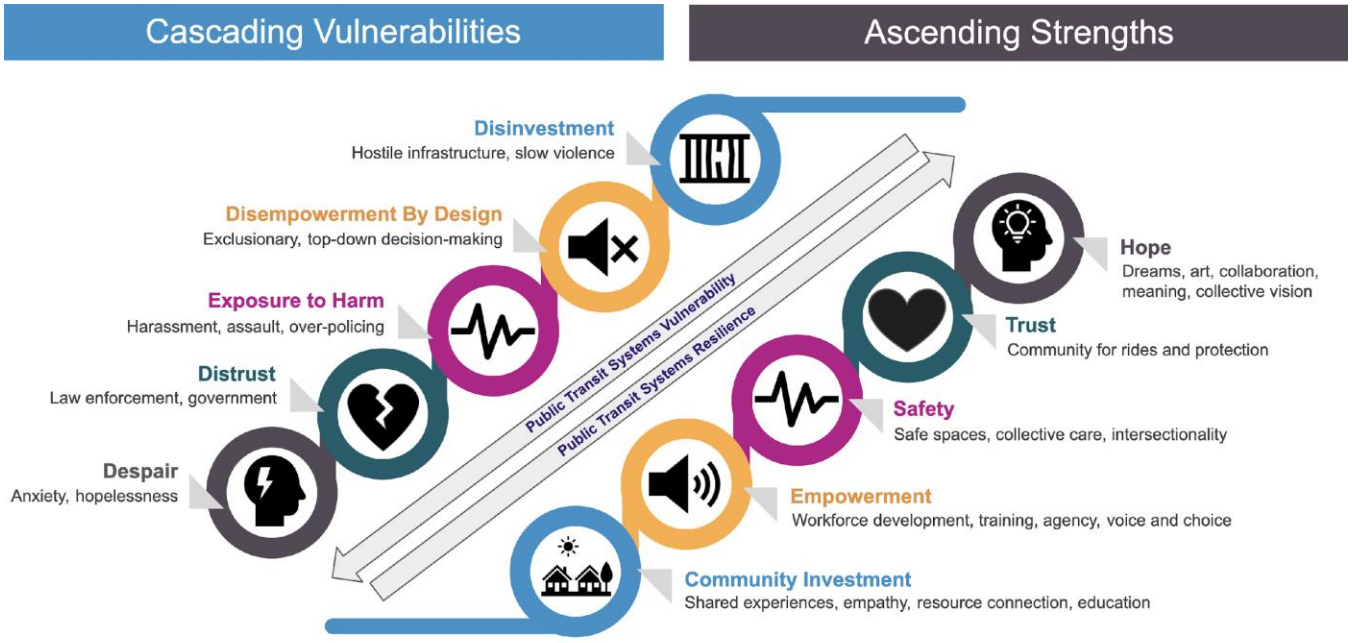

Figure 1. A proposed *Cascading Vulnerabilities, Ascending Strengths* framework for resilience.

Community Recommendations for Transit Resilience

In the fourth section of the listening session, participants were asked to *Design* better collaborations between communities and governments, imagining how resilience hubs and transportation agencies can collaboratively improve hazard preparedness and mitigation. Although participants were not in a position to physically *Deliver* (the fifth and final step of *Appreciative Inquiry*) on their designed resilience strategies during the course of the study, our *Design* section simultaneously facilitated an opportunity for participants to D*eliver* insights and actionable recommendations for policymakers and transit agencies to enhance transportation systems and resilience planning. This section addresses the third question of our research: How do residents of Boyle Heights envision integrating public transit with other forms of social infrastructure in ways that enhance the multisystemic resilience of both engineered systems and social systems?

The following concern was raised by a participant related to the disconnect between policymakers and the communities they impact:

> *I think people need to get to know the community more and talk a lot more to more individual people, because we're not universal. There's such diverse communities with different needs. It's really difficult to gauge the needs of people.... A lot of the times, especially with transport but in general, a lot of the institutions do not get to know the community and have a program that's one-size-fits-all. And it's never adequate enough, because a lot of people get left out, especially the most vulnerable people. And I think that's the biggest problem with institutions in general.*

Another participant in the same session shared a similar suggestion:

> *I think the one thing that Metro could really do is just really listen to the community and be more receptive to their feedback when it comes to development projects, meetings they're holding, decisions that they're making to cut or extend specific lines or bus routes.*

This participant elaborated further on their idea:

> *I think the number one thing that would help a lot, which is kind of unrealistic, is for them to have to go through our situation and ride public transportation. You know, I guess the cliche, like 'walk a mile in our shoes' in these type of situations to really understand the gravity of why it's important to prioritize this kind of support and get a firsthand view and experience of what it's like to go through that situation, [to] feel that anxiety, that dread and that uncertainty, to be able to better make decisions that will support folks in those situations.*

Some participants emphasized the responsibility of community members' role in civic engagement:

> *If you participate in a group, in a community group, you're going to be more informed about what our representatives are doing. And if you're not learning about this, then it's hard for you to be able to question or ask what can happen. When you're involved in community groups, you can become more knowledgeable, and you can also share that information with your neighbors for people who don't want to get involved in community meetings and so on. We can be a kind of voice, a representative for our neighborhood or your own family. You need to have that kind of collective of communication with our representatives so that we can be informed, become more knowledgeable.*

Overall, a significant concern expressed among multiple participants was the disconnect between policymakers and the communities they serve. Participants expressed frustration with institutions' tendency to implement one-size-fits-all programs that often fail to address the diverse needs of different communities, particularly those that have been made most vulnerable. They emphasized the importance of policymakers getting to know the community on a more personal level and engaging in direct conversations with individuals to understand their specific needs and challenges. Participants suggested that decision-makers should be more receptive to community feedback, actively listen to residents' concerns, and experience firsthand the challenges of using public transportation to gain a deeper understanding of the community's needs and the impacts of policy decisions. Overall, there was a strong desire for more personalized, community-informed approaches to policymaking and service provision.

A second major concern about transit was affordability:

> *I think a lesson that transportation agencies can take from other community-based org[anization]s is caring about the community or putting the community first. So, for instance, BHAC offers free stuff to the community, which is what makes it so accessible and so usable, which makes it so useful. I think transportation agencies – like the Metro and the Dash [and] all these other bus companies and transportation companies – really, if they're trying to keep the community in mind, they need to think about*

> *what the community can afford and utilize. I think my main comment here is just affordability. We need to invest in making public transit free or much lower cost [than] it is now.*

Another participant in a different session expressed a similar desire for transit affordability:

> *One wish I have with transit agencies is that they'll offer significantly reduced cost transit or free transit. I know right now they have offers for low-income folks to get free transit to some extent, maybe not unlimited.... I think the resources should be available to more parts of the community.... I think we can really take funding from other parts of the city that are very overfunded and really invest in our public transit. I think there will just be a cascade of benefits if we did that, like [reducing] congestion of traffic, pollution.... We would be tackling so many things just by making public transit free.... I hope I'm not the only one who sees that. I hope people can bring that up to the transportation folks and be like, you will make a big change in the city and the communities all around here if you make public transit free.*

Another participant in the same session echoed this request:

> *Other countries offer free transportation. Why not the U.S.? Why is it that we have to pay for transportation and in other countries, it's offered free? Why are we so behind? You know, and it would make a huge difference in people's lives.*

Participants across all three sessions expressed affordable or free public transit as being a crucial step towards improving quality of life, addressing environmental concerns, and ensuring equitable access to transportation for all residents. Participants emphasized how this would significantly increase accessibility and usage, while reducing traffic congestion and pollution.

A third recurrent suggestion from participants was an innovative idea for public transit agencies to function as community hubs, offering social services beyond transportation. As one participant noted in the Zoom chat: *"Transit agencies are a hub by nature...[so] maybe social services...can be accessed via these agencies."* Participants described how public transit stations could double as hubs for social services that provide community support and development, recognizing the central role that transportation plays in people's daily lives and leveraging this to provide a wider range of essential services. While existing transport hubs have historically been viewed as simple waiting areas to transfer between transit lines, recent conceptualizations of this physical infrastructure have identified its capacity to enhance social inclusion (Krzyzewska and Chruzik, 2025). The development of resilient transit hubs could be achieved by using or expanding the existing physical infrastructure of transit stations and applying the five elements of the *Ascending Strengths* framework (i.e., community investment, empowerment, safety, trust, and hope). Drawing on insights offered across the listening sessions, resilient transit hubs could: (1) feature kiosks with information about available social services in the area to connect people with the resources they need; (2) offer free Wi-Fi and computer access to allow people to apply for jobs, access online education, or connect with government services; and (3) host food banks or the distribution of meals or groceries to those in need through partnerships with local organizations. By expanding their role to include these types of services, transit stations could become more effective community hubs and address a wider range of social needs, while simultaneously improving accessibility and resource efficiency. Further, these hubs could shift the role of officials, like police and transit ambassadors,

toward a model of mutual responsibility and care. This approach could lead to more integrated, supportive communities and help address issues of inequity and lack of access that often intersect with transit reliance.

Additional suggestions posed during the listening sessions included working with the government to support community gardens and Community Land Trusts, thus offering more autonomy to the community. Some participants recommended expanding programming at both the Boyle Heights Arts Conservatory and LA Metro to provide access to backup batteries, gunshot wound training, telehealth services, microtransit buses that connect transport hubs to healthcare services, and access to medical care that does not require insurance.

Discussion

Four Rs of Multisystemic Resilience Planning

This study examined the role of intersecting public transit systems with other forms of social infrastructure (particularly resilience hubs) in enhancing community resilience and hazard preparedness in the Boyle Heights community of Los Angeles. Our findings reveal a complex interplay between infrastructure system vulnerabilities and social resilience, highlighting the need for integrated planning that leverages community strengths. We have summarized our results using a proposed *Cascading Vulnerabilities, Ascending Strengths* framework. Here, we interpret the policy implications of our results through the lens of the Four Rs (Robustness, Resourcefulness, Redundancy, and Rapidity), while tying in principles of Environmental Justice and Asset-Based Community Development (ABCD).

The Four Rs and Environmental Justice

In Boyle Heights, the demand for applying an Environmental Justice lens is rooted in the lived experiences of residents. Participants in our listening sessions spoke about the lasting impact of freeway construction, chronic exposure to pollution, poor air quality (including ozone), a lack of tree canopy and green space, and the encroachment of infrastructure that often isolates rather than connects. These conditions have compounded over time, creating *cascading vulnerabilities* across generations.

Effectively addressing these vulnerabilities in the context of transit planning requires an Environmental Justice framework that acknowledges these systemic inequities while building on the community's ascending strengths. To operationalize this, we map the Four Rs of resilience (Robustness, Resourcefulness, Redundancy, and Rapidity) onto the three pillars of Environmental Justice: recognition, procedural, and distributive justice.

- *Robustness* (or strength) is reflected in *recognition justice*, which is not just the recognition of historic injustices but also the recognition of community strengths, such as the robustness of community resources and the lived experiences that contribute to community resilience.
- *Resourcefulness* (or resource mobilization) is achieved through the meaningful *participation* of community members, centering local voices and leveraging embodied knowledge and social connections to develop and enact solutions that reflect the unique needs and strengths of the community.
- *Redundancy* (or alternatives) is achieved through a combination of top-down planning from agencies and bottom-up initiatives from the community to *distribute* resources more equitably. This involves tapping into a community's alternative support networks, such as neighborhood phone trees, novel transport options like community-based ridesharing, and community meeting spaces. These networks assist and serve marginalized populations, supporting resource access both during ordinary days and disruptions. Recognition of the diversity of transportations barriers that communities experience

highlights how providing redundant pathways to equitable resources access (*distributive justice*) can increase the potential for more participation (*participatory justice*) to further develop more accessible transportation alternatives.

- *Rapidity* (or quick resolution) emerges from accessing these strengthened community networks, which allow for quicker, more coordinated responses to both slow-onset and rapid crises. Rapidity can be supported through *distributive justice*, where infrastructure planning and resources are prioritized for communities with historical barriers to access. This prioritization supports trust building and repair in the government's relationship with communities in areas where historic racialized planning has increased vulnerability, thereby laying a foundation for more rapid responses during crises.

This alignment with Environmental Justice ensures that resilience strategies do not merely support a community in "bouncing back" from crises but in building forward more equitably. This mapping also supports our findings that:

1. Acknowledging community strengths is essential for bottom-up resilience building
2. Integration of transit with social infrastructure, like resilience hubs, can address access barriers
3. Mitigating cascading vulnerabilities requires attending to the distinct experiences and needs of historically excluded populations

Robustness: Strengths-Based and Inclusive Systems Through Recognition

Robustness in resilience planning requires systems that are strong, inclusive, and capable of addressing the ongoing challenges that are significantly impacting marginalized communities. One of the first principles of resilience, *robustness*, requires that systems not only endure stressors but also address the systemic harms that have historically undermined trust in public infrastructure, planning, and governance.

Our findings reveal notable mistrust of traditional safety initiatives from the community, particularly police presence on public transit. As one participant noted, *"I would literally look for any other person with a Metro tag…rather than a police officer…. You take a risk talking to a police officer."* This sentiment aligns with Sundling and Ceccato's (2022) research on the impact of riders' perceptions of safety on transit, emphasizing the need for alternative safety measures that build trust rather than exacerbate fears. The community's call for alternative safety protocols that are rooted in trust and nonviolence is realized through LA Metro's implementation of the Unarmed Transit Ambassador Pilot Program (Sotero, 2023). However, community members have emphasized that the presence of ambassadors alone is not enough. The continued deployment of armed police officers alongside ambassadors undermines the intended trust-building goals. As such, participants voiced a desire not only for non-carceral safety alternatives but also for the removal of police from transit spaces to achieve a truly robust and community-centered approach to safety.

In the context of resilience, robustness means more than physical durability; it includes determining whether systems create a sense of physical and emotional safety and comfort that allows all users, especially those who have been made most vulnerable, to access and navigate them reliably and without fear. When riders feel

unsafe or unwelcome, they may be less likely to utilize transit; thus, the system's effectiveness and equity are compromised, thereby weakening its overall robustness.

The recent integration of non-punitive safety measures demonstrates a movement towards *recognition justice* by acknowledging the lived experiences of marginalized communities who have frequently experienced disproportionate harm at the hands of police officers, thereby fostering more equitable transit systems.

To enhance robustness, transit agencies could:

- Prioritize safety, trust, and inclusivity by reducing police monitoring of fees and expanding programs like the Unarmed Transit Ambassadors
- Ensure empathetic interactions with all riders by implementing trauma-informed training for ambassadors and staff
- Increase physical safety and comfort, and reduce climate anxiety, by installing shaded bus stops with seating and misting stations to protect riders from extreme weather

Resourcefulness: Leveraging Community Strengths Through Participation

Resourcefulness emphasizes the capacity to mobilize local knowledge and community-driven solutions. Listening session participants expressed feeling excluded from LA Metro's planning processes, which reflects missed opportunities to harness the resourcefulness of local voices. Participants' suggestions demonstrated creative approaches to reimagining transit, such as transforming existing transit stations into resilience centers that connect riders to resources and information during both ordinary days and extreme events, in alignment with Baja's (2022) concept of resilience hubs as multifunctional spaces that provide year-round community services while serving as emergency resource centers.

These insights are related to the Environmental Justice pillars of *recognition* and *participatory justice*, which call for honoring community assets and involving local populations in decision-making, respectively. Participants emphasized that by integrating grassroots knowledge and engaging residents in planning, transit systems could better reflect their cultural and contextual needs. Engaging community strengths would enable transit systems to not only be more responsive but also to build trust and foster equitable partnerships, reflecting the Environmental Justice principles of *participatory* and *distributive justice*.

To enhance resourcefulness, transit agencies could:

- Collaborate with community organizations to incorporate community engagement and resources hubs at transit stations, including microtransit services to extend access to nearby resilience hubs, thereby ensuring that residents can easily reach critical resources, such as telehealth services, cooling centers, and emergency supplies
- Engage residents in participatory planning processes to ensure that transit solutions align with their needs and lived realities

- Reimagine public safety by shifting resources towards community-based Transit Ambassadors and away from an armed police force

Redundancy: Layered Systems of Distributed Support

Redundancy ensures that multiple systems work together to provide alternative options, especially during emergencies. Redundancy supports *distributive justice* by ensuring that backup systems, like multiple transit modes or resilience hubs, are equitably distributed, so that marginalized communities have reliable access to essential services in both everyday life and during crises. To build redundancy, transit systems could focus on creating multifunctional transport hubs that meet societal needs beyond just transportation. For example, these hubs could serve as cooling centers during heat waves, information-sharing nodes during crises, and resource distribution sites for essential supplies, such as water, food, and first aid. This approach aligns with the findings of Ciriaco and Wong (2022), which emphasize the importance of integrating resilience hubs into transit networks to ensure they meet the diverse needs of local communities during emergencies. Ciriaco and Wong (2022) also highlight the value of tailoring resilience hubs to the specific needs of each community, ensuring that their design addresses both physical infrastructure and social vulnerabilities.

Additionally, supporting grassroots organizations is critical to enhancing local networks. Initiatives such as neighborhood phone trees, carpools, “personal taxis”, and emergency communication systems provide a layer of community-based support that complements the functionality of formal transit systems. For example, during power outages or transportation service disruptions, these grassroots systems can serve as a backup to share information, coordinate aid, and reduce isolation in populations that have been made vulnerable.

Finally, investing in on-demand microtransit options can increase access to critical destinations, such as healthcare facilities, cooling centers, and resilience hubs. Microtransit provides flexibility during disruptions, allowing communities to maintain mobility and access essential services when traditional transit systems are compromised.

These strategies underscore the importance of redundancy in creating adaptive systems that can withstand both acute crises (such as extreme weather events) and long-term stressors (like ongoing social and economic challenges). Literature on disaster resilience highlights the necessity of layered, interconnected systems to reduce vulnerabilities and improve response capacity. Studies such as Beck and Hensher (2020) illustrate how integrated systems of transportation, healthcare, and social services can work together to address cascading vulnerabilities during emergencies. By building redundancy of alternatives and resource access into transportation systems, cities can better prepare for disruptions, reduce the risks faced by marginalized populations, and support continuity of essential services.

To enhance redundancy, transit agencies could:

- Develop multifunctional transport hubs that serve as cooling centers, information-sharing nodes, and resource distribution sites during crises

- Provide funding, physical space, and communication platforms to support grassroots organizations in strengthening local networks, such as carpool matching, emergency phone trees, and community-based communication systems, that foster social connections and increase collective preparedness.
- Invest in microtransit options to improve access to critical destinations, such as healthcare facilities and resilience hubs

Rapidity: Timely Responses Through Coordinated Distribution

Rapidity focuses on the ability to respond swiftly and effectively to acute disruptions exacerbated by cascading vulnerabilities. Our findings highlight the interconnectedness of transportation, healthcare, and social services, emphasizing the need for rapid coordination across these systems, which would improve distributive justice. This aligns with the findings by Ciriaco and Wong (2024), correlating the needs of those who rely on public transit with the need for resilience centers to be located along transit corridors. Rapidity being a function of connected corridors and services, their research underscores the importance of tailoring resilience hub services and associated transportation planning to the specific needs of each community for improved rapidity. This resonates with our participants' emphasis on the unique challenges faced by Boyle Heights residents and the urgent need for culturally sensitive, community-driven solutions.

Ciriaco and Wong (2024) found that communities valued resilience hubs that offered a range of services beyond emergency response, including health services, social programs, and educational resources. This aligns with our participants' vision of transforming transport hubs into multifunctional spaces that can address various community needs more quickly. Along with the insights from Ciriaco and Wong's research, our findings in Boyle Heights contribute to a growing body of evidence on the importance of coordinated planning between resilience hubs and transportation systems for a coordinated and timely response to community needs. Without requiring extensive physical construction, existing transport hubs could be developed into multifunctional spaces through incremental initiatives, such as providing lists of resources, offering directions to resilience hubs, and adding water stations, cooling infrastructure, and Wi-Fi access to improve the rapidity of emergency response.

Moreover, the alignment between our findings and Ciriaco and Wong's research underscores the commonality of certain community needs when it comes to resilience planning, despite geographical and cultural differences between Canada and the United States, including health services, social programs, and educational resources. This highlights the potential for knowledge sharing and exchange of best practices in urban resilience planning across different locational contexts for expedited learning.

To improve rapidity, transit agencies could:

- Provide accurate updates on transit delays and service disruptions by enhancing real-time communication tools, such as phone apps and electronic signs
- Ensure swift, empathetic engagement during emergencies by training Transit Ambassadors in trauma-informed crisis response

- Create integrated service networks that address transportation, healthcare, and social needs simultaneously by strengthening partnerships with local organizations

Transformation: Reframing Transit as a Social Service

Using a Four Rs framework for physical and social infrastructure offers a pathway for policymakers, planners, and communities to collaboratively create systems that move beyond vulnerability to foster empowerment, equity, and resilience. This transformation calls for a renewed focus on and investment in the interconnectedness of social and physical infrastructure to ensure that public transit can support communities in both everyday life and moments of crisis.

To achieve this transformation, public transit must be reimagined as more than a mode of transportation; it should function as a social service that advances equity and resilience. By addressing long-standing situational and systemic barriers through intentional programming and infrastructure design, transit agencies can better support marginalized communities, reduce vulnerabilities, and foster collective care among residents. This shift toward participatory planning, where engagement goes beyond a survey or public comment, aligns with the three pillars of the Environmental Justice framework by centering the voices of those most impacted and prioritizing their well-being.

Boyle Heights residents have already demonstrated these pillars, such as resourcefulness and robustness, in the face of systemic challenges. By implementing the Four Rs with an Environmental Justice lens, transit agencies can build upon the ascending strengths of communities to transform public transit into a cornerstone of multisystemic resilience that serves not only as a means of mobility but also as a platform for social equity and community well-being.

Conclusions

The impacts of *cascading vulnerabilities*, including institutional disinvestment, exposure to harm, and despair, underscore the need for a paradigm shift in transportation planning. These vulnerabilities disproportionately affect marginalized populations, particularly in communities like Boyle Heights, where systemic inequities compound environmental and social risks. Specifically, participants in our study emphasized inadequate infrastructure (such as uncovered bus stops and insufficient service during extreme weather), lack of trust in the government, and harm caused by over-policing.

In response to these vulnerabilities, our research introduces a new concept, *Ascending Strengths*, which highlights how improved connections between built transportation infrastructure and social infrastructure can foster resilience and equity. This idea reframes transit systems as not merely physical networks but also social lifelines that can mitigate cascading vulnerabilities and build community capacity when planned and managed accordingly. By addressing long-standing systemic challenges, such as planning processes that have failed to repair historic harms, disempowerment by design, and unreliable services, transit systems could transform into more resilient, community-centered ecosystems.

The findings from our listening sessions reveal the great potential of resilience hubs to address cascading vulnerabilities through trust building and collective action. Thus, reimagining transport hubs as resilience centers is a way to not only enhance access to critical resources (like healthcare, education, and cooling centers) but also to shift the role of dominant institutional authority, such as law enforcement, toward a model rooted in collective care and mutual responsibility led by community-based actors and organizations. By applying the concepts embedded in our proposed framework, transit systems can be redesigned to support community power, repair past harms, and address cascading vulnerabilities. This transformation of transit as a social service requires integrating the Four Rs of Resilience (Robustness, Resourcefulness, Redundancy, and Rapidity) with the three pillars of Environmental Justice (recognition, participatory, and distributive justice). By building trust, fostering collaboration, and centering the voices of marginalized populations, public transit systems can evolve into a platform that not only facilitates mobility but also strengthens social resilience and collective well-being. This approach is essential for navigating an era of increasing climate extremes, widening social inequities, and growing community needs. By gaining a better understanding of how these physical and social infrastructure systems intersect and are interdependent, we can generate an upward (as opposed to downward) spiral of resilience to support communities.

Limitations

While this research provides valuable insights into the role of transit systems in supporting resilience and equity, several limitations must be acknowledged. First, the findings are based on a limited geographic scope, focusing specifically on Boyle Heights. While this case study offers a detailed understanding of the challenges

and strengths within one community, its unique context may not fully represent the experiences of other urban areas. Second, the data was collected primarily through listening sessions, which, while rich in qualitative depth, may not capture the full diversity of perspectives, particularly from residents who were unable or unwilling to participate. Lastly, the study is limited in its ability to quantify the impacts of proposed solutions, such as resilience hubs or Unarmed Transit Ambassadors, as the research focused on community aspirations and qualitative feedback rather than quantitative assessments of outcomes.

Future Work

This research presents several avenues for future study: (1) identifying sites along transit corridors to locate additional community resource nodes, (2) measuring the overlap of disaster risk and social vulnerability to identify future program implementation needs, and (3) developing a quick-response survey to distribute following a significant disruption to collect perishable, real-world data on behavioral decision-making factors related to transit and resilience hub access.

References

Anguelovski, I. (2015). *Neighborhood as refuge: Community reconstruction, place remaking, and environmental justice in the city*. MIT Press.

Aoun, G. (2022). 'A living, breathing building': The rise of resilience centers amid extreme heat in the US. *The Guardian*. https://www.theguardian.com/us-news/2022/sep/23/california-extreme-heat-resilience-centers

Ardoin N. M., Gould R. K., et al. (2022). Community listening sessions: an approach for facilitating collective reflection on environmental learning and behavior in everyday life. *Ecosystems and People* 18(1), 469-477.

Baja, K. (2022). Resilience Hubs: Shifting Power to Communities through Action. In N. B. Rajkovich & S. H. Holmes (Eds.), Climate Adaptation and Resilience Across Scales: From Buildings to Cities (1st ed., pp. 89-109). Routledge. https://doi.org/10.4324/9781003030720

Baja, K., & Urban Sustainability Directors Network (2021). Resilience hubs. *Climate adaptation and resilience across scales*, 89.

Beck M. J., Hensher, D. A. Insights into the impact of COVID-19 on household travel and activities in Australia - The early days of easing restrictions. *Transp Policy* (Oxf). 2020 Dec;99:95-119. doi: 10.1016/j.tranpol.2020.08.004. Epub 2020 Aug 18. PMID: 32836998; PMCID: PMC7434414.

Borowski, E., Soria, J., Schofer, J., & Stathopoulos, A. (2023). Does ridesourcing respond to unplanned rail disruptions? A natural experiment analysis of mobility resilience and disparity. *Cities*, *140*, 104439.

Boyatzis, R. E. (1998). *Transforming qualitative information: Thematic analysis and code development*. Sage.

Braun V and Clarke V (2006) Using thematic analysis in psychology. *Qualitative Research in Psychology 3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Bruneau, M., Chang, S. E., Eguchi, R. T., Lee, G. C., O'Rourke, T. D., Reinhorn, A. M., ... & Von Winterfeldt, D. (2003). A framework to quantitatively assess and enhance the seismic resilience of communities. *Earthquake spectra*, *19*(4), 733-752.

Bullard, R. D. (1990). *Dumping in Dixie: Race, class, and environmental quality*. Westview Press.

Bullard, R. D. (1993). Race and environmental justice in the United States. *Yale Journal of International Law*, 18, 319–336.

Bullard, R. D. (1994). *Unequal protection: Environmental justice and communities of color*. Sierra Club Books.

Bullard, R. D. (1998). Overcoming racism in environmental decision-making. *Environment: Science and Policy for Sustainable Development*, 39(4), 10–44.

Bullard, R. D. (2000). Dumping in Dixie: Race, Class, and Environmental Quality. Westview Press.

Bullard, R. D. (2021). *The wrong complexion for protection: How the government response to disaster endangers African American communities*. NYU Press.

Bullard, R. D., Johnson, G. S., & Torres, A. O. (2007). Environmental Justice and Sustainability: Building Equitable Communities. MIT Press.

California Grants Portal. (2023, January 12). CDFA Community Resilience Centers Program. https://www.grants.ca.gov/grants/cdfa-community-resilience-centers-program/

California Senate Bill 155, Chapter 258, 2021. (2021). California Legislative Information. https://leginfo.legislature.ca.gov

California Strategic Growth Council. (2023). Community Resilience Centers: Strengthening community resilience in neighborhoods across California. https://sgc.ca.gov/programs/community-resilience-centers/

Centers for Disease Control and Prevention (CDC). (2010). *Community health assessment and group evaluation (CHANGE): Building a foundation of knowledge to prioritize community needs*. https://www.cdc.gov/healthycommunitiesprogram/tools/change.htm

Chapple, K., & Loukaitou-Sideris, A. (2019). Transit-Oriented Displacement or Community Dividends? Understanding the Effects of Smarter Growth on Communities. MIT Press.

Ciriaco, T. G., & Wong, S. D. (2022). Review of resilience hubs and associated transportation needs. Transportation Research Interdisciplinary Perspectives, 16, 100697. https://doi.org/10.1016/j.trip.2022.100697

Ciriaco, T. G., & Wong, S. D. (2024). Travel Behaviour and Community Needs for Resilience Hubs. Sustainability Analytics and Modeling, 4, 100030. https://doi.org/10.1016/j.samod.2023.100030

City of Long Beach (2019) Long Beach Climate Action Plan. https://www.longbeach.gov/globalassets/energy/sustainability/climate-action-plan/climate-action-plan-final---november-2019.pdf

Coates, T. (2014, June). The Case for Reparations. The Atlantic. https://www.theatlantic.com/magazine/archive/2014/06/the-case-for-reparations/361631/

Cooperrider D. L. and Whitney D. (2001) A positive revolution in change: Appreciative inquiry. *Perspectives on Business and Global Change* 14(2), 1-10. World Business Academy.

County of Los Angeles (2021) Vulnerability assessment: 2021 update. https://www.ladpw.org/environment/vulnerability-assessment

Cutter, S. L. (1995). The forgotten casualties: Women, children, and environmental change. *Global Environmental Change*, 5(3), 181–194.

Davis, M. (1990). *City of quartz: Excavating the future in Los Angeles*. Verso.

Fereday J. and Muir-Cochrane E. (2006) Demonstrating rigor using thematic analysis: A hybrid approach of inductive and deductive coding and theme development. *International Journal of Qualitative Methods* 5(1), 1-11. https://doi.org/10.1177/160940690600500107

Flanagan B. E., Gregory E. W., et al. (2011) A Social Vulnerability Index for disaster management. *Journal of Homeland Security and Emergency Management* 8(1), Article 3. https://doi.org/10.2202/1547-7355.1792

Flanagan, B. E., Gregory, E. W., Hallisey, E. J., Heitgerd, J. L., & Lewis, B. (2018). A social vulnerability index for disaster management. *Journal of Homeland Security and Emergency Management*, 15(1), 20180009. https://doi.org/10.1515/jhsem-2017-0027

Foglesong, R. E., & Stein, C. (2019). *Married to the mouse: Walt Disney World and Orlando*. Yale University Press.

Greenlining Institute. (2024). *What's all the hub about? How community resilience hubs can bridge gaps in social connection, wellness, and transportation*. https://greenlining.org/2024/whats-all-the-hub-about-how-community-resilience-hubs-can-bridge-gaps-in-social-connection-wellness-and-transportation

Guest G., Namey E. and McKenna K. (2017) How many focus groups are enough? Building an evidence base for nonprobability sample sizes. *Field Methods* 29(1), 3-22.

Harrison, J. L., Montgomery, J. M., & Jepson, W. E. (2019). Introduction: Environmental justice and the remaking of environmental governance. *Society & Natural Resources*, 32(9), 933–938.

Harvey, D. (2005). A Brief History of Neoliberalism. Oxford University Press.

Hui, I., Ulibarri, N., & Cain, B. (2020). Patterns of participation and representation in a regional water collaboration. *Policy Studies Journal*, *48*(3), 754-781.

Jackson, K. T. (1985). Crabgrass Frontier: The Suburbanization of the United States. Oxford University Press.

Jacobs, J. (2018). *The death and life of great American cities*. Vintage. (Original work published 1961)

Krzyzewska, I., & Chruzik, K. (2025). Improving accessibility in integrated transport hubs as an example of enhancing social inclusion. *V4 Countries and Ukraine Overview*, 85.

Lunt N (2019) Asset-based and strengths-based community initiatives in the UK. *Global Social Security Review*. https://eprints.whiterose.ac.uk/157119/

Marcuse, P. (1985). Gentrification, Abandonment, and Displacement: Connections, Causes, and Policy Responses in New York City. Journal of Urban and Contemporary Law, 28, 195-240.

Mather, P. C. (2023). Supporting an organizational change process with appreciative inquiry. *New Directions for Student Services*, 2023, 101–111. https://doi.org/10.1002/ss.20499

Mendez, M. (2020). *Climate change from the streets: How conflict and collaboration strengthen the environmental justice movement*. Yale University Pƒress.

Pearce, J., Ulibarri, N., Borowski, E. (2025). Beyond infrastructure: Patterns of environmental justice and multi-level governance in Greater Los Angeles transportation and hazard planning. *UC Irvine Institute of Transportation Studies.* https://escholarship.org/content/qt91d25399/qt91d25399.pdf

Pulido, L. (2000). Rethinking environmental racism: White privilege and urban development in Southern California. *Annals of the Association of American Geographers*, 90(1), 12–40.

RAND Corporation. (2024). Extreme Heat and Mortality in Los Angeles County. https://www.rand.org/pubs/external_publications/EP70630.html

Renne, J. L., Sanchez, T. W., & Litman, T. (2011). Carless and special needs evacuation planning: A literature review. Journal of Planning Literature, 26(4), 420-431. https://doi.org/10.1177/0885412211412315

Roberts, J. T., Parks, B. C., & Vasquez, W. F. (2019). Climate justice and the limits of international environmental law. *Environmental Politics*, 28(1), 1–24.

Rothstein, R. (2017). The Color of Law: A Forgotten History of How Our Government Segregated America. Liveright Publishing.

Schlosberg, D., & Collins, L. B. (2014). From environmental to climate justice: Climate change and the discourse of environmental justice. *Wiley Interdisciplinary Reviews: Climate Change*, 5(3), 359–374.

Scott, D. (2019). *Contesting sustainable development: Civil society and ecological modernization in the developing world*. Routledge.

Sotero, D. (2023, March 6). L.A. Metro Celebrates Official Launch of New Ambassador Pilot Program. Metro. https://www.metro.net/about/l-a-metro-celebrates-official-launch-of-new-ambassador-pilot-program/

Stein, S. (2019). *Capital city: Gentrification and the real estate state*. Verso.

Sundling, C., & Ceccato, V. (2022). The impact of rail-based stations on passengers' safety perceptions: A systematic review of international evidence. Transportation Research Part F: Traffic Psychology and Behaviour, 86, 99-120. https://doi.org/10.1016/j.trf.2022.02.009

Turner, D. S., Evans, W. A., Kumlachew, M., Wolshon, B., Dixit, V., Sisiopiku, V. P., Huynh, N., & Anderson, M. D. (2010). Issues, practices, and needs for communicating evacuation information to vulnerable populations. Transportation Research Record, 2196(1), 159-167. https://doi.org/10.3141/2196-17

Ulibarri, N., Ajami, N., & Pahl-Wostl, C. (2022). Polycentric governance and water resilience. *Water Resources Research*, 58(1), e2021WR030870.

Ulibarri, N. & Scott, N. (2017) Linking Network Structure to Collaborative Governance, *Journal of Public Administration Research and Theory*, Volume 27, Issue 1, 1 January 2017, Pages 163–181, https://doi.org/10.1093/jopart/muw041

USDN. (2022). Boyle Heights Arts Conservatory. http://resilience-hub.org/wp-content/uploads/2022/11/USDN_Progress-_BoyleHeights_November22-3.pdf

Vale, L. J. (2014). The politics of resilient cities: Whose resilience and whose city? *Building Research & Information*, 42(2), 191–201.

Wan, S., & Wong, S. D. (2024). Equity in Resilience Hub Design and Transportation through Community Discussions. Findings. https://doi.org/10.32866/001c.87654

Whyte, K. P. (2011). The recognition dimensions of environmental injustice: Indigenous peoples and the role of recognition. *Environmental Justice*, 4(4), 200–205.

Woo, B., Fan, W., Tran, T. V., & Takeuchi, D. T. (2019). The role of racial/ethnic identity in the association between racial discrimination and psychiatric disorders: A buffer or exacerbator? *SSM - Population Health*, *7*(1), 100378. https://doi.org/10.1016/j.ssmph.2019.100378

Zuk, M., & Chapple, K. (2016). Gentrification, Displacement, and the Role of Public Investment. Journal of Planning Literature, 31(1), 83-102. https://doi.org/10.1177/0885412215610491