Building the Beloved Community: Designing Technologies for Neighborhood Safety

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Abstract

Building the Beloved Community: Designing Technologies for Neighborhood Safety

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Neighborhood safety technologies (NSTs) are digital technologies used for the purpose of increasing safety within the context of a neighborhood. NSTs such as Nextdoor, Citizen, and Amazon Neighbors are some of the most downloaded social and news platforms in the United States and are used in hundreds of thousands of neighborhoods nationwide. Designers of these technologies aim to improve user safety through the development of novel features like real-time alerts, interactive maps, personalized feeds, and the ability to report, consume, and discuss criminal incidents and other safety-related information online. This dissertation investigates how NSTs shape the individuals and communities they aim to serve. All research for this dissertation occurred in Atlanta, Georgia and focuses on the impact of NSTs on Jackson Grove (anonymized), a historically Black neighborhood in the city of Atlanta.

Through a case study of the Citizen app, I find that NSTs employ a host of deceptive design patterns that negatively impact individual and collective welfare. NSTs negatively impact individual welfare by contributing to a *dysfunctional fear of crime*, which undermines a person's

quality of life without making them safer in practice, and NSTs negatively impact collective welfare by strengthening race- and class-based stereotypes. To investigate the potential for design to improve individual welfare, I conduct a mixed-methods study to support users in developing a more *functional fear of crime*, that is, fear which motivates precaution without negatively impacting quality of life. I identify five concrete design strategies to support users in developing a more accurate and contextualized understanding of risk. At the same time, this research surfaces that such strategies may have hidden costs to the larger communities within which they are adopted. Finally, to investigate the potential for design to improve collective welfare, I conduct a case study of a neighborhood street outreach program. I find that the existing conceptualization of safety as protection contributes to harm and that by adopting an alternative conceptualization of safety that centers basic needs and relationships, designers can better serve users and their communities.

My research makes four contributions. The first is an empirical understanding of how NSTs employ deceptive design patterns, harming both individual and collective welfare. Second, I identify concrete design interventions that can support users in developing a functional fear of crime. These interventions contribute to a conceptual understanding of how to design NSTs that support user welfare. Third, I surface the implicit logic underlying the design of existing safety technologies and offer an alternative conceptualization rooted in Transformative Justice principles. Finally, I observe that designers can play a meaningful and intentional role in shaping user behavior by introducing *nonviolent design patterns*, an alternative to deceptive design patterns, which align the users' choice architecture with the principles of Transformative Justice. By leveraging nonviolent design patterns, designers can help build a world where it's easier to love one another, easier to build a Beloved Community.

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I completed this dissertation during uncertain and challenging times; it is only with the kindness, love, and generosity of my own community that I have been able to achieve any success!

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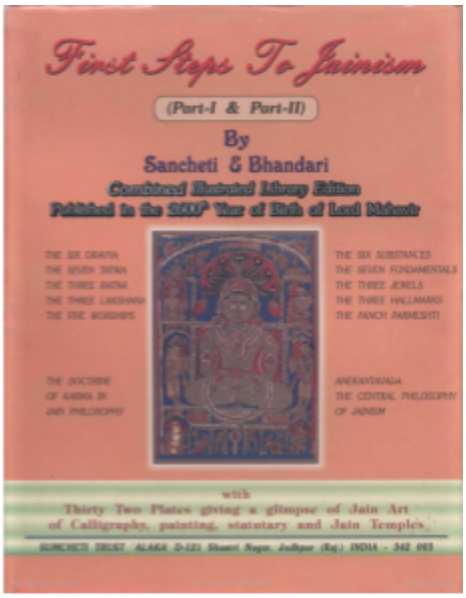

Figure 1: The "First Steps to Jainism" authored by my great-grandfather Asoo Lal Sancheti in 1989

I was lucky to have incredible colleagues and collaborators. Working with Ashley Boone, Breanna Baltaxe-Aldomony, Alyssa Sheehan, JaeWon Kim, Robert Wolfe, Lisa Dirks, Justin Petelka, Leo Stewart, Alannah Oleson, and Julia Dunbar pushed me intellectually while also making everything more fun. I am also grateful for the camaraderie and friendship of my Thursday lunch crew and the i18s cohort, and especially Julia Dunbar, who has been my loyal and goofy support system since day one.

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I met Kartik Shastri the summer before I started my PhD. He is an endless source of inspiration, and his faith in me has helped me find confidence, clarity, and purpose. None of this research would have been possible without his unwavering confidence in me. I feel so incredibly blessed to have him by my side.

Chapter 1. Introduction

Technologies such as Nextdoor, Citizen, and Amazon Neighbors are some of the most downloaded social and news platforms in the United States, and are used in hundreds of thousands of neighborhoods nationwide (Molla, 2019; Nextdoor, 2024). In contrast to traditional print and television media, these *neighborhood safety technologies (NSTs)* offer users novel ways to engage with crime information through the use of features like real-time alerts, interactive maps, personalized feeds, and incident reporting (Kennedy and Coelho, 2022; Molla, 2019; Chordia, 2023). In developing these technologies, designers make morally laden decisions, such as defining what is considered unsafe and who should be informed. These decisions have the potential to powerfully influence users' beliefs and behavior (Erete, 2015). Prior literature, for example, has documented how safety technologies can influence users' levels of civic engagement (Erete, 2015; Erete and Burrell, 2017), the social norms of the neighborhood (Kurwa, 2019; Lowe et al., 2017), and individuals' feelings of safety (Kadar et al., 2016; Blom et al., 2010). NSTs can also impact individuals who are *not* users of those technologies by contributing to racial profiling (Lowe et al., 2021; Kennedy and Coelho, 2022; Kurwa, 2019; Chordia, 2023) and online racism (Wu et al., 2022; Bloch, 2021).

Given that these technologies are increasingly popular and that design decisions can have far-reaching consequences for both users and non-users, this dissertation investigates how NSTs can best serve the users and communities where they are adopted. Specifically, I ask:

- *RQ1:* How does the design of existing neighborhood safety technologies impact users of these technologies?

I find that existing NSTs create harm to both individual and collective welfare, leading me to ask RQ2 and RQ3:

- *RQ2:* What design decisions have the potential to support individual welfare?
- *RQ3:* What design decisions have the potential to support collective welfare?

1.1 Thesis Overview

In Chapter 1, I present the motivation for this work, including my research questions, an overview of each dissertation chapter, the claims of this thesis, and my positionality.

Chapter 2 presents related work by first discussing research on NSTs in the field of Human-Computer Interaction (HCI). This background illustrates how the dominant logic used by safety technologies has focused on the protection of users. All research for this dissertation was conducted in Atlanta and the last two studies in the Jackson Grove neighborhood. I conclude Chapter 2 by providing context about this environment.

Chapter 3 is a case study of the Citizen app, an existing NST. I first introduce deceptive design patterns, UI elements that can modify a user's choice architecture and can have powerful implications when incorporated in NSTs. I conduct a deceptive design pattern review of the user interface and interview users of the app to understand how these elements impact the user experience. I find that the Citizen app creates two harms: 1) *emotional load* for users by heightening their fear of crime, and 2) *social injustice* by strengthening race- and class-based stereotypes. I conclude this chapter by discussing the need to both decrease fear of crime for users of NSTs and orient users toward social justice.

Chapter 4 investigates modifications to the design of existing NSTs that could enhance individual welfare by supporting users in developing a *functional fear of crime*. In contrast to a dysfunctional fear of crime, which negatively impacts quality of life, a functional fear of crime motivates routine caution in ways that do not erode quality of life. By conducting a mixed-methods study, I identify five design strategies that can support users in developing a more functional fear of crime. This work demonstrates the importance of providing users with a contextualized and

accurate representation of risk, as well as the need to design for de-responsibilization. I additionally discuss the potential negative externalities for communities where these technologies are adopted.

Chapter 5 explores Transformative Justice-based approaches to conceptualize and implement safety. I present a case study of a street outreach program in Jackson Grove that aims to provide unhoused members of the community with resources to address their basic needs. I present three specific incidents that exemplify the types of threats to neighborhood safety and how they are perceived and addressed by the neighborhood. This study surfaces the need to shift designers' conceptualization of safety from protecting the user to meeting the basic needs of the community.

At its core, this dissertation questions what HCI means by safety and for whom. The definitions that designers adopt change the nature of the neighborhoods where these technologies are used by impacting users' relationships with the people and places around them. Chapter 6 reflects on these questions as well as the power that designers wield in impacting individual and collective welfare. In this chapter, I also introduce *nonviolent design patterns*, which orient designers toward aligning users' choice architecture with the principles of Transformative Justice principles. I argue that by doing so, design can help build a world where it's easier to love one another, easier to build a Beloved Community.

Table 1: Overview of Dissertation Chapters

Chapter Title	**Content**	**Contributions**
Chapter 1. Introduction	Motivation for my work, overview of dissertation chapters, thesis statements, positionality	
Chapter 2. Related Work and Context	Background on NSTs in HCI; context on Atlanta and the Jackson Grove neighborhood	

Chapter 3. Evaluating Existing NSTs	Case study of the Citizen App; interviews with 15 users and a deceptive design pattern review	Empirical understanding of how safety platforms impact individual and collective welfare; evidence of how deceptive design patterns are employed in NSTs
Chapter 4. Designing to Support User Welfare	Interviews with 16 residents of Jackson Grove who have a dysfunctional fear of crime; national survey of 64 individuals with a dysfunctional fear of crime.	Identification of design decisions that have the potential to support a functional fear of crime; conceptual understanding of how to design NSTs to support individual welfare
Chapter 5. Designing to Support Collective Welfare	Case study of the Jackson Grove street outreach program; interviews with 17 participants of the program and digital ethnography of the neighborhood Facebook group	Alternative conceptualization of safety that focuses on the basic needs of a community rather than protection of an individual user; guidance for how designers can implement such a definition
Chapter 6. Discussion	Reflections on the dissertation, nonviolent design patterns, contributions, future work, and conclusion	Introduction of nonviolent design patterns

1.2 Thesis Statements

The claims of this dissertation can be summarized in these three statements:

TS1. Existing neighborhood safety technologies employ deceptive design patterns, which have the potential to amplify users' fear of crime and perpetuate race and class-based stereotypes at scale.

TS2. By providing holistic and contextualized information, neighborhood safety technologies can support users in developing a more functional fear of crime, which motivates precaution without negatively impacting quality of life.

TS3. HCI researchers' existing conceptualization of safety focuses on the protection of individuals and their property from external violence or threat. Supporting safety for everybody requires shifting this conception of safety toward meeting the basic needs of a community.

1.3 Positionality

I was raised in the Jain tradition and the ethics of Jainism have influenced both my personal values as well as how I approach my work. The central tenet of Jainism is nonviolence and this tenet influenced my research in many ways, but most overtly through my commitment to a "Beloved Community." Dr. Martin Luther King, Jr.'s vision of a "Beloved Community" is a vision of living together with diversity and without violence and of a society characterized by love and trust rather than fear and hatred. This vision undoubtedly influenced what I saw as a vision to work toward in Jackson Grove.

All research for this dissertation was conducted in the city and specifically the neighborhood that I live in. Conducting interviews and hearing people's fears and personal stories of victimization greatly heightened my awareness of local safety incidents and exacerbated my own fear of crime. I noticed myself changing walking routes, being more attentive to securing my home and vehicle, and feeling negative stereotypes arise in my own mind. At the same time, recruitment for the dissertation led me to become involved with my neighborhood association, get to know my neighbors, and attend local events. In the past year, I've become the chair of the neighborhood outreach committee and have worked with the city to pilot a new program to support the unhoused. Through my work on this dissertation, I saw the same tensions around fear and trust that were happening on a societal level mirrored within me. This work has taught me that realization of a Beloved Community requires not just societal change, but also a personal commitment to grapple with my fear and cultivate my capacity to trust.

Chapter 2. Related Work and Context

2.1 Safety Technologies in HCI

There is a rich body of work on safety technologies in HCI that spans more than a decade. Much of the early literature sought to design technologies to reduce individuals' risk of victimization

(Kadar et al., 2016; Shah et al., 2011; Tan, 2015; Blom et al., 2010). This work was influenced by victimization theory from criminology, which views victims and offenders as rational actors who use the information they have to assess their risk of being victimized or caught, respectively (Lewis and Salem, 1981). Digital technologies inspired by this perspective sought to provide users with information that would lower their chance of victimization. For example, Blom and colleagues designed a mobile application that allowed women to view and label spaces as "safe" or "unsafe" (Blom et al., 2010), and Shah prototyped CrowdSafe, which shared location-based crime information and traffic navigation guidance with users (Shah et al., 2011). These technologies focused on protecting users from potential threats.

In contrast to the victimization theory, the social control theory focused on the community and the informal and formal controls in place to deter crime (Lewis and Salem, 1981; Sampson, 1988). Digital technologies drawing from this theory emphasized the importance of not only sharing information with individuals, but also supporting community engagement, collaboration, and problem-solving in order to protect users (Kadar et al., 2016; Lewis and Lewis, 2012). Researchers in HCI studied neighborhood listservs (Lewis and Lewis, 2012; Erete, 2015; Erete and Burrell, 2017) and social media (Wu et al., 2022; Zhang et al., 2020; Sachdeva and Kumaraguru, 2015a; Israni et al., 2017; Hattingh, 2015; Sachdeva and Kumaraguru, 2015b) to understand how to increase collaboration between citizens and local authorities (Zhang et al., 2020; Sachdeva and Kumaraguru, 2015b), encourage civic engagement (Erete and Burrell, 2017; Erete, 2015), support user engagement and information sharing (Lewis, 2012; Kadar et al., 2016; Brush et al., 2013), and decrease individuals' fear of crime (Kadar et al., 2016; Blom et al., 2010; Blythe et al., 2004). These technologies focused on protecting co-located groups of people from potential threats.

The most recent work examining safety technologies in HCI has investigated the potential for NSTs to perpetuate harm against historically marginalized populations. For example, empirical work studying online communication on local neighborhood listservs and Nextdoor find that these

platforms serve as spaces for online negotiations of “suspicious behavior” that can lead to increased policing and surveillance of people of color (Lowe et al., 2021; Lowe et al., 2017; Kurwa, 2019; Mols and Pridmore, 2019). On Reddit, ambiguous and passive policies toward racist comments lead to both new and old racism in discussions of safety (Wu et al., 2022). Researchers have documented similar patterns of racism, policing, and surveillance on other apps where users organize around and discuss local safety, such as WhatsApp (Mols and Pridmore, 2019) and Amazon Neighbors (Bridges, 2021). A study analyzing product reviews and promotional material of Citizen, Nextdoor, and bSafe (Kennedy and Coelho, 2022) found that companies encourage users to surveil members of their communities, leading users to express fear and racist beliefs. Collectively, this research suggests a need to investigate the role that design plays in perpetuating harm against historically marginalized populations. Sociologist Rahim Kurwa explains that such work is critical because surveillance and policing "relies[rely] on de-racialized governing narratives of safety that nevertheless have racist implementation and results” (Kurwa, 2019, p.114).

2.2 Atlanta and Jackson Grove

Atlanta is a racially and economically diverse city in the southeastern portion of the United States. According to the 2020 census, Black people make up the largest percentage of the city (51%), followed by White people (40.9%), and Asians (4.4%) (Census, 2020). Once considered a “Black Mecca," Atlanta’s racial demographics have, however, changed drastically in the last decade. For the first time since the 1920s, the Black population has been declining while the White population has been growing (Dewan, 2023) due to gentrification and population growth (Lartey, 2018). Additionally, in 2019, Atlanta had the second largest inequality gap in the country, with 20% of the population living below the poverty line (Bach, 2020). A survey collected by the City Continuum of Care counted roughly 3,200 unhoused individuals in 2020, 88% of whom were Black (Partners for Home, 2020).

Jackson Grove is a neighborhood in southeastern Atlanta with a population of roughly 3,000 people. Jackson Grove is historically a Black neighborhood, but like the rest of Atlanta, Jackson Grove's racial demographics have changed drastically in the past two decades, and White people now make up the largest percentage of the neighborhood (Census and Policy Map, 2020). Estimated per capita income is $54,218 and the homeownership rate is 57.98% (Decennial Census, 2020).

In the early 2000s, Atlanta had one of the highest rates of violent crime in the United States. Although crime rates have largely decreased since the 2010s, violent crimes such as homicides, aggravated assaults, and shooting incidents have gone up since 2017 (Perry and DiRico, 2021). In Jackson Grove specifically, the police department reported 65 crimes against persons and 383 crimes against property in 2022 (Crime Maps, 2023). In addition to standard police presence, there is a private neighborhood policing organization called the Jackson Grove Security Patrol. Funded by local residents, the Jackson Grove Security Patrol hires off-duty officers to patrol the neighborhood (East Atlanta Security Patrol, 2023).

Recruitment for this study occurred in the midst of city-wide debates around the construction of a $90 million police and fire training complex (Rico, 2023). Opponents argued that the facility was costing money that could better be directed elsewhere, that it would train the city's police force to become more militarized, and that it would disturb a precious expanse of green space in a rapidly developing metropolitan area (Rico, 2023). The Atlanta Police Foundation and supporters of the facility say the complex will "improve morale, retention, recruitment and training" for APD (Public Safety Training Center, 2023). This tension around "Cop City," debates about a new city jail, as well as recent high-visibility shootings of Black men at the hands of police and White vigilantes resulted in increased public awareness of policing and safety concerns during data collection for this dissertation (Fausset, 2022; Oppel et al., 2023).

Chapter 3. Evaluating Existing NSTs[1]

I conducted a case study (Merriam and Grenier, 2019) of the Citizen app, a commercially available location-based crime alert technology that notifies users about local incidents related to public safety. To understand how the design of existing NSTs impact users, I investigated Citizen's use of deceptive design patterns. Deceptive design patterns (also known as dark patterns) are user interface elements that modify users' choice architecture for attention, data, and money (Brignull, 2022). These features are employed in the vast majority (95%) of apps on the Google Play Store (Di Geronimo et al., 2022), and hence, without investigating their influence, we have limited understanding of the impact of NSTs on users' experience.

I interviewed fifteen users of the Citizen app who reside in Atlanta and conducted a deceptive design pattern review of the app. Triangulating these two datasets, I have found that Citizen employs a collection of user interface elements that together raise the salience of safety incidents, emphasizing the extent to which reported incidents pose a threat to the user. The app further presents itself as a solution to danger, leveraging a collection of common deceptive design patterns to exert purchase pressure on the user and encourage data disclosure. Participants' experiences aligned with this feature analysis. They voiced an appreciation for receiving hyper-local, real-time safety information that helped them navigate risk, but many also reported that the app's information-sharing practices increased fear and encouraged dependence on the app. Furthermore, users explained that Citizen influenced their offline behavior, including the neighborhoods they visited and their interactions with Black and unhoused individuals perceived to be dangerous.

This study demonstrates how deceptive design patterns, human biases, and sociocultural contexts interact to produce harm for both users and non-users of the Citizen app. Deceptive

[1] Chordia, Ishita, et al. "Deceptive design patterns in safety technologies: A case study of the citizen app." *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems*. 2023.

design patterns harm individual welfare by creating anxiety for users and harm collective welfare by strengthening race and class-based stereotypes. In light of these results, I have identified *emotional load* and *social injustice* as two forms of harm perpetuated by deceptive design patterns that have yet to be documented (Mathur et al., 2021).

3.1 Related Work: Deceptive Design Patterns in HCI

Deceptive design patterns are UI elements that "modify the underlying choice architecture for users" (Mathur et al., 2021, p.9). Deceptive design patterns grew out of manipulative practices in retail, research on persuasive design, and digital marketing as a way for companies to gain users' attention, data, and money (Narayan et al., 2020). Deceptive design patterns use language, emotion, color, style, and cognitive biases to undermine user agency (Mathur et al., 2019; Mathur et al., 2021). They are pervasive on online platforms and have been documented in the vast majority (95%) of apps on the Google Play Store (Di Geronimo et al., 2022), including e-commerce (Mathur et al., 2019), gaming (Zagal et al., 2013), and social media platforms (Roffarello et al., 2022; Lukoff et al., 2021). Examples of common deceptive design patterns include "Infinite Scrolling" (Roffarello et al., 2022), where new content automatically loads as users scroll the page, and "Hard to Cancel" subscriptions (Mathur et al., 2019).

Deceptive design patterns can be highly effective in manipulating user behavior (Nouwens et al., 2020; Lugiri and Strahilevitz, 2021). Prior research has found that American consumers are twice as likely to sign up for a premium theft protection service when presented with a mild deceptive design pattern and four times as likely to sign up when presented with an aggressive deceptive design pattern compared to users who are shown a neutral interface (Nouwens et al., 2020). Calo and Rosenblat argue that digital technologies are uniquely effective at influencing user behavior because of their ability to capture and store information about users, their ability to architect virtually every aspect of the platforms, and their ability to translate insight about user

behavior into design (Calo, 2013; Calo and Rosenblat, 2017). Furthermore, the emergence of online markets, such as digital sharing economies, presents new opportunities for companies to manipulate users by modifying the choice architecture of both sellers (e.g., Uber drivers) and buyers (e.g., riders) (Calo, 2013; Calo and Rosenblat, 2017).

Deceptive design patterns can diminish user well-being through financial loss, invasion of privacy, and cognitive burdens (Mathur et al., 2021). Schull and others have found that social media platforms employ addictive deceptive design patterns, such as infinite scroll or Youtube's autoplay, that rely on a variable reward, mimicking strategies used by the gambling industry (Schüll, 2012; Lewis, 2014), and prior work has even documented the prevalence of deceptive design patterns in mobile applications for children (Radesky et al., 2022). The impact of deceptive design patterns, however, is not limited to individual users. Mathur and colleagues discuss the potential for deceptive design patterns to also impact collective welfare, by decreasing trust in the marketplace and by contributing to unanticipated societal consequences (Mathur et al., 2021). They point to Cambridge Analytica's use of personal data, collected with the help of deceptive design patterns on Facebook, to influence the 2016 United States presidential election as an example.

While deceptive design patterns have not been investigated in the context of safety technologies, their ability to modify users' choice architecture indicates that they can have powerful implications when incorporated in NSTs.

3.2 Methods

My colleagues and I employed a case study method (Merriam and Grenier, 2019) to understand how deceptive design patterns influence the user experience. We bound our study to Atlanta users and their experience with the Citizen app from 2021 to 2022. For the single case to have power, the selection of the case needs to be strategic (Flyvbjerg, 2006). We selected Citizen

because we see it as an *extreme* case (Yin, 2012). Citizen deviates from other safety technologies in its profit model because it does not sell advertisements nor does it sell user data (Citizen FAQ, 2021). Rather, Citizen's premium feature connects users to Citizen employees who monitor a user's surroundings; this is the only way Citizen currently generates revenue. We chose Citizen for our case because we hypothesized that this business model may have unique implications on the design of the application. At the same time, because Citizen has many of the same features as other safety technologies, including the ability to view and discuss safety incidents, receive alerts about safety incidents, and view location-specific data, we hypothesized that our findings may reveal insights about other safety technologies as well.

We triangulated data from two sources (Yin, 2012). We first conducted user interviews and asked participants about the influence of individual features to allow evidence of deceptive design patterns to emerge organically. We then conducted a researcher-led review of the user interface to identify known deceptive design patterns. In the following sections, we give context for our case and describe our process for collecting and analyzing data.

Citizen Context

Citizen is a location-based crime alert platform that notifies users about local incidents that can affect public safety (Ingram and Farivar, 2021). Citizen was originally released in 2016 as Vigilante, a platform where users could develop vigilante-style networks to protect themselves from potential offenders. After being banned from the Apple App Store for its potential to incite violence, parent company sp0n, Inc. re-branded and re-released the platform as Citizen in 2017 (Ingram and Farivar, 2021). The mission of the app, as reported on its website in August 2022, reads: "We live in a world where people can access information quickly, share effortlessly, and connect easily — but we have yet to see the power of bringing people together to watch out for

each other. At Citizen, we're developing cutting-edge technology so you can take care of the people and places you love" (Citizen About, 2022).

Citizen's custom-built AI algorithm listens to first-responder radio transmissions. From these raw feeds, the AI algorithm automatically processes radio clips and extracts keywords. A Citizen analyst listening to the 911 dispatch then writes a short incident notification, which may be sent to users as an alert (Bertoni, 2019). These incidents are supplemented with crowdsourced user videos, which are reviewed by the company's moderators before appearing on the app. The Citizen FAQ reports that they include "major incidents that are in progress, or ones that we assess could affect public safety" (Citizen Incident Reporting, 2021). The radius around which a user will receive notifications varies based on a number of factors, including the "nature of the incident and the population density of the area" (Citizen Location, 2021).

The basic version of the app is free, does not have ads, and CEO Frame says it does not sell or share user data (Bertoni, 2019). However, Citizen is currently facing pressure from venture capitalists backing the platform to monetize and is experimenting with premium features, such as "Citizen Protect," which allows users to contact company employees to virtually monitor their surroundings and dispatch emergency responders (Ashworth, 2021).

There are five tabs that users can interact with in the app, and Figure 2 shows screenshots of each tab. The five tabs are: 1) the Home tab, which displays a map with the user's current location and nearby incidents as well as a list of nearby incidents; 2) the Safety Network tab, which displays a map of the user's friends' current locations. This tab also displays the safety incidents near each friend, the distance from each friend to the user, and the battery life remaining on each friend's mobile device; 3) the Live Broadcast tab, which allows users to record live videos. They can choose between two types of live videos: "Incident" or "Good Vibe" with the app defaulting to "Incident"; 4) the Newsfeed tab, which shows live videos captured by users. Tapping into a video takes users to a page with more information about the incident, including additional video clips (if

available), a list of updates, comments and reactions from other users, and the address on a map. In addition to local incidents, users can also choose to view incidents in other major cities or a "global" category; 5) the Notifications tab lists a history of all reported incidents since the user joined the app.

As of January 2022, Citizen is released in 60 cities or metro areas (Citizen Availability, 2021). Citizen was made available in Atlanta in October 2020, and as of November 2020, was reported to have over 17,000 local users (Boyd and Huddleston, 2020).

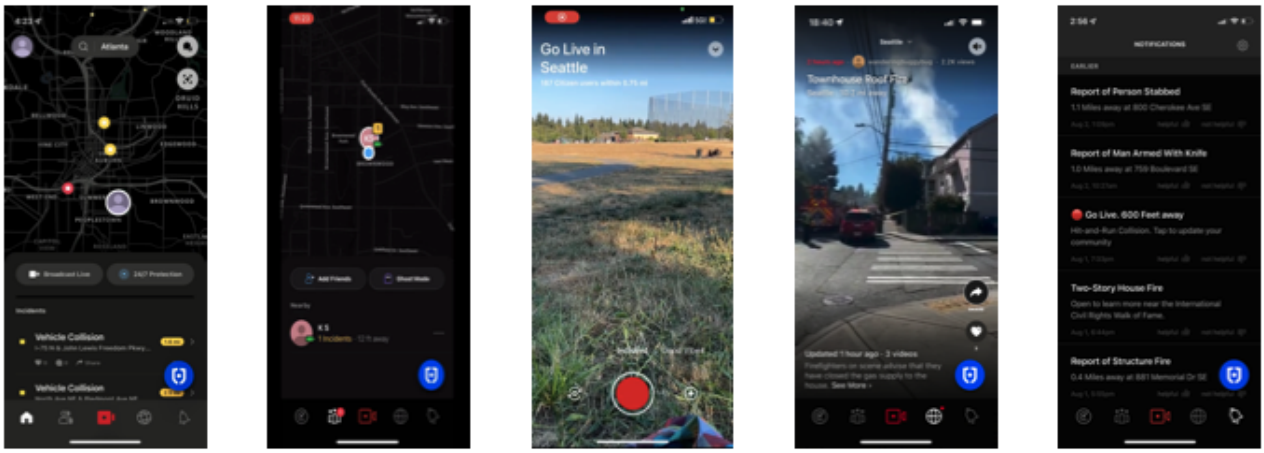


Figure 2: Citizen is made up of five main tabs: a) Home tab, b) Safety Network tab, c) Live Broadcast tab, d) Newsfeed tab, e) Notifications tab.

Data Collection

User Interviews

Two members of the research team conducted fifteen semi-structured Zoom interviews with Citizen users who live in and around Atlanta. The first twelve interviews were conducted between September and October 2021, and an additional three interviews were conducted in June and July 2022 targeting people of color so that our findings would better reflect the diversity of Atlanta.

To recruit Atlanta users, we posted a screener survey on Nextdoor, Reddit, and Facebook, as these are sites where there is prior evidence of users engaging with local safety-related

information (Wu et al., 2022, Sachdeva and Kumaraguru 2015a, Lowe et al., 2021). There were 139 individuals who completed the initial screening survey. We followed up with 67 individuals and invited them for interviews. Twelve of these individuals completed the interviews. All but one of the participants we interviewed found our post on Nextdoor. The majority of people in this sample were between 35 and 44 years old, female, and White. In our second round of recruitment, we aimed to interview more people of color and posted our screening survey on subreddits and Facebook groups for Black colleges in Atlanta. We also posted on two different Nextdoor groups in predominantly Black neighborhoods. There were 72 individuals who completed the recruitment screening survey, 24 of whom self-identified as Black residents of Atlanta. We invited nine of these individuals for interviews, and conducted interviews with the three who accepted.

Participants noted that they had used Citizen between five weeks and two years, with a rough average of 9.5 months (some participants did not give exact answers). Participants spent between five minutes to 12 hours per week on the app, with a rough average of approximately 87.5 minutes per week. Table 2 lists the demographics of all 15 participants. Our participant sample includes the following: 53% of our participants identified as female (n = 8) and 40% identified as male (n = 6). One participant declined to specify their gender. 46.6% identified as White, 6.6% identified as Hispanic or Latino/a, 13.3% as Asian or Pacific Islander, 20% as Black, and 6.6% identified as White and Native American. Additionally, one participant declined to specify their race. Despite our targeted recruitment strategy, Black people were underrepresented in our sample. This may be for a number of reasons. Our research team could not find data about the racial makeup of Citizen users to determine whether our participants reflect the broader population of Citizen users in Atlanta, but prior work suggests that Black people are less likely to use social media to find out about local crime activities (Israni et al., 2017). Additionally, Black communities in Atlanta have been exploited by researchers and have high levels of distrust, which has affected recruitment of this population in the past (Le Dantec and Fox,

2015). In both the screening survey as well as follow-up emails to schedule the interview, we explained that all interviews would be recorded on Zoom, which may have biased our sample toward those participants who are more trusting of researchers or feel more lax with privacy. There is an opportunity for future research to focus specifically on Black populations regarding their usage of the app.

During interviews, we asked participants to describe (1) the features they used, (2) their motivation for use, (3) how often they used each feature, and (4) their experience with that feature, including the way it may have shaped their behaviors and beliefs. The interviews ranged from 21 minutes to 57 minutes, with the average interview length being 42.31 minutes (*sd* = 11.04). Each participant was compensated with a $30 e-gift card.

Table 2. Demographic Characteristics of Citizen Users

Participant ID	Race	Age	Gender	Length of Time Using Citizen	Time Spent on Citizen Each Week
P1	White	25–34	Female	About 4 months	30 minutes–1 hour, maybe more
P2	White	45–54	Female	7 months	10 minutes
P3	Black	25–34	Female	5 weeks	60 minutes
P4	White	25–34	Female	2 months	About an hour
P5	Undisclosed	35–44	Undisclosed	Over a year	5 minutes
P6	White and Native American	35–44	Female	3–6 months	30 minutes or so
P7	Asian or Pacific Islander	35–44	Male	6 months	30 minutes
P8	Hispanic or Latino/a	35–44	Male	6 months	30 minutes
P9	White	25–34	Female	1.5 years	10–20 minutes
P10	White	65–74	Male	3 months	Only when notified
P11	White	35–44	Male	1.5 years	1.5 hours
P12	White	35–44	Female	2 years	20 minutes
P13	Black	18–24	Male	Undisclosed	12 hours
P14	Black	25–34	Male	6 months	Undisclosed
P15	Black	18–24	Male	2 years	10–15 minutes

Deceptive Design Pattern Identification

Three members of the research team conducted an interface analysis to identify deceptive design patterns employed by the Citizen app. Adapting a methodology used by Di Geronimo et al. (2020) and Gunawan et al. (2021), we recorded our interactions with Citizen by following six predefined user scenarios. An iPhone X, an iPhone 13 mini, and a Pixel 4a were used to record and interact with Citizen version 0.1100.0. Researchers recorded the scenarios in their city of residence, which included Atlanta as well as Seattle. Recording incidents in our city of residence was not only practical, but also enabled us to contextualize the incidents we viewed on the app. The six user scenarios were selected to capture the diversity of ways that users can interact with the app, which we learned from user interviews as well as from the first author's use of the app for research purposes over the course of one year.

User Scenarios:

1. *Download and Setup:* Download the application and allow alerts. Share your location data and enter your home address when prompted by the application. Share your contacts, and add 1–2 members of the research team to your Safety Network. Navigate and explore all five tabs at the bottom of the screen. Share, follow, and comment on one incident.
2. *Incident Alert:* The first time you receive an alert, tap on the alert and explore the landing page. This alert may be about a contact who is added to your Safety Network.
3. *Random Check:* Explore the Home tab, the Safety Network tab, and the Notifications tab. Customize the settings to your preference.
4. *Broadcast Live Incident:* Navigate to the Broadcast tab. Give the application permission to use the microphone and camera and start recording a live incident happening in the area (e.g., police cars or helicopters overhead). Submit the incident for moderators to review and stop recording.
5. *Premium Use:* Upgrade to the Citizen Protect feature and sign up for the free 30-day trial.

6. *Delete and End Use:* Turn off notifications and delete friends from your Safety Network. Cancel the Citizen Protect subscription. Delete account and remove the application from the phone.

After recording our interactions with the app, we had a total of 18 videos with an average length of 3.35 minutes. We used an inductive approach (Creswell and Poth, 2016) to identify deceptive design patterns since prior work has not yet examined deceptive design patterns in NSTs. Using Mathur et al.'s definition of deceptive design patterns (2021) and a coding methodology adapted from Radesky et al. (2022), three researchers independently watched the videos and identified instances of monetization and reinforcement techniques that we believed modified the underlying choice architecture for us as users.

After removing duplicates, we had a total of 34 usage experiences where we believed the design modified the user's choice architecture. It is important to note that we did not consider designer intent during this review, as Di Geronimo and colleagues note, "understanding designers' intentions and ethical decisions is subjective and may lead to imprecision" (Di Geronimo et al., 2020). Instead, we chose to assess what was presented in the user interface and whether or not those designs modified the choice architecture for users (Mathur et al., 2021).

Data Analysis

Our data analysis process occurred in three stages: 1) analysis of the interview data; 2) analysis of the data from the interface review; and 3) integration of the two datasets.

To identify themes in the first twelve interview transcripts, four members of the research team, including the first author, independently coded the transcripts using Delve Tool, a qualitative data analysis tool. The research team met for two weeks to develop the codebook—all disagreements were resolved through discussion. The first author grouped these codes into larger themes. Over the course of five weeks, our research team met weekly to discuss, refine, and

iterate on the codes as well as the emerging themes. After collecting our second round of interview data, our team members coded the transcripts using the existing codebook. During this second round, we generated one new code, which led us to re-code older transcripts with this new code in mind. At the end of data analysis, we had 36 codes that were grouped into six overarching themes.

To identify deceptive design patterns, the three members of the team who collected and identified the usage experiences organized these usage experiences using affinity diagramming (Harboe and Huang, 2015) in Miro Board. Affinity diagramming is an inductive approach that allows users to iteratively group data by theme. This process helped us identify six underlying deceptive design patterns that motivated the usage experiences. We renamed these six patterns using existing nomenclature by consulting deceptive design pattern taxonomies from attention capture (Roffarello et al., 2022), e-commerce (Mathur et al., 2019), and privacy (Bösch et al., 2016) domains. The final set of six deceptive design patterns and examples of corresponding usage experiences are presented in Table 3.

The first author integrated the two datasets by iteratively matching on 1) feature and 2) concept. For example, interview data that discussed the Safety Network was integrated with data from the interface analysis related to the Safety Network, and interview data that discussed the concept of community was integrated with data from the interface analysis that was related to the community. After this matching process, two other members of the research team provided feedback on the integrated data. Collection and analysis of the two datasets occurred independently, and thus, not all deceptive design patterns were reflected in the user interviews, and not all user experiences were influenced by deceptive design patterns. We present our integrated data in the Results Section, sharing the deceptive design patterns identified by researchers as well as how those features did and did not influence the user experience.

3.3 Results

The Citizen interface creates an inflated sense of danger while simultaneously positioning itself as a solution to that danger. We describe the interface components that create this effect and report on users' experiences with these features.

Manufacturing Anxiety

The Citizen interface presents a stream of incidents that systematically include categories of events that do not pose a risk to the user. Participants consistently told us that they valued using Citizen but felt an increased sense of fear as a result of their engagement with the app. We document how the notification stream, lack of contextual detail, and lack of community contributed to their increased sense that danger lurked around every corner.

Interface Analysis: Indiscriminately Raising the Salience and Visibility of Safety Incidents

In reviewing the interface, we encountered five types of incidents that were shared with users but did not present a threat to their safety. First, the app notified users about incidents that were not proximate. For example, in one instance, the notification feed displayed an incident about a missing child from a neighboring state (see Figure 3e), and in another, it showed mass shootings from another part of the country. These incidents informed users about alarming incidents that were too far away to affect their personal safety but were presented alongside incidents that occurred nearby, expanding the set of alarming events that were shared with users.

Second, we encountered incidents that were not a threat to public safety and represented minimal or no risk to those who were not directly involved. For example, one incident alerted users of an "Occupied Stuck Elevator" (see Figure 3d). Third, we found that incidents persisted on the feed long after they were over. For example, as shown in Figure 3f, users were shown information about a "Small Brush Fire" that had been extinguished nine hours prior. Videos shared on the Live

Broadcast Tab appeared to persist for 24 hours, even if the incident had been resolved. For example, the first author received notifications that a friend was 0.5 miles away from a reported structure fire and, later, that the same friend was 1.1 miles away from a man reported to be armed with a gun and involved in a dispute (see Figure 4d). In a dense metropolitan city where nearly half of all adults live in a home with a gun (Joyner, 2022), this may always be the case, but the alerts signaled to the user that there was reason to be concerned for the safety of a loved one, regardless of whether or not that loved one was actually in danger. Finally, we encountered incidents that did not provide enough information to determine whether or not the incident presented a safety threat. For example, one incident reported a "Man Threatening Staff" without additional context, leaving the user unsure of how, if at all, the incident related to broader public safety concerns (see Figure 3d).

Thus, the collective set of incidents documented events that might be reported as local news stories with few presenting a plausible threat to the user's safety. However, Citizen did not encourage users to consume content as local news; the app encouraged users to stay vigilant and maintain real-time awareness of safety risks like "active shooters" by enabling alerts (see Figure 3a). Citizen required users to enable alerts in order to view their Notification Feed, manufacturing an artificial dependency, what Mathur et al. call a *forced action* deceptive design pattern (Mathur et al., 2019). Fourth, the app encouraged users to add friends to their Safety Network (see Figure 4c), and upon doing so, people began receiving intermittent alerts about incidents that the app framed as relevant to their friends' safety.

User Experience: Constant Notifications Manufacture Anxiety

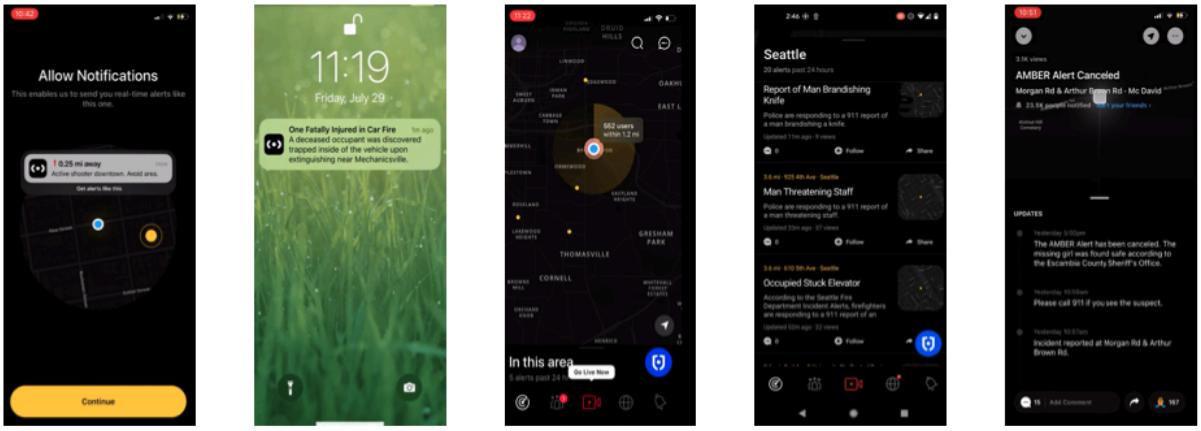
All participants reported that Citizen increased their awareness of safety-related incidents in Atlanta. P10 described the app as an "electronic bubble of information" that heightens his awareness of his surroundings no matter where he goes. Citizen left participants feeling shocked

at how many criminal incidents occur in the city, commenting on the number of car thefts (P8), fires (P11), and instances of gun violence (P10). They expressed their dismay over the prevalence of danger saying things like, “there’s so much crime and you just don’t expect that” (P8), and they explained that this awareness developed through their use of Citizen, which had surfaced a backdrop of crime they had not previously realized existed. For example, P1 told us, “There’s a level of ignorance is bliss where, if you don’t know anything going on, you know everything seems safe and happy and then, when you add Citizen suddenly you’re aware that there’s danger around.”

Participants in our study viewed information from Citizen as reliable because of its unfiltered nature. They trusted the reports because they came from police radio (P8, P12) and perceived incidents to be devoid of the extra commentary (P1), “sensation” (P5), and political slant (P7) that they associated with local news and social media posts (P1, P5, P7, P8, P10, P11). However, the affordance that participants found most valuable was Citizen’s ability to provide hyper-local, real-time information. Participants P3, P4, and P10 all shared that they were alerted about incidents that they could see happening outside their house or gunshots that they could hear in their neighborhood, incidents they perceived as relevant to their safety but too minor to be reported on the news. P10 shared that these alerts helped him “know what to do” and which places to avoid at what time, and P13 liked that he can find out about crime “immediately.” P5 put it succinctly: “I just want to know, like locally, just straight up what’s going on near me.” As these examples illustrate, for our participants, the core use case for Citizen is to cultivate a real-time awareness of nearby events that might affect their safety.

Although participants appreciated the increased awareness that came with using Citizen, they also said that the frequency of alerts was “stressful” (P9) and “anxiety-inducing” (P6). This is consistent with what users have shared on product reviews of the app (Kennedy and Coelho, 2022) Participants received five to fifteen alerts per day, with the influx becoming “really crazy” at night (P8). The incidents that participants felt were the least helpful were ones that were “far, far

away" (P3) or inconsequential to their personal safety. P11, for example, guessed that maybe "one out of 20 [incident notifications] is actually useful" because "unless you're within half a mile or a quarter-mile away from me, I really don't care." P3 and P12 felt similarly, voicing that it was "annoying" (P3) to receive so many "random notifications about things that are not happening within my vicinity" (P12). Participants reported that they often received notifications about "fires" (P11) and "helicopters" (P9) that they did not care about, and P6 shared that Citizen alerts her about "a whole bunch of fluff, if you will, you know unnecessary calls to the police." Participants expressed frustration with excessive alerts that depict "all this crime, but it's actually not, and then it makes it not as useful, like the boy who cried wolf" (P9).



(a) (b) (c) (d) (e)

(f) (g)

Figure 3: Users are encouraged to to allow incident alerts from the Citizen app (a). Upon receiving an alert (b), users can tap it to view the story, view other nearby alerts on a map (c), or view a list of recent notifications (d). While our research team mostly received local notifications (e.g., within five miles), (e) shows a notification about an Amber Alert of a missing child from a different state. (f) displays a list of incidents that are "Further Away" and (g) shows a video on the Live Broadcast tab of a fire that had been resolved hours ago.

For some participants, the excessive notifications manufactured what they perceived to be an unnecessary sense of fear. For example, P2 explained that "there's always a little action right around me because I'm by Edgewood, and there's kind of a lot of crap going on in Edgewood, so [the constant stream of notifications] just has me super paranoid." Other participants shared that they expected crime in a big city but seeing so much of it was "scary" (P4), "anxiety-inducing" (P6), and "not for the faint of heart" (P8). P6 described this phenomenon by explaining that, because of Citizen, she hears about "every little teeny tiny thing, whether it's true or not... instead of like hearing the things that actually matter, I see all of these different things that are probably not a concern. But then it's like it's overwhelming to see like, 'wow, 15 different things have happened within a mile from me.'" P12 agreed, describing the app as "alarmist."

Participants suggested ways that the app might scale back irrelevant notifications and prioritize relevant ones, and as a result, inspire fear only when warranted. For example, P5 reflected on the difference between violent and nonviolent crimes with respect to his safety, and P9 explained that Citizen needed to be more discerning about the "difference in severity" between incidents. She wished there were "more ways to break down when you would get notifications and about what types... like I don't want a notification about a traffic accident but, like, I would like to know if there's a shooting right across the street, or if there was a break in near my complex within you know, a mile or two." P11 suggested that Citizen implement a "geofence" so that he would only be alerted about notifications that were proximate. Although users did not seem to be aware of the *forced action* deceptive design pattern, the requirement to enable alerts in order to view the

Notification Feed disempowered users from choosing how and when they would like to view incident information.

User Experience: Lack of Context and Quality-Control Inspires Unwarranted Concern

Participants shared that the lack of contextual information made it difficult to discern whether an incident was cause for concern and wanted Citizen to surface details that would enable them to make this judgment more readily. P1, for example, said:

> "It's very important to be able to separate... what's real, what's a threat, and what's not, because at the end of the day, if you get into a fight with your boyfriend inside your house and you call the police, I'm very sad for you and I hope that you're okay, but, I don't need to see an alert on my app that there is a report of like, you know, 'brawl in the street,' and like, 'someone with a knife chasing a woman' because then I get worried... and so I think that there's a way of making it objective versus just the over-inundation of information that then causes you to not trust it or not wanting to know."

As P1's quote illustrates, participants' perceived lack of context made it difficult to differentiate between private incidents and threats to public safety, contributing to unnecessary fear. In other examples, P11 described an incident where the Atlanta Police Department was conducting a drill, but Citizen incorrectly transcribed it as a "full-on open assault, like, shooting between two different parties" which led to alarm throughout the neighborhood (as witnessed by P11 in the comments). These kinds of incidents prompted requests for "quality-control" (P12) and "a little fact-checking" (P9).

Participants also speculated that this lack of quality control, fact-checking, and context led to consuming culturally and racially biased information. P9 reflected on this concern saying, "The issues of, like, you know somebody like looking into a car, like, I question is like—was it a black

person looking into their own car? [Or] was it actually somebody, like, checking car handles and trying to break into cars?" Similarly, P11 knows "a lot of 'Karens'[2] in the neighborhood" who are quick to call 911, thereby inflating the Notification Feed with biased incidents that may nevertheless inspire concern.

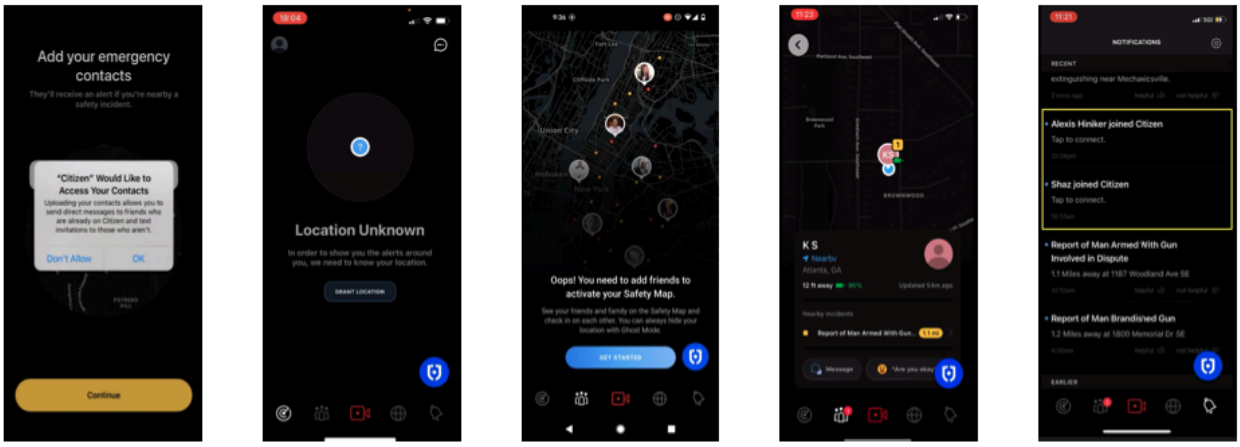


Figure 4: During the onboarding process, users are invited to add optional emergency contacts. To do so, they are required to grant Citizen access to their phone's contacts (a). Users are required to share their location in order to access the app's incident map (b) and required to add friends from their contacts to use the Safety Network (c). Once they've added friends to the Safety Network, they can view their friends' current location and battery life on the Safety Network tab (d). When one of their contacts joins Citizen, the user receives a notification prompting them to connect with their contact (e).

User Experience: Lack of Community Limits Users' Resilience to Fear

Participants in the study infrequently interacted with other users on Citizen. Twelve participants shared that they had never posted on Citizen. P1 talked about how her contributions to the app consisted of once adding a "sad emoji" reaction while P11 described Citizen as a platform where people did not "make lifelong friendships." Participants cited the following deterrents for connecting with other users: personal preference in using the app for quick news alerts (P1), online anonymity (P4), and high amounts of negative content, which made it a difficult place to

[2] Karen refers to the 2020 "Karen" meme caricaturing White women who typically overreact and escalate situations including making threats to involve the police or abusing grocery store workers for mask-wearing policies. The meme is often associated with white supremacy (Negra and Leyda, 2021).

“hang out” (P1). Participants said they encountered more community-building activities on other platforms, such as Nextdoor and Facebook. P1 talked about how she turns to Nextdoor and Facebook for “personal color commentary” to augment the reports she sees on Citizen. She explained that this commentary enables her to have “a more complete picture” of what is happening in her neighborhood, and makes it “a lot easier to live with that danger that you [she] know[s] about from Citizen.” Reflecting on the impact of the “personal color commentary," she shared:

> “It does make it less scary... when you add [start using] Citizen, suddenly you’re aware that there’s danger around you but you don’t know exactly who or how or why that danger exists, you just know that it is, and then with Nextdoor you get a little more understanding of why this person is waving a gun on the corner and that if you drive through they’re not going to shoot out your window, like, they’re really pissed at their ex-husband.”

As this story illustrates, participants saw the interpersonal communication that occurs on other platforms as humanizing and potentially mitigating fear of crime. One participant shared that the lack of online community on Citizen left few chances for users to “make sense of what are the motivations and the kinds of things that may be incentivizing that kind of behavior,” leading users on Citizen to be more “apathetic” than “empathetic” in their comments (P5). While one participant said that he liked that the comments were uncensored (P11), others said they found the comments “gross” (P4, P5), “unkind” (P4), “violent” (P5), and “racist” (P11).

Table 3: Deceptive Design Patterns employed by the Citizen App

Deceptive Design Pattern	Definition	Example Within Citizen	Influence on User Experience	Domain
Social Investment	The use of social metrics to reward users for their engagement and incentivize continued use	Sharing the number of nearby users who would presumably view, react, and comment to user-uploaded videos	N/A	Attention Capture (Roffarello et al., 2022)
Obstruction	Making a certain action harder than it needs to be in order to dissuade users from taking that action	A hidden "Skip" button needed to avoid premium upgrade	N/A	E-commerce (Mathur et al., 2019)
Misdirection	The use of language, visuals, and emotions to guide users toward or away from making a particular choice	A floating button to upgrade to Citizen Protect overlaid on safety notifications and videos	N/A	E-commerce (Mathur et al., 2019)
Forced Action	Requiring users to take certain tangential actions to complete their tasks	A requirement to enable alerts in order to view the Notification Feed	Users enabled alerts and received information that was not always relevant to their safety concerns	Privacy (Mathur et al., 2019)
Publish	Sharing personal data publicly	An alert that notifies users that a contact has joined Citizen without informing that contact	Users added contacts to their Safety Network and received alerts about contacts that were not always relevant to their safety concerns	Privacy (Bösch et al., 2016)
Obscure	Making it challenging for users to learn how their personal data is collected, stored, and/or processed	The lack of transparency about what personal data is collected and how it is stored	Users did not trust Citizen and felt reluctant to share information with the application	Privacy (Bösch et al., 2016)

Note: Citizen employs known deceptive design patterns from attention capture, privacy, and e-commerce domains.

Offering a Solution to Users' Heightened Safety Needs

Despite the frustration and anxiety that users reported, they also felt it was important to keep using the app to better manage their own safety (P1, P2, P9, P14). The users we interviewed were not unaware of the negative impacts of using Citizen, but felt beholden to the application. Since downloading Citizen, P14 described having a constant urge to know "what's really going on" including checking whether a place he is in is "secure." P2 shared that she felt "beholden to these sound alerts that instill panic. It's like Pavlov's dog: you hear the bell and you have a reaction; it's visceral... I feel like a slave to it but it's the only way I'm going to be able to control my safety as much as I can." Others agreed—P9 voiced that she has gone back and forth on whether or not to delete the app because it induces anxiety, but decided not to get rid of it because it provided her with valuable information.

Thus, we found that Citizen became both a source of and a solution to anxiety for our participants. Here, we examine the interface features that position Citizen as a solution and the steps—both with and without the app—users took to manage their safety.

Interface Analysis: Encouraging the Use of Lucrative Features That Promise Protection

Citizen offers users three features for their protection, their loved ones' protection, and their community's protection: Citizen Protect, Safety Network, and Live Broadcast. These three features are also profitable, helping the company gain users' money, data, and attention.

Citizen Protect is Citizen's premium feature that was launched in 2021. The feature offers users the option to contact Citizen employees, known as Protect Agents, who can monitor the user's surroundings, contact first responders when situations escalate, alert users' emergency contacts, and create new incidents on behalf of a user to alert nearby users of the app. Citizen Protect is promoted as a tool that brings people together to watch out for each other (Citizen About, 2022). In-app advertisements give the example of a Protect Agent creating an incident to alert nearby users about a missing pet and the nearby users responding en masse (see Figure 5c). Researchers found this vision of mobilizing users reminiscent of Citizen's prior avatar as the Vigilante app. Although the base app is free, my colleagues and I found that Citizen aggressively advertises its premium features with the use of deceptive design patterns. For example, the Citizen Protect feature is advertised twice to new users during the sign-up process. In the latter instance, researchers noted the hidden "Skip" button, which made it particularly challenging to bypass the advertisement, an example of a deceptive design pattern called *obstruction* (Mathur et al., 2019). The most egregious deceptive design pattern, however, is a floating button to sign up for Citizen Protect that is overlaid on each screen, constantly visible as users scroll through videos and notifications, many of which do not present any threat to users' safety but heighten fear nonetheless (see Figure 5e). We saw this as an example of a *misdirection* deceptive design pattern,

a button that supports Citizen in translating heightened awareness and anxiety about safety into purchases. Users can purchase an individual or a family plan.

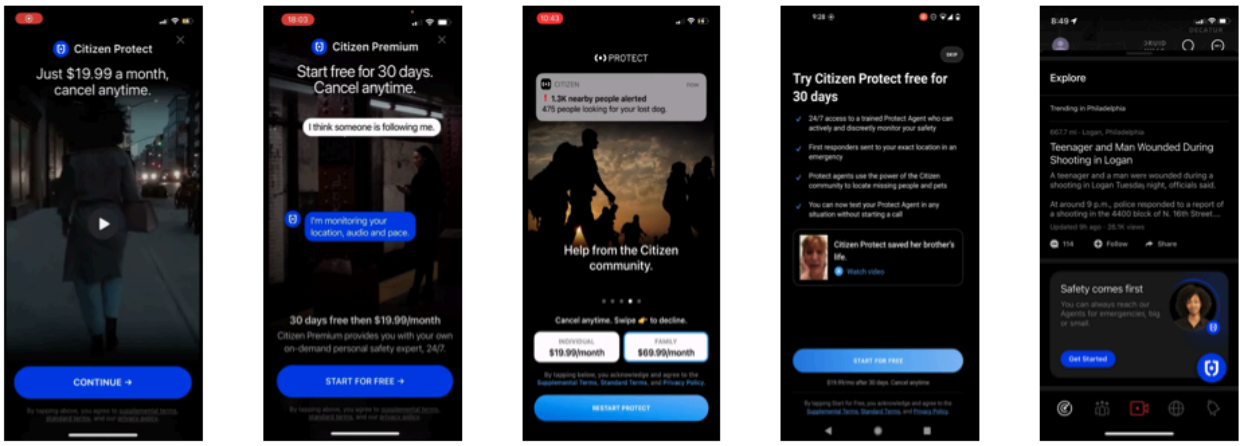


Figure 5: The Citizen Protect feature is first advertised to users during the onboarding process (a) (b). In-app advertisements highlight the benefits of using Protect and spotlight "success stories" such as finding missing pets (c) or people (d). There is also a floating blue button to sign up for Citizen Protect that is constantly visible in the lower right corner of the screen (e).

Citizen also encourages users to monitor their friends and family's safety by adding contacts to their Safety Network. To take advantage of this feature, Citizen requires users to share their entire contact list with the app (see Figure 4a). There is no option to add contacts individually, an example of a *forced action* deceptive design pattern (Mathur et al., 2019) because it creates a false dependency. If users choose to share their contacts, Citizen will alert all contacts who are existing Citizen users that their friend has joined the app without informing the user. This alert encourages contacts to add the user to their Safety Network and share location data with the user (see Figure 4e). We saw this as an example of *publish*, a privacy deceptive design pattern (Bösch et al., 2016), where information about an individual is shared without their consent or knowledge. This deceptive design pattern has the potential to exponentially increase new users for Citizen. Researchers also discovered that the app collected data about the user without their knowledge, including data about the user's heart rate and about their mobile device's battery life. Battery life

information was shared with friends on the Safety Network without consent. These are examples of privacy deceptive design patterns which *obscure* what data is being collected and how (Bösch et al., 2016).

The app describes Live Broadcast as a feature that allows users to create and share videos in order to "spread awareness of safety incidents with your community in real-time." Citizen nudges users with verbal cues and displays the number of nearby users (who would presumably see the live video) (see Figure 2c). We see this as an example of a *social investment* deceptive design pattern because it encourages the use of the app through social metrics such as the potential number of reactions, comments, and views to user-uploaded videos (Roffarello et al., 2022). Researchers also documented one instance where users were prompted with the notification: "Go Live. 600 feet away. Hit-and-Run Collision. Tap to update your community" (see Figure 2e). The research team found this notification particularly challenging to reconcile with the app's mission to support user safety (Citizen About, 2022). User-generated broadcasts were used to capture and engage users' attention. For example, one researcher received an alert that there was a "live video at the scene," to encourage viewing a video of an overturned car after a collision. Each video was also overlaid with users' comments, reactions, and a pulsating share button to encourage users to share the video via text or social media.

User Experience: A Heightened Need for Safety Requires Action

Sensitized to the risks around them, users engaged Citizen's features for protection in two ways and responded individually, taking matters into their own hands, in many ways.

While we did not speak to any participants who had used Citizen Protect or Live Broadcast and could not evaluate the influence of the *obstruction*, *misdirection*, or *social investment* deceptive design patterns, we did speak to four participants who added friends to their Safety Networks (P1, P3, P4, P6). P6 mentioned that he has a very diverse group of friends, and given the

racially-charged political climate, he appreciated the ability to make sure they were safe. P3 similarly appreciated being able to track her family members' locations. P1 downloaded the Citizen app when her friend invited her to join her Safety Network due to the *publish* deceptive design pattern. While P1 valued the information she received from the app, she decided to turn on "Ghost Mode" because alerts about P1's nearby incidents were causing her friend undue stress and anxiety.

Taking advantage of the information on Citizen, we observed how some participants began engaging in detective work. A Citizen post helped P14, an undergraduate student, create awareness about his missing friend. Other students on his campus also used the app, and P14 found that the comment section provided useful and comforting information when his friend went missing. Some participants viewed incidents on Citizen and cross-referenced that information on other platforms to get more context (P1, P4, P6, P9). P9, for example, was able to collect more information about a neighbor's missing car using Citizen and Facebook, while P4 was able to locate a Nextdoor neighbor's missing mail by cross-referencing information from Citizen.

Others did not feel as comfortable relying on Citizen because they worried about sharing location data with the app (P9, P12, P15, P11). P11 changed his settings so that he was only sharing his location when he was using the app because he assumed Citizen had to make money, and they must be doing something with his data that he was unaware of. P12 lives in an apartment complex where she knows there is gang activity. However, she admitted that she no longer feels comfortable calling 911 because she worries identifiable information might be leaked onto Citizen. She said, "I can't believe I question now calling 911… it made me think to have like who has access to 911 recordings now?" Although users did not seem to be aware of specific deceptive design patterns, the lack of transparency about Citizen's privacy policy due to design decisions such as the *obscure* deceptive design pattern disempowered users from taking actions that might protect their safety.

In addition to relying on Citizen, many participants took matters into their own hands and began carrying tasers (P9), guns (P12), knives (P2), mace (P2, P9), and investing in new home security systems (P7, P9, P12). Others began avoiding certain subpopulations perceived as dangerous. A small group of participants shared that their use of the app led to an increased fear of individuals who are unhoused (P1), mentally ill (P2), Black teenagers (P2), and "Black men" (P4). P12 felt that she sees so many crime-related incidents with such little context that her mind can't help but draw conclusions about who is committing these crimes. P1 reflected that:

> "Before I downloaded Citizen, when I would see homeless people in the park I wouldn't think anything of it, you know they're there sleeping, this is a soft, relatively private place for you to lay your head tonight, and I would go on my way. Since downloading Citizen, I will leave a little more space, and I will look in those bushes a little more like, 'is there, someone that could potentially be right there waiting to pounce?'"

For P11, Citizen brought to light the city's "vagrancy problem" and the sense that more police activity and local leadership is needed.

Almost every participant began avoiding certain areas of the city that they perceived as dangerous. Participants mentioned changing the routes they drove (P8), the routes they walked at night (P2, P4, P6, P9, P11), and the businesses they frequented (P9, P11). Based on the incidents that participants viewed on the app, they began to create mental models of "hot pockets" (P6) in the city to avoid. P8, for example, said that after seeing the same street names again and again, she began avoiding those areas. Similarly, P11 described how he used Citizen to figure out if he should "avoid that section of town" for the day. Furthermore, these mental models persisted beyond just the usage of the app. P4, for example, no longer attends the Castleberry art walk because she now associates that neighborhood with crime, and P2 said she no longer goes out for walks alone after

six p.m. For others, the data from the app has influenced long-term decisions like where to buy a house (P7, P8) and whether it makes sense to move to another state altogether (P2, P10). The areas that participants mentioned as "hot pockets" of crime include Castleberry Hill, home to one of the highest concentrations of Black-owned land and businesses in the country, and Mechanicsville, where the vibrant and predominantly Black community of the 1950s has since diminished largely due to misguided urban renewal (BNC, 2021; Mechanicsville, n.d).

3.4 Discussion

Expanding the Taxonomy of Harm

In a 2021 meta-review of the literature, Mathur et al. identified individual and collective welfare as overarching normative concerns that underlie the discussion on deceptive design patterns (Mathur et al., 2021). They offer a taxonomy of harms organized under these two categories with the hope of providing researchers with a common language to explain why deceptive design patterns are of import and concern (Mathur et al., 2021). Their review of the literature finds that deceptive design patterns have the potential to harm individual welfare through financial loss, invasion of privacy, and cognitive burdens. They also have the potential to harm collective welfare through decreased competition, reduced price transparency, distrust in the market, and unanticipated societal consequences (see Figure 6).

In light of my results, I propose the need to expand this taxonomy to include *emotional load* as harm to individual welfare. Emotional load is defined as the emotional cost borne by users due to a technology's deceptive infrastructure. I see the need for researchers to begin systematically documenting this harm; leveraging empirically validated measures from psychology to identify and measure complex emotions such as fear can support researchers in this endeavor. As an example,

Westin and Chiasson use an empirically validated scale to measure users' "fear of missing out" and the role that deceptive design plays in producing this fear (Westin and Chiasson, 2021).

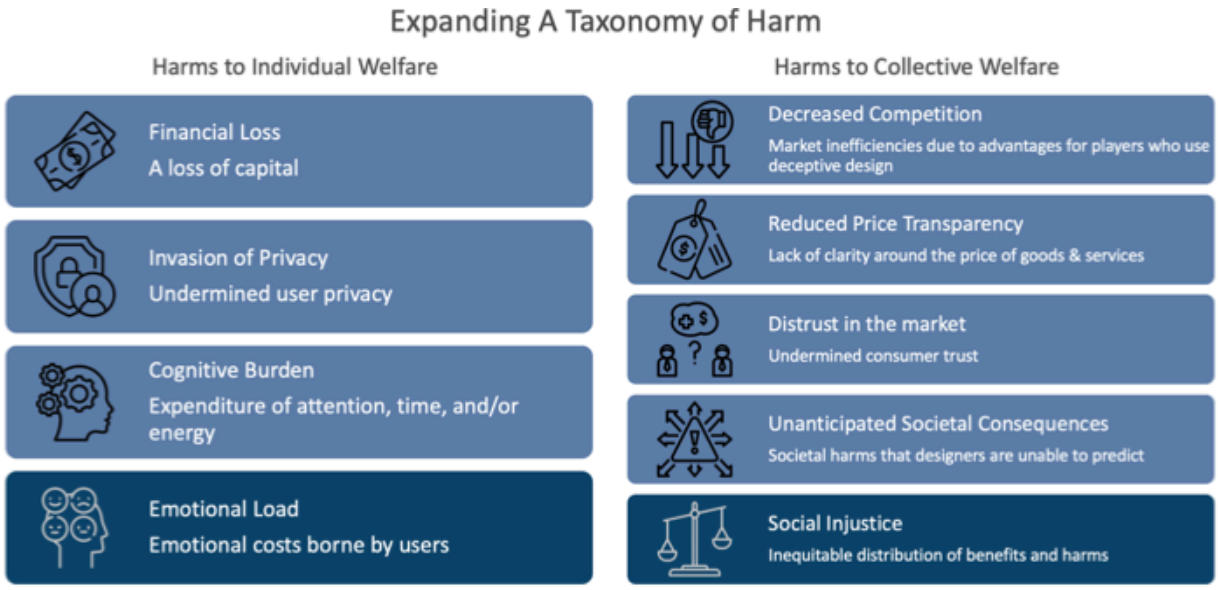


Figure 6: We propose an expansion to the Mathur et al. taxonomy of harm (Mathur et al., 2021). Light blue items are taken from the existing taxonomy; dark blue items are our proposed additions. All icons are taken from Flaticon.

Unlike individual welfare, which has been a core focus for deceptive design pattern research, collective welfare has received little attention (Mathur et al., 2021). This is an oversight given the ways that technologies can interact with social and cultural contexts to reproduce harm for whole subpopulations. We propose an expansion of Mathur et al.'s taxonomy to include *social injustice* as harm to collective welfare. Social injustice refers to the inequitable distribution of harms and benefits in society (Dombrowski et al., 2016; Chordia et al., 2024). This is distinct from harm due to *unanticipated societal consequences*, which are harms that designers are unable to predict. Mathur et al. give the example of Cambridge Analytica's use of personal data from Facebook to initiate a disinformation campaign to influence the 2016 United States presidential election (Mathur et al., 2021) as an unanticipated societal consequence. In contrast, social injustice can be identified and documented in design using frameworks such as those proposed by

Costanza-Chock (2020) and Dombrowski et al. (2016). As an example, Corbett engages a social justice framework proposed by Dombrowski et al. to identify the ways that commercially available technologies can reproduce and resist gentrification (Corbett and Loukissas, 2019). By expanding the taxonomy of harm to include social injustice, we hope to draw attention to the ways that deceptive design can harm some populations while benefiting others.

The Federal Trade Commission (FTC) is an independent government agency whose mission is to promote competition and protect consumers from unfair or deceptive practices (FTC Mission, 2022). It has a long history of investigating and regulating seller behavior that "unreasonably creates or takes advantage of an obstacle to the free exercise of consumer decision-making" (Beales III, 2003). In such cases, the FTC evaluates whether the seller's behavior "causes or is likely to cause substantial injury to consumers which is not reasonably avoidable by consumers themselves and not outweighed by countervailing benefits to consumers or to competition" (FTC Overview, 2021). Not only does the FTC have the authority to regulate such behavior, but it can also provide remedies for "significant injuries," such as financial losses (Pitofsky, 1976). In recent years, the FTC has requested feedback on proposals to regulate how companies collect and store user data (Federal Register I, 2022) and how they hide fees (Federal Register II, 2022), for example. By expanding the taxonomy of harm, we hope to raise these issues as critical for researchers to document and for the FTC to start investigating.

Limitations

There are a few limitations of this study. First, 12 of the 15 user interviews were done almost a year prior to the interface analysis of the application. While the main functionalities of the app remained the same, the first author who used Citizen for the duration of the study did note some incongruence. For example, by the time we conducted the interface analysis, Citizen appeared to be advertising Citizen Protect more aggressively and using nudges to encourage users

to Live Broadcast. We hypothesize that the reason we were not able to interview users who had broadcasted or used Citizen Protect is that these were not popular features at the time the interviews were conducted, due to their limited advertising. This data would have further illuminated the ways that deceptive design patterns can create purchase pressure. Future work could contribute meaningfully by taking a longitudinal approach to understanding how the influence of deceptive design patterns evolves over time.

A second limitation is the lack of precision in understanding users' emotional states. Participants used words like stress, worry, insecurity, anxiety, fear, and paranoia interchangeably, limiting our ability to specify the exact nature of the user experience. For this reason, we suggest future work draw on methods from psychology to precisely define the influence technologies have on users' emotional states.

Third, our findings are unique to Atlanta users in 2020 and 2021. Users from different cities at different time periods may have very different experiences with the application. Since companies often conduct A/B testing, which provides some users with views that differ from views presented to other users, even the participants we spoke to may have had different views of the application. For this reason, we suggest that future investigations of deceptive design patterns using case methods clearly communicate the bounds of the case and refrain from generalizing beyond those bounds.

Fourth, consistent with prior literature on deceptive design patterns (Mathur et al., 2019; Di Geronimo et al., 2020; Radesky et al., 2022), the research team conducted an interface analysis of the Citizen app. However, this approach likely limited the number of patterns that we were able to identify since the review was restricted by the experience of three users. Further, because the user interviews were conducted prior to the interface analysis, we may have attended more to features that were discussed by users, including incident alerts and feeds. Future work can account for these limitations by supplementing researcher reviews with users' posts and

comments directly from the application. This may be especially useful to identify deceptive design patterns in domains that are understudied.

Finally, as with other interview-based research, our data is self-reported. Participants could have misremembered, selectively shared information, or may have interpreted past experiences and emotions differently than how they were originally experienced. Participants may have been especially hesitant to share the negative influences of Citizen on their emotional states or behavior due to the heightened vulnerability that such responses demand.

Summary of Contribution

The goal of this study was to investigate how the design of existing NSTs impact users of these technologies. I find that the Citizen app employs a collection of deceptive design patterns that collectively raise the salience of safety incidents, exert purchase pressure on the user, and encourage data disclosure. Participants' experiences aligned with this feature analysis. They voiced an appreciation for receiving information that helped them navigate risk, but many also reported that the app's information-sharing practices increased fear and influenced their offline behavior, including the neighborhoods they visited and their interactions with Black and unhoused individuals perceived to be dangerous. In light of these results, I identify *emotional load* as a harm to individual welfare, and *social injustice* as a harm to collective welfare. Future work should investigate the potential for design to decrease users' fear of crime and for NSTs to explicitly orient toward social justice.

Chapter 4. Designing to Support User Welfare[3]

The findings from Chapter 3 demonstrate that NSTs can increase users' fear of crime by broadcasting frequent, local, and personalized information about potential safety risks. These

[3] Chordia, Ishita, et al. "Tuning into the World: Designing Community Safety Technologies to Reduce Dysfunctional Fear of Crime." *Proceedings of the 2024 ACM Designing Interactive Systems Conference*. 2024.

platforms can thus contribute to a *dysfunctional fear of crime*, which undermines a person's quality of life and mental health without actually making them feel safer. In this work, I investigate the potential for design to foster a *functional fear of crime*, which motivates routine caution without negatively impacting quality of life. Understanding how the design of a platform can support a shift from a dysfunctional to a functional response is critical, as dysfunctional fear can prevent engagement in routine activities, impacting psychological well-being and quality of life (Stafford et al., 2007). Additionally, dysfunctional fear can discourage social interactions, contributing to mistrust, isolation, and withdrawal from urban life (Miethe, 1995). Finally, excessive fear of crime in the United States is not expressed neutrally and can lead to stereotyping and profiling of Black Americans, as documented in Chapter 3 (Chordia et al., 2023; Wu et al., 2022).

I conducted a mixed-methods study collecting data from individuals who have a dysfunctional fear of crime. I first interviewed residents of Jackson Grove to understand the influence of discrete design decisions on fear within a specific context. I then validated these interview results by surveying a national pool of individuals who also struggled with a dysfunctional fear of crime. This work contributes five concrete design strategies that reveal insights about the influence of digital technologies on users' perceptions of risk and provide nuance to HCI discussions on fear of crime. I also discuss theoretical and design implications of this work, identifying key priorities for designers of safety technologies interested in supporting a functional fear of crime. Finally, I reflect on the hidden costs of these design strategies on the collective and the need for community-centered design.

4.1 Related Work: Fear of Crime

The fear of crime consists of three dimensions: cognitive, affective, and behavioral (Doran and Burgess, 2012). The cognitive dimension reflects the rational thought processes around risk calculations, the affective dimension captures the emotions associated with fear, while the

behavioral dimension captures the actions that result as a response to fear (Franklin et al., 2008). The fear of crime affects far more people than crime victimization itself and has widespread negative effects on individual and collective well-being. Fear of crime can erode quality of life (Stafford et al., 2007; Miethe, 1995) and contribute to poor mental health, including anxiety and depression (Doran and Burgess, 2012). At a societal level, the fear of crime can harm social trust, intergroup relations (Jackson, 2009; Hale, 1996), and influence policies around policing and punishment. Experimental research, for example, has documented how media misrepresentation around crime can increase public support for punitive policies, such as the death penalty (Britto and Noga-Styron, 2014).

Fear is also a primary human emotion essential for survival and can motivate necessary precautionary behavior. Prior literature from criminology differentiates between *dysfunctional fear*, which erodes individuals' quality of life, and *functional fear*, which motivates vigilance and changes in behavior that do not erode quality of life (Jackson and Gray, 2010; Gray et al., 2011). Dysfunctional fear is more common than functional fear; a large survey deployed by Gray and colleagues found that 27% of the population struggles with a dysfunctional fear of crime and 8% with a functional fear of crime (Gray et al., 2011). Fears are not static, however, and can become more or less functional due to social, environmental, and demographic factors.

The Disorder, Indirect Victimization, and Social Integration Theories have been shown to predict dysfunctional fear of crime (Lee et al., 2020). The Indirect Victimization Theory is a demographic theory that examines "whether people's fear of crime is associated with their experiences of crime or feelings of vulnerability" (Doran and Burges, 2012, p.26). Indirect Victimization Theory explains that non-victims may experience the same emotions that result from direct victimization when they are exposed to those incidents through the media or through interpersonal communication (Rountree and Land, 1996). In contrast, the Disorder Theory is an environmental theory that focuses on "cues in the external environment that trigger fear of crime"

(Doran and Burges, 2012). It contends "that there is a positive relationship between fear of crime and people's perceptions of the social and physical characteristics of an environment" (Doran and Burges, 2012; Perkins and Taylor, 1996). The Social Integration Theory is a social theory that hypothesizes that individuals who reside in communities with strong social networks, where neighbors know and talk to one another, experience less fear (Rountree and Land, 1996; Hale, 1996). Gibson and colleagues found that collective efficacy, defined as the "social cohesion among neighbors combined with their willingness to intervene on behalf of the common good" (Sampson et al., 1997, p.918), is the key mechanism through which social integration influences the fear of crime (Gibson et al., 2002). In contrast to the Indirect Victimization and Disorder Theory, which discuss facilitators, or factors that lead one to heightened fear, the Social Integration Theory discusses inhibitors, or factors that improve the sense of safety (Franklin et al., 2008).

4.2 Methods

Data collection for this study occurred in two stages. We first conducted interviews with residents of the Jackson Grove neighborhood who had a dysfunctional fear of crime, as defined by Jackson and Gray (Jackson and Gray, 2010). We then validated the interview results by deploying a survey to a larger pool of individuals who also struggle with a dysfunctional fear of crime.

User Interviews

The research team conducted sixteen semi-structured interviews with residents of a single neighborhood, following the guidance of prior research that has shown the usage of NSTs varies based on neighborhood characteristics and local concerns (Erete et al., 2014; Israni et al., 2017). A convenience sample was used to select the neighborhood; we recruited all participants from Jackson Grove due to the first author's access to residents and background knowledge about the area because she too resides in the area.

Interview Protocols

The interview protocol had two components: 1) reflection questions about participants' current usage of safety platforms, and 2) questions about how the design of a safety platform could either heighten dysfunctional fear or support a more functional fear of crime. To scaffold participant feedback, we identified key design decisions from existing safety applications and lightly refined views from these apps to obscure the branding, anonymize, and focus the user's attention on the design in question. We identified these key design decisions from five existing community safety applications: Neighbors, Citizen, Mobile Patrol Public Safety, Nextdoor, and Life 360. We chose safety platforms that are popular on the Google Play Store, and identified features in these existing systems that could influence fear of crime based on our theories of change. For example, the Disorder Theory predicts that the infinite scroll feature can heighten dysfunctional fear of crime by contributing to the perception that the environment is rife with crime. The Indirect Victimization Theory predicts that features that heighten the salience or visibility of a safety-related incident contribute to fear by heightening users' awareness of their vulnerability. The Social Integration Theory predicts that design decisions such as a Help Map, which contribute to the perception that people are willing to help on another or intervene on behalf of the common good, can support a functional fear of crime (see Figure 7).

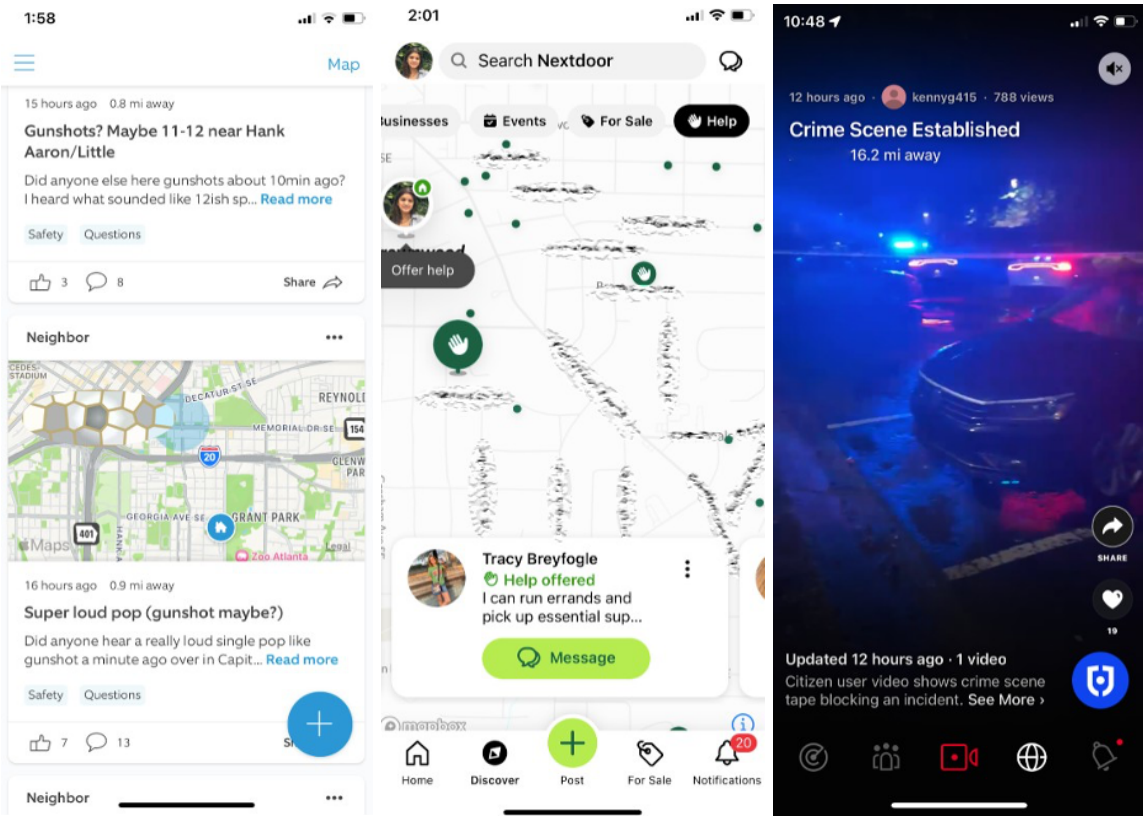


Figure 7: This figure demonstrates three different design decisions that have the potential to influence a dysfunctional fear of crime: a) the Disorder Theory suggests that infinite scroll on the Neighbors app can heighten fear by contributing to the perception that the environment is rife with crime; b) the Social Integration Theory suggests that the Help Map on the Nextdoor app can decrease fear by contributing to the perception that people in the area are willing to help one another; and c) the Indirect Victimization Theory suggests that graphic videos from the Citizen app can heighten fear by increasing the salience or visibility of safety-related incidents.

Participants

Participants for our study were required to be above the age of 18, live or work in Jackson Grove, use neighborhood safety platforms to learn about local crime and safety, and report a dysfunctional fear of crime. We used Jackson and Gray's empirically validated questionnaire in order to categorize potential participants as Unworried, Dysfunctionally Worried, or Functionally Worried (Jackson and Gray, 2010), and then invited those who were categorized as Dysfunctionally Worried for interviews. Participants were categorized as:

- *Unworried* if they were unconcerned about crime using standard measures (e.g., "How worried are you about falling victim to burglary, etc?" not very, not at all)
- *Dysfunctionally Worried* if they were "very" or "fairly" concerned about crime and their quality of life was reduced by that concern or by the precautions they take because of their concern. We measured precautions by asking questions about avoidance and protective behaviors.
- *Functionally Worried* if they were "very" or "fairly" concerned about crime, but their quality of life was not reduced by that concern or by the precautions they take because of their concern. Additionally, to be characterized as functionally worried, the precautions they take must help them feel at least "a little" safer. This suggests that their concern motivates healthy, cautionary behavior that supports their sense of safety without negatively impacting their quality of life.

We note that this categorization is subjective, and similar behaviors may produce different categorizations for different individuals. Jackson and Gray, however, find that this subjectivity offers the greatest confidence because "the individual in question is best placed to take a view on his or her behaviors, as well as to understand the effects of his or her behaviors and worries on quality of life" (Jackson and Gray, 2010, p.7).

To recruit users, we posted a screener survey on the Jackson Grove neighborhood Nextdoor page, a local Atlanta Reddit page, and the Jackson Grove Facebook neighborhood group, as these are sites where there is prior evidence of users engaging with local safety-related content (Wu et al., 2022; Sachdeva and Kumaraguru, 2015a, Lowe et al., 2021). There were 55 individuals who completed the initial screening survey, and 16 of these individuals completed the interviews. We compensated all participants with a $40 electronic gift card.

On average, participants had lived or worked in Jackson Grove for six years and the majority were living with friends or family. Sixty-three percent of our participants identified as female, 25% identified as male, and 13% identified as non-binary. Although we oversampled females relative to the general population, the criminology literature has consistently established that women are significantly more likely to experience both fear and dysfunctional fear, which likely explains our sample demographics (Jackson and Gray, 2010; Stanko, 1993). The majority of our participants were aged 35–44. 38% identified as White, 31% as Black, 25% as Asian or Pacific Islander, and 6% as Hispanic or Latino/a (see Table 4).

Table 4: Participant Demographics

Participant ID	Age	Gender	Race	Platforms Used	Household members	Time Spent in Jackson Grove
P1	55-64	Female	White	Facebook, NextDoor, Ring	No one	22 years
P2	35-44	Female	Hispanic or Latino/a	Nextdoor	My son, he's 8	8 years
P3	35-44	Female	White	Facebook, Nextdoor	My partner, Blake and two children aged 3 and 10 months	6 years
P4	18-24	Female	White	Facebook	2 roommates	8 months
P5	55-64	Male	White	Nextdoor	No	10 years
P6	35-44	Female/non-binary, depending on who's asking	Asian or/and Pacific Islander	Facebook, Twitter	I live with two friends, who own the house	8 months
P7	35-44	Female	Asian or Pacific Islander	Facebook, Nextdoor	Husband and son	1 year
P8	18-24	Female	White	Facebook	My roommate and older brother	8 months
P9	35-44	Male	Asian or Pacific Islander	Ring and Facebook	Wife and two sons	5 years
P10	35-44	Female	Asian or Pacific Islander	Ring, Citizen, FB, Instagram (ATL scoop), NextDoor	My husband	2 years
P11	35-44	Male	Black	Facebook, Atlantanewsfirst.com, patch.com, Twitter	Son and wife	4 years
P12	25-34	Female	White	Instagram, Nextdoor	Roommates	9 month
P13	18-24	Non-binary	Black	Nextdoor, Atl311, crime reports, SpotCrime	I live with my roommate	whole life
P14	35-44	Male	Black	Facebook, Patch, Twitter, 11Alive	My wife	4 years
P15	18-24	Female	Black	Citizen, Mobile Patrol and SpotCrime	Alone	1.5 years
P16	18-24	Female	Black	Nextdoor, Facebook, Instagram, Whatsapp	My parents	10 years

Data Analysis

We used an inductive approach to identify emerging themes about the influence of design on users' fear of crime. Two members of the research team independently coded each transcript in Delve, a tool for collaborative qualitative coding, and wrote memos about patterns they observed while coding. Examples of our codes at this stage included "resolution of incident" and "providing perspective." All coders met weekly for four weeks to discuss memos and compare codes for each

transcript. Difference in codes seeded rich conversations that helped evolve our understanding of the dataset. We iterated our codes based on these conversations, sometimes converging on codes and other times keeping multiple codes for a single quote. The first author then used Delve's hierarchical organization features to group the codes into higher level themes. Members of the research team who have been involved with coding independently reviewed these groups and met to discuss changes. The themes were then iteratively refined over three team meetings. The final five themes included: 1) Empower users to selectively view crime information, 2) Share specific and actionable information, 3) Provide updates and resolutions, 4) Encourage collective action, and 5) Enhance the visibility of good news.

Survey

To evaluate our interview findings, we deployed a survey with a national pool of individuals who had similar characteristics as our interview participants.

Survey Instrument

To develop the survey instrument, we first distilled each of the five themes from our interview data into representative prototypes. For each of the five themes, the first author reviewed all associated codes and brainstormed one to three low-fidelity prototypes that reflected the data. As a group, we then discussed each theme and selected one prototype for each theme that 1) best represented the theme, 2) drew from design ideas that surfaced during interviews, and 3) would help us answer any unanswered questions. We refer to the final set of prototypes used in the survey as "representative prototype" throughout the rest of the paper (see Figures 8–12).

Our survey presented respondents with these five representative prototypes in a random order, and asked respondents to answer four scaled-response questions and one open-ended question for each prototype. These questions asked participants to speculate about how using the

feature might influence their 1) quality of life, 2) behavior, and 3) concerns about crime, consistent with Jackson and Gray (Jackson and Gray, 2010). We also included three attention check questions that were randomly distributed throughout the survey. See Table 5 for example survey questions.

We piloted our survey and discovered that pilot participants found it challenging to understand core design decisions when they were abstracted from specific applications. We thus asked participants to envision their response to these features in the context of Facebook or Nextdoor. We chose these two applications as they were the most popular among our interview participants (see Table 4).

Table 5: Example Survey Questions

Question	Scale
If this feature were incorporated, how do you think it would affect your concerns about crime?	1= Decrease concern a lot 2= Decrease concern a bit 3= No effect 4= Increase concern a bit 5= Increase concern a lot -1= Unsure
If this feature were incorporated, how do you think it would affect your quality of life?	1= Reduce quality of life a lot 2= Reduce quality of life a bit 3= No effect 4= Improve quality of life a bit 5= Improve quality of life a lot -1= Unsure

Participants

To recruit participants, we posted a screener survey widely on Nextdoor neighborhood groups and neighborhood Facebook groups, as we were interested in recruiting individuals who could envision the representative prototypes in the context of Facebook and Nextdoor. After running into challenges with falsified data and auto-generated entries (a known challenge in qualitative work post-pandemic [Ridge et al., 2023]), we chose to finish recruiting strictly from private groups on Slack and Facebook. Although this strategy significantly reduced the number of falsified or

auto-generated entries, it also introduced sampling bias, which limits the generalizability of our results. We screened individuals who responded to our posts against four inclusion criteria, where participants needed to live in the United States, be fluent in English, have used Facebook or Nextdoor to find out about local crime and safety information in the past month, and have reported a dysfunctional fear of crime as defined by Jackson and Gray (Jackson and Gray, 2010).

From those criteria, we were able to have 64 individuals complete the survey. Using Cohen's $d = .5$ and $\alpha = .05$, the default values often used by the HCI community, we ran a power test and established that our sample size enabled us to obtain a power of over 90% for each of the t-tests reported below, which is greater than the established recommendation (Caine, 2016). The majority of our survey respondents were aged 25–34, and we again over-sampled females relative to the general population, but not necessarily relative to the population that has a dysfunctional fear of crime (Jackson and Gray, 2010) (see Table 6). We ran one-sample t-tests to verify that our sample did indeed have a dysfunctional fear of crime and found that the mean response to the question "How much is your quality of life affected by the precautions you take?" was significantly higher than a response of 1 ("Not at all") ($mean = 3.7$, $sd = 1.0$), $t(63) = 20.6$, $p < .001$, $d = 2.31$. And a one-sample t-test found that the mean response to the question "How much is your quality of life affected by your worry about crime?" was also significantly higher than a response of 1 ("Not at all") ($mean = 3.8$, $sd = 0.9$), $t(63) = 24.1$, $p < .001$, $d = 2.3$. All participants were compensated with a $20 electronic gift card.

Table 3: Summary of Participant Demographics

Gender Identity	Men (35.9%), Women (64.1%), Non-binary (0%)
Age Range	18-24 (17.2%), 25-34 (42.2%), 35-44 (15.6%), 45-54 (18.8%), 55+ (6.25%)
Race	Asian or Asian American (17.2%), Black or African American (37.5%), White (42.2%), Other (3.2%)

Data Analysis

There is much debate about the best way to analyze Likert scale data, and different scholars have made different decisions (Mirahmadizadeh et al., 2018; Gombolay and Shah, 2016, de Winter et al., 2012). We chose to use t-tests as prior work has established the validity and robustness of using t-tests with Likert scale data and has found that t-tests have nearly equivalent empirical results, yet a slightly lower Type II error rate than their non-parametric counterparts (de Winter et al., 2012; Gombolay and Shah, 2016; Meek et al., 2007). A low Type II error rate was especially important, as we wanted to capture potentially minute differences between functional and dysfunctional fear responses. Furthermore, using t-tests with Likert data is not an uncommon practice in HCI because Likert data, though ordinal, can "reasonably be approximated as an interval scale" with increasing sample sizes (Gombolay and Shah, 2016).

For each scaled-response question, we thus calculated a two-sided, one-sample t-test, asking whether the mean value was significantly different than a response of 3 ("no effect"). The null hypothesis (Hθ) was that there was no significant difference between the mean value of the responses and a response of 3 ("no effect"), while the alternative hypothesis (H1) stated that there was a significant difference between the mean value of the responses and a response of 3 ("no effect"). All statistical tests were conducted in SPSS, and we considered results significant if the *p*-value was less than the significance level of .05 (α = 5%). The Cronbach alpha score was .84, indicating a high level of internal consistency or reliability across survey questions. For the open-ended questions, we conducted inductive analysis, similar to the analysis we conducted for the interview data. The first author coded the open-ended answers for each prototype in Delve. Example codes included "holistic perspective" and "trust in police." The research team then independently reviewed the codes and met as a group to refine the codes. We did not further group these codes into overarching themes as there was limited open-ended data for each prototype.

4.3 Results

In this section, we present five strategies that designers of safety platforms can use to decrease dysfunctional fear and support a more functional fear of crime. For each strategy, we share 1) findings from our interviews, 2) the representative prototype, and 3) results from the survey.

Empower Users to Selectively View Crime Information

"You have to find a way to protect your peace, you know. Because if you absorb everything that's out there, you'll go crazy. You'll be high anxiety, terrified." —P2

Interview Findings

Participants shared that because crime information is so pervasive, they are "constantly bombarded by that fear factor" (P2) and that as consumers of this information, they would benefit from features that would help them limit and filter information.

P2, P5, P7, P9, and P10 all received information about incidents that were not proximate, but that contributed "to the overall sense of like impending doom" (P9). P10 explained that the role of NSTs was to inform him about nearby incidents because "if something is major enough, it's happening 3 miles away, it's going to be in the news." P2, P5, and P9 especially cared about the surrounding blocks or about a "half a mile" radius (P2). P2 explained, "Who cares what happens in East Lake? You know it's like a different world over there. It's like they get robbed all the time, you know, but I don't need to know about their robberies, they're not gonna come rob us over here." Participants preferred to limit posts about incidents that were not proximate because these types of incidents did not present a threat to users' safety but evoked fear nonetheless.

Similarly, seeing information from a whole week or month was "overwhelming" (P5), "jarring" (P3), "less relevant" (P8), and just "too much" (P12). P7 explained that "it can feel like that 'never ending scroll,' there's always so much content and being able to just focus on the immediacy

of incidents from today, I think, is just healthier for all of us." She hypothesized that the reason these platforms share so much untimely information is to "keep you engaged and keep you scrolling." Participants suggested interventions such as "having today's stories highlighted" (P8 and also P11, P16) as well as "defaulting to show the immediate" (P3). The idea of "healthier default" was also shared by P2 and P7 who felt that seeing incidents only from the past 24 hours as a default would be less "alarming" (P2). This was not true for everyone, however. For a subset of participants who primarily used purpose-built platforms like Citizen, which are solely dedicated to sharing crime and safety information, it was valuable to see the "whole week" (P13) of information as well as news about the whole city or even globally (P14). P11, P13, and P14 preferred to see more information but wanted to instead limit the amount of graphic content (P11, P13) and "violent" videos that they encountered online (P11).

Participants observed that their concerns about crime all tied "back to consumption" and that they wanted more "options to pick and choose" the content they consume (P3). Participants suggested interventions to change how information is organized so they could more easily focus their attention on incidents that presented the greatest threats to their safety. P8, for example, felt that if posts were formatted so you only saw "headline, location" then it would be easy to get the big picture and you would have to click "in order to get more context." This would allow her to quickly scan, so if she saw, "'shots heard' and it's like Linwood Park, I'm not that worried about it, that's not near me and I'm not going to click on that." Another participant suggested creating "a sub page [on the neighborhood Facebook group] that was just about all of this crime and safety stuff" so then you'd have to actively "hunt out the bad news" instead of being bombarded with information (P3, also P1). The ability to separately view safety information would also ensure that relevant safety information is not "diluted with other messaging" and information (P10, also P4, P8).

Representative Prototype and Survey Evaluation

Our participants suggested that they would appreciate ways to selectively view crime information. We designed the Filter prototype, which allowed users to filter posts by location, timeliness, and content type (see Figure 8).

In response to the question, “If this feature were incorporated, how do you think it would affect your concerns about crime?" respondents felt that the Filter prototype would significantly decrease their concerns, as evidenced by mean values that were significantly less than 3 (a response of “No effect”) measured by a one-sample t-test (*mean* = 2.52, *sd* = 1.26): $t(57) = 2.92$, $p < .01$, $d = .38$. Similar to many interview participants, survey respondents explained that they appreciated the ability to limit information so they could “manage and avoid unwarranted anxiety that results from learning about crime more than .5 miles away.” While significant, this effect was not universal; 25% of participants shared that the feature might “stress” them out and could lead to a “certain amount of panic and anxiety” if there were many incidents occurring close by.

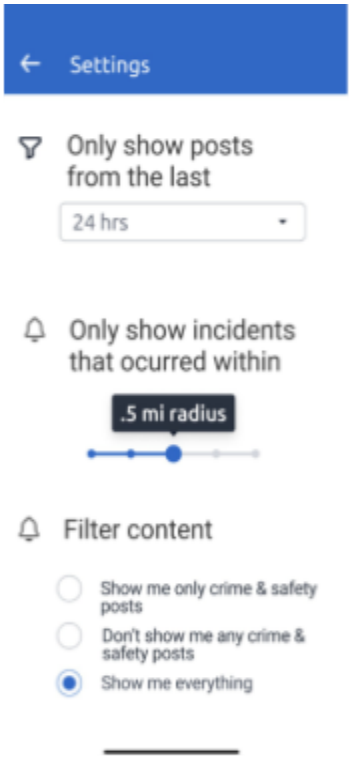


Figure 8: The Filter prototype shows a settings view where users can filter posts by time, distance, and content type.

For 54% of participants, the Filter prototype supported a more functional fear of crime by motivating behavior changes that increased feelings of safety and quality of life. These participants shared that the addition of this feature may lead them to make changes to their behavior such as “stay home more,” “avoid any areas that have an increase in crime or are notorious for crime,” “change my route,” and “lock the doors and stay indoors” if there was nearby activity. This is consistent with prior work that finds such behaviors supporting a functional fear of crime (Lee et al., 2020). A one-sample t-test comparing the average response

against a value of 3 (a response of "No effect") found that respondents anticipated the Filter prototype leading to changes in their feelings or behaviors in a way that would have a significantly positive effect on their quality of life (*mean* = 3.66, *sd* = 1.23): $t(58) = 4.1$, $p < .001$, $d = .54$.

Share Specific, Actionable Information

"What can I learn from wasting my time reading all these posts? Do I really have a takeaway and understand if it was resolved, and what the issue actually was?" —P5

Interview Findings

Posts about safety incidents were often "incredibly vague" (P4), leaving participants unsure of which incidents presented a threat to their safety and what actions they should take to protect themselves. Participants shared examples of posts that described nearby "disturbances" (P4) and "shots heard" as ones that can leave them feeling helpless because they don't know how to respond. P3 explained that with robberies and burglaries, "you're gonna change your day to day to keep yourself from being victimized, but 'shots heard'... nothing I can do." These types of incident notifications left P3 feeling helpless; "all it does is make me more fearful... if I hear that there's gunshots every night, all of a sudden I don't want to go outside at 6pm." The "paranoia" (P10) intensifies when the incident is "super close to me, but there's no more detail" (P10) or when the posts are incredibly vague but the "person who's posting it is using language that implies that we should be really worried about it" (P4). Participants felt that posts were often sensationalized, which created a sense of urgency and alarm; P12 found that on Nextdoor "everyone tends to use attention-grabbing titles to make their posts seem urgent or important, even though most of the time they aren't," and P3 stopped following a safety-related Instagram account because "it is nothing but the ridiculousness and the scary." P10 explained that safety-related information can leave her feeling disempowered because "without knowing what's happening, you're getting

alarmed about something that you shouldn't be stressed about because you don't know what it is and it's probably 1) not my business and 2) unlikely to have a dangerous effect on me." This type of content exacerbated dysfunctional fear by negatively impacting participants' quality of life without empowering them to take precautionary behavior.

Participants wanted more information so they would know what immediate changes to make to their behavior. Being able to easily find basic information such as "time of day" (P6 and P9), the "actual location" (P5 and P6), and police response (P15) was important. The vast majority of participants wanted to know the incident location so that they would "know where to avoid" (P15 and also P5, P6, P9, P16). Both P13 and P9 had used interactive crime maps that show precise locations of safety-related incidents. P9 shared that a map that "prioritized or ranked lowest threat and more extreme" by color would help him quickly scan, discriminate between violent and nonviolent incidents, and determine when it's safe to go where. P6 summarized that detailed information is essential to help her determine "whether or not it affects my life and whether or not I need to make changes to my behavior, like if I need to be more careful of when I know packages are arriving, to be home."

Representative Prototype and Survey Evaluation

Our participants suggested that they would appreciate information that was actionable, rather than vague or sensational. We designed the Map prototype, which allows users to view safety incidents on a map. Per P9's suggestion, we color-coded ongoing threats, violent incidents, and nonviolent incidents to help participants prioritize threats to safety (see Figure 9).

Participants reported that the Map prototype would not significantly decrease their concern about crime. Although the average response rate was less than 3 (a response of "No effect"), a one-sample t-test did not find it significantly so. Thirty percent of participants shared that the feature would decrease their concern at least a little while 42% said it would increase

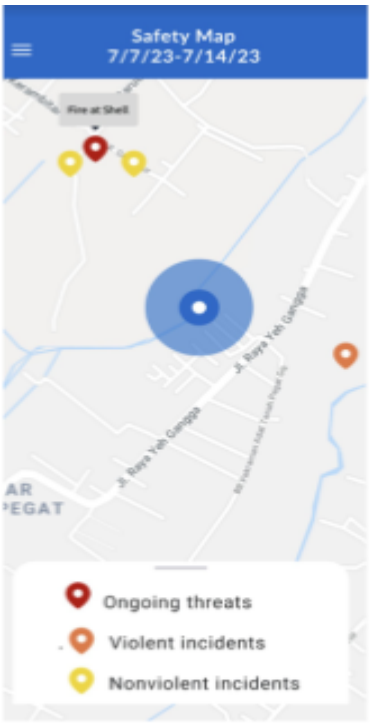


Figure 9: The Map prototype visually organizes incidents and color-codes the incident type.

their fears at least a little. One participant shared their mixed feelings about the feature: "It would decrease and increase my concern, if it's an ongoing or violent thread I would be panic or get really worried but if it's non violent it would decrease my worry...[sic]" Still, for 46% of participants, the Map prototype supported a more functional fear of crime by motivating behavior changes that increased feelings of safety. These participants shared that the addition of this feature would help them "know where to go and where to avoid." One participant shared that they would "feel empowered to navigate my neighborhood more safely and may consider increasing my use of public transportation [sic]." Respondents explained how even if the feature increased concern, it would still impact their quality of life for the better; one participant shared, "I want the feature, but probably will affect my mental state negatively. But not so negatively to the point where I don't want the feature." Although participants felt that this feature would have both positive and negative impacts on them, a one-sample t-test comparing the average response against a value of 3 (a response of "No effect") found that respondents anticipated this feature having a significantly positive effect on their quality of life (*mean* = 3.4, *sd* = 1.14): $t(61) = 2.8$, $p < .01$, $d = 2.4$.

Provide Updates and Resolution

"Anything that has an actual resolution would make me feel better." —P12

Interview Findings

Half the participants we interviewed wanted updates and resolutions on safety incidents. The lack of “follow up” (P8), especially for time-sensitive incidents, created “community panic” (P8) while the prevalence of safety posts that were unresolved perpetuated the belief that “the police aren’t doing anything” (P13), the “cops aren’t going to respond in time” (P7, also P10), and the mayor’s office is “ineffectual” (P1).

Participants wanted updates and more information about closed cases; they worried that the perception that there are not enough resources to resolve incidents “empowers people who are of a criminal element to be bolder and leads to other more dangerous life-threatening crimes” (P5, also P16). Participants had signed up for Citizen alerts, SpotCrime alerts, and Amber Alerts and reflected on how “alarming” these can be (P2). P2 felt that “they don’t give you an update, and they should be required to do that because, you know, that’s not fair. It’s like you’re invading my phone with this information” and then “you’re just gonna leave people in a state of anxiety and not give them closure?!” Especially for “time-sensitive” situations such as “fires” or an “active shooter,” updates would help keep “community panic down” (P8), provide “peace of mind” (P8), and “quench those fears” (P15). P5 voiced that he gets updates from his power company if the power goes out, but on Nextdoor, even when there’s a shooting or death there is little follow-up (also P3). P7 suspected that “they don’t tell you that [resolution] because they want you to go into the app and use it and get sucked into it.” When asked about resolution notifications, P8 shared that she often tries to find updates on her own and would appreciate that information being easily accessible. For P4, P5, P6, P8, and P15, updates about life-threatening or time- sensitive incidents can help them understand “what parts of the neighborhood to avoid and when it’s okay to go to them again” (P6).

Participants also wanted to see evidence that “cases are not going unanswered” (P14), that “culprits are being caught” (P11, also P14, P15), and that stolen items are being recovered (P15).

Seeing these kinds of stories "sort of tempers just the incessant reporting of crime" (P5). P16 shared that it's not enough to know that the police were called unless he knows that "actions" were taken: "What did the police do? Did they help in finding the someone who rummaged the car?" P15 suggested that platforms share monthly updates that demonstrate the "police are working toward solving these crimes in this neighborhood." Similarly, P10 suggested platforms share "initiatives being done by the police to reduce" the most frequent types of incidents in the neighborhood. The effect of seeing these success cases may lead to a downward spiral in crime; if there is widespread perception that the police are "doing their work" and recovering those cars, then "those who are committing those crimes will get scared about stealing those cars. So I think it will make me feel a bit safer" (P16). P5 observed that police "are on Nextdoor and stuff and do try and pat themselves on the back when they've apprehended someone, so there is some effort to do that, but it doesn't seem very robust and maybe it just doesn't happen very often."

Participants reported complicated relationships with the Atlanta Police Department (APD), both voicing distrust as well as comfort in police presence. P11, for example, wanted to require police to share updates with "pictures, so it wouldn't look like it's some forgery or some fake message sent from the police department just to close a case that is around in the public." Because of the history of police violence both nationally, but especially in Atlanta, we asked participants about whether community organizations, local government, and local leadership could provide the same kind of reassurance through updates. Participants shared that any type of resolution, whether it's from the police, city council, or local nonprofits, had the potential to support their sense of safety. P10, for example, found it "comforting" when her city council representative responded to a local safety incident by reassuring residents that "this is something that we know to be a problem and we're working on it right now," and P5 felt that the awareness that there are nonprofits in the neighborhood makes him feel safer. For the majority of participants, however, only nonprofit organizations that are actually "solving the problem" would

make them feel better (P1, also P12). P1 describes a foundation that provided employment opportunities for "waterboys" who used to threaten motorists as an example of an organization that's solving the problem. Along with the majority of other participants, P1 believed that unless a local nonprofit is doing something to change "bad actors" into productive members of society, it wouldn't necessarily make her feel safe.

Representative Prototype and Survey Evaluation

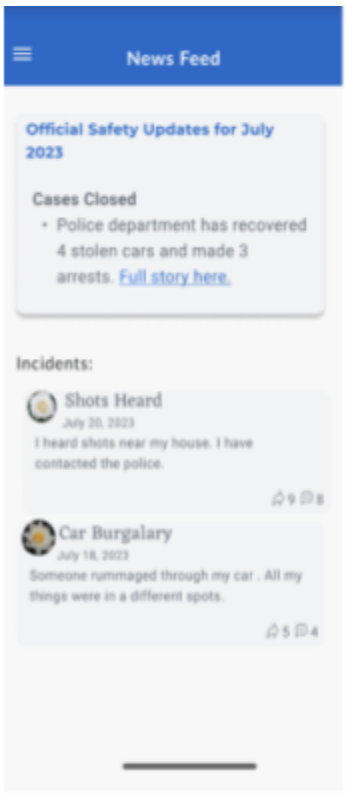


Figure 10: The Official Updates prototype shows a newsfeed with monthly updates about cases that have been closed by the police department.

We designed the Official Updates prototype, which allows users to view monthly updates from local officials about cases that have been closed at the top of their feed (see Figure 10). Across all the prototypes, the Official Updates prototype had the strongest impact on participants' concerns about crime. In response to the question, "If this feature were incorporated, how do you think it would affect your concerns about crime?" respondents felt that the Official Updates prototype would significantly decrease their concerns, as evidenced by mean values that were significantly less than 3 (a response of "No effect") (*mean* = 2.33, *sd* = 1.22) : $t(62) = 4.34$, $p < .001$, $d = .55$. Among all the features, the mean value was the lowest and the t-value was the highest, indicating the greatest effect (see Figure 13). Survey respondents shared that "knowing that some of these incidents or crimes that happened last month has been solved is a huge relief " and that such information would offer a "strong sense of security."

Fifty-six percent shared that the Official Updates prototype would support a more functional fear of crime. Participants shared that this feature would help them be more aware of incidents that are occurring and avoid dangerous areas. Respondents also shared that this feature

may influence the behavior of "culprits" who may be disincentivized to continue criminal activity. At the same time, respondents warned that they don't have "trust" in law enforcement and may further lose faith in local officials' abilities if crime did not decrease in the long run or that law enforcement took long periods of time to resolve cases. One respondent summarized, "It might make me feel slightly safer if I hear about things the police are doing to catch criminals, but only if crime is actually reduced as a result." These examples demonstrate the value respondents place on feeling not only that incidents are being resolved, but also that crime is actually reducing. A one-sample t-test comparing average response against a value of 3 (a response of "No effect") found that respondents anticipated the Official Updates prototype leading to changes in their feelings or behaviors in a way that would have a significantly positive effect on their quality of life (*mean* = 3.82, *sd* = 1.09) : $t(61) = 6.0$, $p < .001$, $d = 2.0$. Across all features, the Official Updates prototype had the largest t-value and the highest mean value, indicating that it's highly unlikely that this feature does not improve users' quality of life (see Figure 13).

Encourage Collective Action

"Someone's always looking out. Someone is always reporting stuff. If anything happens to you and you put it in the Facebook group you could have, like, 15 people be like, 'yeah, happened to me too' or like, 'yeah, I saw that.' It's very much, like, people-have-each-other's-back kind of community." —P8

Interview Findings

Participants felt safer when they believed that their neighbors were vigilant and looking out for one another. P2, a native Californian who grew up worrying about gang violence, shared that she knows "how important it is to know your neighbors and watch out for each other," and P5 shared that the "sense that there are eyes and ears" in the neighborhood helps him feel safe. Seeing the amount of engagement on safety-related posts in the neighborhood contributed to that sense of

safety. For example, regularly seeing crime and safety posts on the neighborhood Facebook page made P8 feel safer because it showed that "neighbors are being vigilant and want to warn each other. There's like a sense of community... of warning others and kind of being that alarm call to the rest of the neighborhood to watch out." Furthermore, the fact that every post has "hundreds of comments" shows "that people are really invested" (P8). P15, who gets alerts from SpotCrime and Citizen, shared that when she gets alerts, it makes her "feel like my neighbors got my back" because the fact that "someone posts it, it means they're trying to keep others safe as well."

Participants reacted strongly when asked how they would feel about replacing individual posts with aggregate graphs and statistics. While graphs and statistics were helpful, they were not a replacement for the pictures, videos, and commentary that accompany individual posts (P7, P13). There are "notorious criminals like Jumper Cable Jerry" (P2) and by posting pictures and videos, you know to "keep an eye out" (P2) and "be on alert" (P10). P1 shared that when there was a man who "brutalized his dog," a neighbor captured it on his Ring camera and posted it online. The video was "reposted and reposted" and the man was eventually arrested. For low-income communities of color, the ability to alert one another can be a critical form of self-preservation. P1, a longtime resident of Jackson Grove, shared that historically, the neighborhood "was vastly African American.. and not that affluent at all. And like we were kind of left on our own as many communities of color who are not of high economic status are." P1 explained that because the police weren't patrolling in the neighborhood, you had to learn to rely on each other and that it's important to "tell people to be on the lookout… so that the community can work together" (P1).

Prior work, however, has documented how online conversations about crime can reinforce negative stereotypes and contribute to both class- and race-based profiling (Chordia et al., 2023; Lowe et al., 2017; Wu et al., 2022). Participants voiced concerns about sharing photos and videos, including protecting the privacy of the perpetrators and their families (P9, P11, P14) as well as the stereotyping (P9) and "the very racist comments" that often accompany such posts (P6). P9, a

South Asian man, shared that he has received "looks driving through Ormewood if someone saw me, like 'oh a brown guy.'" Participants believed that by highlighting the complex mental health, substance abuse, and poverty-related challenges that underlie safety incidents, platforms can "create more empathy" (P9) and weaken negative stereotypes. P8, for example, shared an incident where an unhoused individual was aggressive at the local McDonald's and asked her for money. Viewing posts about neighbors stocking a local food closet and providing resources for the unhoused reminded her that "it's a more complex problem" that includes mental health issues and addiction and that "the one guy who's harassing us on Saturday night, he's not representative of the greater population of people who are going and benefiting from these events and these donations." P12 and P9 shared similar sentiments, suggesting that design interventions, such as tagging posts as mental-health related (P12) or automatically associating posts with social organizations (P9) can help viewers of those posts keep perspective, so instead of commenting that a girl riding her bicycle "'looks suspicious, should I call the cops?'" people might start "looking out for her, and maybe more people will care about her" (P12). When asked about opportunities for users to connect with community organizations working toward neighborhood safety, P5 shared that it may be a way for neighbors to watch out for each other and "very quickly change your mindset to like, 'Okay I'm mad about this and feeling helpless and oh wait! I can maybe help at the Boys Club and help some kids from becoming the guy who stole that package.'" P9 felt that such an approach is "something that's missing from a lot of our social networking," and wanted the platform to automatically suggest local organizations that the original poster can contact based on the context and location of the post. These participants, however, were in the minority. For the majority of participants, social service opportunities would not change how they felt about crime, unless they were assured "that doing this will help in a downtick" of crime (P12).

Representative Prototype and Survey Evaluation

We were curious whether providing opportunities to take actions that support not just personal, but also collective safety can support a functional fear of crime. We designed the Support Local Organizations prototype, which allows users to support local organizations involved in neighborhood safety programming and made clear that such activities contribute to long-term safety (see Figure 11).

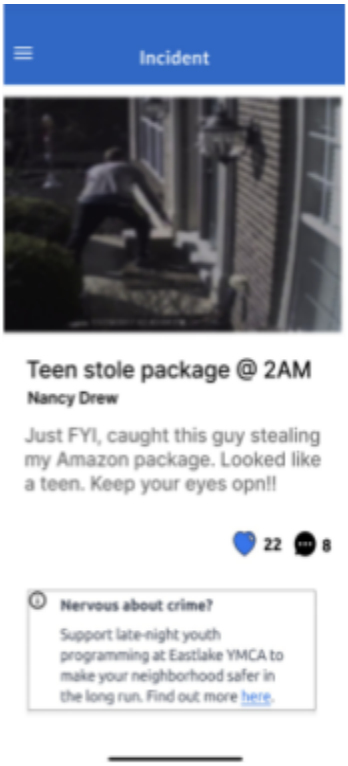


Figure 11: The Support Local Organizations prototype shows a post that provides users with opportunities to support community organizations involved in neighborhood safety.

Participants reported that the Support Local Organizations prototype would significantly decrease their concern about crime. In response to the question, "If this feature were incorporated, how do you think it would affect your concerns about crime?", respondents felt that the feature would significantly decrease their concerns, as evidenced by mean values that were significantly less than 3 (a response of "No effect") ($mean$ = 2.77, sd = 0.83) : $t(57) = 2.92$, $p <$ .005, d = .38. Participants shared that it would help them feel safer to know "that there's an organization who are ready and out to safeguard the environments" and that "members of the community are going to try to do something." While the effect was significant, the majority of participants shared that the Support Local Organizations prototype would not lead to changes in their concern unless they saw an impact on the crime rate. One respondent summarized: "It wouldn't change my feelings unless I was seeing actual results from the program." These examples demonstrate the value respondents place on feeling that crime is actually reducing. Participants acknowledged that there might be long-term effects saying, "I don't think it would have any immediate affect on the quality of my life, but maybe in time I might see some positive changes

happing in my area from the new feature [sic]." While theory suggests that getting involved with local organizations may reduce crime in the long run (Sharkey et al., 2017), our participants preferred information that more directly supported safety in the short term.

For 20% of participants, the Support Local Organization would lead to a more functional fear of crime. Participants shared that the feature might "galvanize communities" and encourage them to "donate." One respondent shared that they would appreciate a "call to action to do something about crime rather than bunker up" and another shared that they would like the opportunity to meet others and "gather intel." A one-sample t-test comparing the average response against a value of 3 (a response of "No effect") found that respondents anticipated this feature having a significantly positive effect on their quality of life (*mean* = 3.31, *sd* = 0.74) : $t(61) = 3.3$, $p < .01$, $d = 1.4$. However, across all the prototypes, the Support Local Organization prototype led to the smallest increase in quality of life (see Figure 13).

Enhance the Visibility of Positive News

"Feed me the positive. Feed me the stuff that will get me out of the house." —P3

Interview Findings

Almost all participants shared the importance of seeing "good news" in order to get a "more thorough picture" of the neighborhood (P1). P9 felt that "the biggest thing" he'd like to see is "counterbalancing negatives with positives and making sure we're not just being bombarded with negative messaging." Participants hypothesized that the reason the crime information gets more attention is because of people's "morbid curiosity" (P12), the "entertainment" value (P12), and the fact that NST algorithms prioritize posts with more engagement, which "have a tendency to be the negatives" (P9). P7 felt that if platforms focused more on good news, then "it wouldn't feel like we're living in this crime-ridden neighborhood or society" (also P1 and P9). Examples of good news

included “wholesome” things “happening in the community” (P9), such as “community meet ups, celebrations being done” (P16), “the farmers market” (P9) and “clean up events” (P9). P9 explained that after seeing so many carjackings and thefts, “honestly, I think even neutral helps to counterbalance the negative.” Participants shared that seeing stories about “good Samaritans” and “local heroes” positively influenced their perception of their neighbors. For example, P5 shared that seeing a post about neighbors volunteering or fundraising “makes you feel safer generally that your neighbor might not be a criminal or an enemy, but might be a friend or a resource. It’s pretty significant I’d say.” Many participants shared that consuming so much crime information contributed to a sense of “stranger danger” (P4 and also P6, P12, P15), particularly toward the local unhoused population (P1, P4, P8, P9), but that seeing positive news about their neighbors reminds them that “people are actually doing good” (P7 and also P3, P16) and that “there’s very much a positive force too” (P8). Positive news can also create an upward spiral of positivity, and P12 described that seeing neighbors proactively improving the community can serve as “positive reinforcement in a way, where it’s like if you see change happening, it makes you feel like you can do more.”

Participants shared ideas to enhance the visibility and encourage the consumption of positive news. Ideas included having regular online competitions for “best good news story of the day” (P5), creating rules on the neighborhood Facebook group to limit the number of crime stories posted by any one individual (P3), and organizing the feed to see “the positive stories first, and then the negative stories later on” (P13). P5 suggested that you want to first prioritize “active crimes,” but “otherwise just the general default protocol for sharing information could start with the good news stuff and the community stuff and then have to click a few more times to get the crime reports.” These design ideas, however, may not necessarily apply to purpose-built NSTs. Participants like P10, P13, and P15 who use purpose-built NSTs that are strictly dedicated to crime and safety did not want to be “interrupted” by good news, which is not “relevant” (P13). P10

explained that "if I get an app for safety reasons, I'm using it for that specific reason. I'll get my positive news elsewhere." These distinctions point to the need for different design interventions for NSTs with a diversity of information and purpose-built NSTS.

Representative Prototype and Survey Evaluation

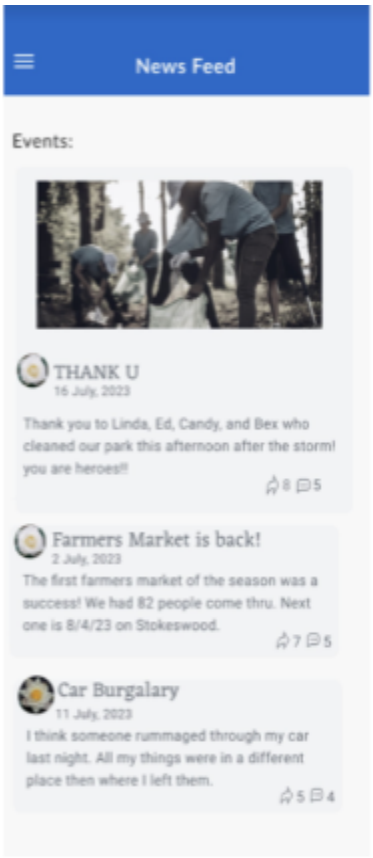


Figure 12: The Good News prototype displays a newsfeed that prioritizes good news at the top of the feed.

Based on interview data, we designed the Good News prototype, which displays good news stories at the top of the feed before any crime or safety incidents (see Figure 12).

In response to the question, "If this feature were incorporated, how do you think it would affect your concerns about crime?", respondents felt that the Good News prototype would significantly decrease their concerns, as evidenced by mean values that were significantly less than 3 (a response of "No effect") measured by a one-sample t-test (*mean* = 2.52, *sd* = 1.000) : $t(62) = 3.79$, $p < .001$, $d = .48$. After the Official Updates prototype, the Good News prototype had the highest t-value, indicating that it's highly unlikely that this feature does not decrease users' concerns about crime (see Figure 13). Respondents explained that the feature afforded them a holistic picture of the neighborhood and hypothesized that such a feature would "reduce anxiety," help with their "mental state," and create a "positive emotional experience." One participant summarized, "It would put a positive spin on things occurring around my neighborhood rather than a constant spree of crime and the resulting fears." At the same time, respondents were concerned that by focusing on good news they might miss critical safety-related information or that the good news would not diffuse their worries. One participant explained, "I feel like I would

be putting on blinders....” This indicates a need to combine good news with features like emergency alerts, which would reassure users that the platform will alert about critical, time-sensitive information when necessary. For 31% of participants, the Good News prototype did support a more functional fear of crime by motivating behavior changes that increased feelings of safety and quality of life. These participants shared that the addition of this feature may lead them to be more aware of nearby events and shift how they move around in their environment. One respondent shared, “Would help in feeling a bit secure with all the positive news and may try to go to places which was avoided in the past out of fear ! Will reduce the level of anxiety [sic].” Overall, a one-sample t-test comparing the average response against a value of 3 (a response of “No effect”) found that respondents anticipated this feature having a significantly positive effect on their quality of life (*mean* = 3.65, *sd* = 0.97) : $t(62) = 5.3$, $p < .001$, $d = 1.4$.

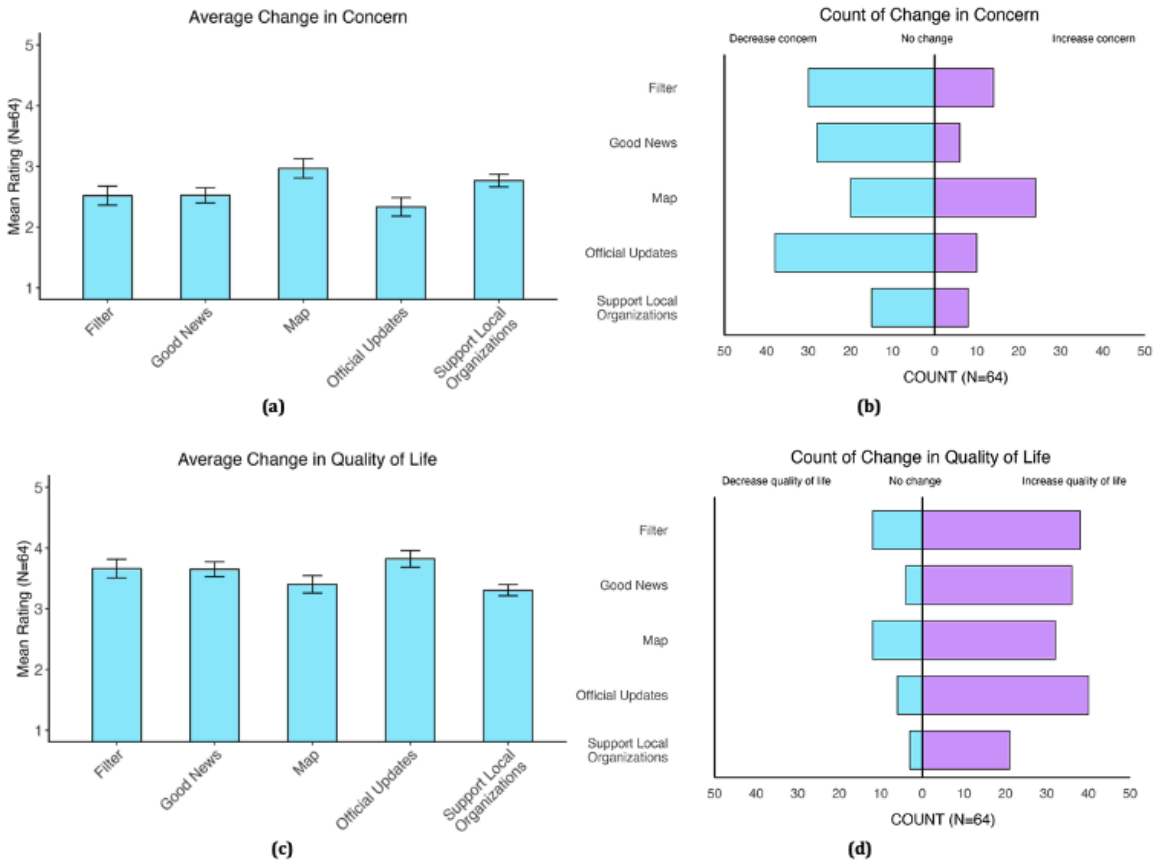


Figure 13: (a) Average participant ratings to the question, "If this feature were incorporated, how do you think it would affect your concerns about crime?" for each of the five features with standard error bars; (b) Count of participant ratings to the question, "If this feature were incorporated, how do you think it would affect your concerns about crime?" in a diverging bar graph; (c) Average participant ratings to the question, "If this feature were incorporated, how do you think it would affect your quality of life?" for each of the five features with standard error bars; (d) Count of participant ratings to the question, "If this feature were incorporated, how do you think it would affect your quality of life?" in a diverging bar graph.

4.4 Discussion

In this study, we recruited individuals with a dysfunctional fear of crime to investigate the types of features that would make their fear of crime more functional. Consistent with the Disorder, Indirect Victimization, and Social Integration Theories, I find that users' perceptions of their environments, their victimization risk, and the efficacy of their social networks influence their fear of crime. By triangulating theory and empirical data from our participants, we were able to identify

five design strategies that have the potential to shift users' perceptions about risk and support them in developing a more functional fear of crime.

In this section, we present design and theoretical implications of this work, highlighting key principles for designers of NSTs as well as identifying areas of future work for researchers.

Support an Accurate and Contextualized Understanding of Risk

The design of existing NSTs can distort users' perceptions of the world around them by "bombarding" them with a high volume of inactionable, sensationalized, and inconclusive safety-related information, which contributes to a dysfunctional fear of crime. Existing platforms indiscriminately raise awareness of safety-related incidents despite the emotional costs that accompany such awareness (Chordia et al., 2023). Rather than prioritizing awareness, designers of NSTs can support a functional fear of crime by accurately representing an environment and contextualizing risk within that environment. The results of this study indicate that designers, for example, do not need to expose users to incidents that are further than one mile away or older than 24 hours. Such "healthy default" can prevent users from conflating present, local risks with risks in surrounding areas or risks that presented a threat in the past. Second, sharing positive information supports an understanding of risk that is contextualized within a larger information landscape. Singular representations of place that are governed entirely by crime frame victimization as routine. By providing a diversity of information—about local events, good Samaritans, volunteering efforts, and even neutral news—designers can help users maintain perspective and better calibrate their risk of victimization. Finally, we found that the majority of participants would appreciate updates and resolutions that could give them a sense of "closure." Viewing incidents without resolutions creates the perception that "nobody is doing anything." By sharing updates and resolutions, designers can support users in developing a more nuanced understanding of the actions that local officials are taking to support their safety. Collectively,

these examples demonstrate that supporting a functional fear of crime means supporting users in developing an accurate and contextualized understanding of risk that is appropriately "tuned into the world" (Solomon, 2008). By enabling this tuning, designers can encourage behavioral responses that foster both safety and quality of life.

Design for De-Responsibilization

Since the 1990s, neoliberal governments around the world have implemented a practice of "responsibilization" whereby government entities increasingly transferred the responsibility of managing risk onto individuals (Garland, 1996). Pyysiäinen and colleagues described it as a form of participatory governance, which sought to shift explanation of problems and the responsibility for addressing those problems from external agents to the self (Pyysiäinen et al., 2017). "Active citizens" were encouraged to set up preventative measures, such as neighborhood watch programs, and an emphasis on personal responsibility led to the proliferation of personal safety devices—cameras, smart doorbells, bolts, removable car stereos, and CCTVs (Jackson and Gray, 2010). The digital age has heralded a new ability to receive personalized, hyper-local information about safety risks for individuals to further monitor and manage.

I observed that while participants were enthusiastic about the Map and the Filter prototypes, such features also had the potential to increase concern by creating an additional burden to act on the heightened awareness that these features afforded. Participants consistently shared that they appreciated the control, but the exposure to increasingly accessible, local, and timely information created pressure to consume information and change behaviors accordingly in order to manage their safety. Our results demonstrate the need for designs that support "de-responsibilization," whereby individuals shift responsibility for managing risk onto local leadership. Across all the features, participants were most enthusiastic about updates from local authorities. This points to opportunities for NSTs to increase the visibility of work done by police,

mental health professionals, street outreach workers, city council representatives, and other local leaders to support a functional fear of crime.

Account for Hidden Community Costs

While functional fear can motivate precautionary behavior, that behavior can also have what Jackson and Gray refer to as "hidden community costs" (Jackson and Gray, 2010). For example, participants shared that communication with other neighbors can increase their awareness and support sense-making (Powell et al., 2018) in ways that improve safety and quality of life. At the same time, both our results and prior work document how such communication can also reinforce class- and race-based stereotypes (Chordia et al., 2023), contribute to profiling (Lowe et al., 2021), and lead to increased collaboration with the police which can have disproportionately negative consequences for people of color (Muhammad, 2019). Prior work suggests that avoidance behaviors, such as those supported by the Map prototype, can reduce informal social monitoring in areas perceived to be dangerous, which can actually result in increased crime and increased fear of crime (Sampson et al., 1997). While participants shared that the Map prototype helped them feel safer and improved their quality of life by informing them about which areas to avoid and when, there is a cost to the broader community that can actually lead to increased crime in the long run. Other precautionary behaviors, such as moving into gated communities, may lead to social divisions and segregation (Jackson and Gray, 2010), and much work has documented how the proliferation of smart doorbells and private safety cameras has expanded the surveillance state (Bridges, 2021).

We only recruited individuals with a dysfunctional fear of crime who preferred immediately actionable information and clear evidence that their safety was improving. There was much less support for longer-term interventions, such as investing in local nonprofits or community organizations, despite evidence that such investments lead to a long-term decrease in

the crime rate (Sharkey, 2017). Without taking into account community costs, there is a potential that improving functional fear for individuals might actually decrease community safety in the long run. These examples also point to the need for theorizing a functional fear of crime that is defined not just by improvements to individual quality of life, but also by increased quality of life for the larger community within which an individual resides. Furthermore, prior work has documented that costs to the community are not uniform and are rather disproportionately inflicted on low-income communities of color (Chordia et al., 2023). We see opportunities for future work to build on such research and continue identifying and accounting for these costs.

Limitations

There are a few limitations of this study. First, both our interview as well as our survey questions required participants to speculate about how the representative prototypes may influence their concerns, behavior, and quality of life. While triangulating data collection allowed us to gain confidence in participants' responses, long-term behavioral interventions can deepen our understanding of the influence of these features.

Second, challenges with survey recruitment led us to use convenience sampling and biased our sample toward individuals with whom we have a shared membership in an online, private group. Likely, this skewed our sample toward urban, tech-savvy, and higher-educated Americans. While this does not affect the internal validity of the findings, it does limit our ability to generalize to a broader American population (Andrade, 2021). We see an opportunity for future work to build on these results with a larger and more diverse sample across the United States.

Summary of Contribution

The goal of this study was to identify design decisions that have the potential to support individual welfare. I contribute five concrete design strategies to support users in developing a functional

fear of crime: empower users to selectively view crime information, share specific and actionable information, provide updates and resolutions, encourage collective action, and enhance the visibility of good news. I discuss theoretical and design implications of this work, highlighting the importance of prioritizing an accurate and contextualized understanding of risk for users of safety platforms as well as designing for de-responsibilization. I see the need for future work to evaluate our empirical findings through long-term behavioral interventions and further theorize the constructs of dysfunctional and functional fear to account for costs to the community. This work suggests that there is a need to theorize safety from a community perspective in order to account for negative externalities that are placed on the larger communities within which NSTs are used.

Chapter 5. Designing to Support Collective Welfare

Current information-sharing practices and infrastructure around local safety can create fear of crime and contribute to a culture of surveillance and policing that disproportionately impacts historically marginalized individuals (Chordia et al., 2023). Prior research has found that NSTs, such as Nextdoor and Citizen, afford users the ability to shape social norms (Lowe et al., 2017; Israni et al., 2017) and decide who is and is not a threat to the community (Lowe et al., 2021). Empirical work studying online communication on local neighborhood listservs and Nextdoor find that these platforms serve as spaces for online negotiations of "suspicious behavior" that can lead to increased profiling and surveillance of people of color (Lowe et al., 2017; Lowe et al., 2021; Kurwa, 2019). These online conversations about crime can become a vehicle to reinforce and perpetuate the notion that "crime is a Black activity" (Wu et al., 2022; Lustbader, 2019; Molla, 2019). Indeed, empirical work has found that posts discussing Black men have unique characteristics, including an alarmist tone, disproportionate use of pictures for identification purposes, and an assumption of guilt that is not applied to White men (Lowe et al., 2017). On

Reddit, the combination of implicit biases, anonymity, ambiguous and passive policies toward racist comments that is focused more on protecting Reddit's image and user engagement, and thread moderators' function more to "correct misinformation" leads to both new and old racism in discussions of safety (Wu et al., 2022). Furthermore, designs that seek to improve existing NSTs may support individual user welfare, but continue to place costs on the larger communities where users reside (Chordia et al., 2024).

In this study, I ask how designers might develop justice-oriented NSTs that support collective welfare. I conducted a case study on a novel neighborhood social work program from October to December 2023 in Jackson Grove, Atlanta. I conducted 17 interviews with residents, business owners, and local leaders who participated in the program by contacting the neighborhood social worker and triangulated that information with three months of data from the Jackson Grove neighborhood Facebook group. This study has surfaced three types of safety incidents that are common in neighborhood environments. This, in and of itself, is a contribution. Furthermore, I leverage Transformative Justice principles to offer a novel conceptualization of safety that is focused on the basic needs of the community and offer guidance on how to translate this alternative conceptualization to design.

5.1 Related Work: Transformative Justice

Peacemaking criminology is a subfield of criminology with an underlying goal of responding nonviolently to incidents of crime and violence (Pepinskey and Quinney, 1991; Moloney, 2009; Nocella and Anthony, 2011). Peacemaking criminology holds an underlying belief in the innate dignity and worth of all individuals (Moloney, 2009). Responding to violence with more violence not only dishonors that belief, but ultimately fuels more violence. Instead, peacemaking criminology leverages the work of historical peacemakers such as Mahatma Gandhi and Dr. Martin Luther King, Jr. to ask how nonviolent approaches can guide society's response to crime

(Pepinskey and Quinney, 1991; Moyer, 2001). One of the most well-known theories within the field of peacemaking criminology is Transformative Justice (Nocella and Anthony, 2011).

Transformative Justice is an approach to addressing violence that asks practitioners to not only examine the ways in which current systems, structures, and norms perpetuate harm, but to also imagine new community-based alternatives so that the conditions that enabled the harm to occur in the first place are transformed (Piepzna-Samarasinha et al., 2020; Kaba et al., 2020). Ruth Morris, a Quaker who first coined the term "Transformative Justice," argued that our current conceptualization of crime ignores underlying socioeconomic and structural causes: crime, she explained, is "an attempt to find power by the powerless and a negative response to pain by those in pain" (Morris, 2000). Transformative Justice thus aims to go "all the way down to the root system of the harm" and critically examine the intersecting roles of economics, identity, and politics that may have contributed to an incident of violence (Kaba et al., 2020). In contrast to retributive forms of justice, which ask who is to blame and what punishment they deserve, Transformative Justice asks what circumstances enabled the harmful behavior and what measures could prevent these circumstances in the future (Zehr, 2011).

Transformative Justice seeks to use a violent incident as an opportunity to dismantle systems that created the conditions for violence and replace them with alternatives that center on accountability, care, and healing (Generation 5, 2007). At the minimum, Transformative Justice seeks to respond to violence in a way that does not perpetuate more violence; it does not rely on oppressive systems like the prison industrial complex and also does not rely on systemic forms of violence like racial stereotypes or vigilantism (Kaba et al., 2020). While Transformative Justice seeks to hold those who have perpetrated crimes accountable, it acknowledges the humanity and innate worth within those who have committed harm and does not view them as the "enemy" (Nocella and Anthony, 2011). Criminologist and activist Anthony J. Nocella II provides an example of how Transformative Justice addresses individuals who have committed harm:

> "For instance, if a 14-year old boy who is queer and from a poor neighborhood robbed a store when it was closed at 2:00 a.m., transformative justice would not only look at the crime of burglary, but why the boy did it. Was the boy kicked out of his home by a father who was homophobic? Did the boy need money for food, clothes, and shelter?" (Nocella and Anthony, 2011, p.4).

Our society marginalizes those who are poor and queer, hence there are at least two victims in this scenario—the owner of the store who was robbed and the 14-year-old boy who is a victim of wider systemic injustices. This is an example of how Transformative Justice breaks down victim-perpetrator binaries and sheds light on how we are all complicit in maintaining systems that create and perpetuate harm (Nocella and Anthony, 2011).

Transformative Justice thus provides a strategy for crime prevention that serves as an alternative to policing, surveillance, and other retributive approaches that are prolific in HCI, despite their potential to perpetuate harm. Fortunately, recent work in HCI has begun leveraging Transformative Justice to design technologies that address gender (Sultana et al., 2022) and street violence (Dickinson, et al., 2021; Erete et al., 2022)—I build on this emerging body of work.

5.2 Methods

My colleagues and I employed a case study method (Merriam and Grenier, 2019) to understand the information needs for a justice-oriented NST. We bound our study to Jackson Grove residents and their experience with a neighborhood social work program from 2023–2024. For the single case to have power, the selection of the case needs to be strategic (Flyvbjerg, 2006). We selected the Jackson Grove social work program because we see it as a *revelatory* case (Yin, 2012). While there are a large number of studies investigating the potential for design to support community policing (Zhang et al., 2020; Israni et al., 2017; Sachdeva and Kumaruguru, 2015b; Lewis and Lewis, 2012), this investigation is of a novel program and has the potential to provide unique insight into

how an community can collaborate to address local safety concerns in a manner consistent with the principles of Transformative Justice.

I triangulated data from two sources (Yin, 2012). I conducted 17 interviews with community members who contacted the neighborhood social worker about one or more safety incidents. I then manually collected data from the Jackson Grove neighborhood Facebook group. These two forms of data collection are complementary—interviews can provide context and depth to data collected online, while participant observation allows researchers to observe individuals in a natural environment where they are distanced from the researcher and more likely to behave authentically (Franz et al., 2019). In the following section, I give context for this case and describe my process for collecting and analyzing data.

Context

The Jackson Grove neighborhood social work program began in October 2023 to address local concerns about rising homelessness. The city council, along with the Jackson Grove Neighborhood Association, collectively raised $100,000 for a one-year pilot program to hire a dedicated social worker, Mic Lona (anonymized for privacy) to support the local unhoused population. Mic is an employee of Unbounded Care, a homeless outreach agency that uses a trauma-informed, consent-based and housing-first approach. Mic's role evolved over the course of the program, but included 1) supporting the unhoused population in getting the documentation needed to move into permanent supportive housing, and 2) following-up on community referrals made by community members about neighborhood situations that involved the unhoused. Mic accepted community referrals via phone, text, and social media (see his business card in Figure 14). Mic's role does not include emergency services.

Fig 14: Mic Lona's Business Card

The Jackson Grove neighborhood Facebook group is described as a private "forum for Jackson Grove to share about neighborhood issues or anything else that the community may need to know about." It was originally created in 2014, and as of January 2024, had over 10,000 members. The group is highly active, averaging around 27 posts per day. Mic Lona has been a member of this group since June 2020, and I have been a member since April 2022.

Data Collection

User Interviews

We conducted 17 semi-structured interviews, one with Mic Lona and 16 with community members, business owners, and nonprofit leaders who had made a community referral to Mic. To recruit users, we posted on the neighborhood Facebook page, a neighborhood Slack group associated with a local nonprofit, and reached out in person and online to business owners and nonprofit leaders who may interact with the unhoused population.

Table 7: Participant Demographics

Identifier	Age	Ethnicity	Gender	Number of years living or working in Jackson Grove	Individual's Role in Jackson Grove
Mic	N/A	White	Male	3	Neighborhood Social Worker
C1	35–44 years old	White	female	2	Community Member
N1	35–44 years old	White	Male	3.5	Director of Nonprofit
C2	65–74 years old	White	Female	5+	Community Member
C3	35–44 years old	White	Female	8.5 (East Lake) just a visitor in Jackson Grove	Community Member
C4	25–34 years old	Hispanic or Latino/a	Female	5	Community Member
C5	N/A	N/A	N/A	N/A	Community Member
B1	35–44 years old	White	Female	5	Business Owner
C6	55–64 years old	White	Female	16	Community Member
N2	45–54 years old	Black, White	Female	47	Director of Nonprofit
B2	45–54 years old	White	Male	18	Business Owner; Neighborhood Leader
C7	35–44 years old	Asian or Pacific Islander	NonBinary	13	Community Member
B3	55–64 years old	Asian or Pacific Islander	female	16 years	Business Owner
C8	65–74 years old	White	female	38	Community Member
C9	55–64 years old	White	Male	22	Community Member, Neighborhood Leader
C10	18–24 years old	Black	Female	13	Community Member
C11	45–54 years old	White	Female	40+	Community Member

Table 7 lists the demographics of all 17 participants. While all participants identified as community members (C), some participants also held additional roles, such as business owners (B), directors of nonprofits (N), and leadership either in the Jackson Grove Business Association or the Jackson Grove Community Association (identifiers used in column one of Table 7 make these roles visible). We intentionally prioritized recruiting a diversity of roles to understand the range of needs and experiences in the neighborhood. Sixty-five percent of participants' primary role was that of community member (n=11). Of these, two participants identified as housing insecure or unhoused (C10 and C11). Our participants lived or worked in Jackson Grove an average of 16 years. The majority self-identified as female (65%) and White (71%). Six percent of our participants were aged 18–24, 6% were aged 25–34, 31% were aged 35–44, 19% were aged 45–54, 19% were aged 55–64, and 13% were aged 65+.

Our interview protocol asked participants to describe: (1) their motivation for making a referral, (2) their method for making a referral, (3) the information they shared and received, (4) their overall experience with the referral process, and (5) changes that they would like to make to the referral process. Interviews were conducted in person or on Zoom. We also conducted one interview via Facebook Messenger as C10 did not have transportation to meet in person and was not comfortable using Zoom. Each participant was compensated with a $40 e-gift card, except for C11. We were warned by Mic that C11 was actively struggling with alcohol addiction and monetary compensation might enable her; we thus compensated her with a hot meal and appropriately sized clothing. The challenges associated with interviewing C10 and C11 demonstrate the need for researchers working with such vulnerable populations to be trained or collaborate with trained professionals before proceeding.

Virtual Ethnography

Virtual ethnography requires the researcher to immerse themselves in people's virtual lives for an extended period of time (Hine, 2008). I joined the Facebook group in April 2022 and used participation in the group as a means to understand, for example, local culture and humor, specific places that were considered safe or unsafe, and emergent social hierarchies. My colleagues and I manually collected data from the Facebook neighborhood group. We collected the text, comments, and reactions of all posts that were either authored by Mic or tagged him in the comments or text of the post between October 1 and December 31, 2023. Data for each post was collected at least two weeks after it was posted to ensure that we captured all responses. This process resulted in a total of 54 posts and 800 comments.

Virtual ethnography introduces ethical challenges around consent and anonymity (Hine, 2008). To protect the identifiability of group members who did not explicitly consent to participating in our study, we anonymized the name of the neighborhood and the name of the Facebook group. We additionally anonymize all names and redact any identifiable information, including in figures and tables. The Facebook group is private, so quotes from the paper are not searchable publicly on Facebook.

Data Analysis

We conducted inductive thematic analysis, "searching across a data set… to find repeated patterns of meaning" (Braun and Clarke, 2006). Consistent with Braun and Clarke's approach, we first immersed ourselves in the data, reading all interview transcripts and Facebook posts and noting initial reflections and questions (Braun and Clarke, 2006). These notes seeded rich conversations during weekly team meetings, which helped us collectively evolve our understanding of the corpus. We then manually coded the Facebook posts and interview data, looking for *semantic*

patterns across both datasets. Examples of codes at this point included "training" and "credibility." I used Delve, a collaborative qualitative data analysis tool, to group these codes into initial themes. My collaborators and I met to discuss and revise these themes. During this process, we also identified an underlying set of *latent* or *conceptual themes*—three types of safety incidents that spanned the set of safety concerns in the neighborhood. We chose three specific incidents that were 1) discussed by multiple participants, 2) discussed in both interviews and on the Facebook group, and 3) were representative of the three types of safety incidents that we saw in our data more broadly. The Results Section below is organized to reflect these three safety incidents while the content of the Results Section reflects our final set of semantic themes.

Positionality

I have lived in Jackson Grove since February 2022 and have served as the Jackson Grove Outreach Committee chair since February 2023. Seven months after assuming my chair position, I decided to pursue a research project on neighborhood social work. As chair of the outreach committee, I was charged with managing and tracking progress related to the social work program. My responsibilities as Street Outreach Chair extend beyond the scope of the research study and included meeting regularly with Unbounded Care and sharing monthly updates with residents through the Facebook neighborhood group. Walstrom refers to researchers in this role as "participant experiencers," because they are active participants in the group of study and have "personal experience with the central problem being discussed by group participants" (Walstrom, 2004, p.175).

These two roles—that of researcher and of committee chair—productively informed one another. For example, I had established relationships with other leaders in the community and leveraged those relationships for interviews. Indeed, our participants include many leaders from the neighborhood—nonprofit directors, business owners, leaders in the community

association—who were willing to participate in the study due to their relationship with the first author. Furthermore, my established presence in the neighborhood Facebook group gave credibility to recruitment posts. Interviews with participants provided me with a unique perspective, which informed program design, and conversations with Unbounded Care helped contextualize research findings. At the same time, these dual roles may have made it challenging for participants to criticize the program since it was something that I was associated with organizing. Multiple participants also appeared to overestimate my ability to implement their suggestions and feedback. Furthermore, recruitment posts that solicited "feedback" about the neighborhood social work program negatively affected my budding relationship with Mic Lona.

Despite challenges, this research would not have been possible without the multiple roles I held, and ultimately, I hope that this research has and will continue to benefit the Jackson Grove neighborhood.

5.3 Results

Mic received community referrals about three types of situations: threats to public space, threats to a community member's safety, and threats to personal safety. We present three specific incidents that are representative of these three types of incidents. Collectively, these three incidents surface a range of design implications for technological infrastructure that supports a justice-oriented approach to neighborhood safety.

I. Threat to Public Space

C2 walks her dog in Sandalwood Park every day. In mid-October 2023, she noticed that a man had moved into the park and had set up a tent. At first "he was pretty clean and self-contained"; C2 even remembered giving him Halloween candy and bringing him dinner. However, by November, the area around the tent had become "a garbage dump" (C2). C2 felt that it was a threat to one of

the few green spaces in the area and decided to contact city services as well as Mic Lona, the neighborhood social worker, to relocate the man and get the park cleaned.

When Mic receives a call, he views it as a *community referral about an "unaddressed need."* He shared that: "the way my mind works it out is, there's an unaddressed need. This person is in the park, and they don't have food or there's a mental issue, there's something going on." When someone makes a referral, it's helpful for him to get as much information as possible about those unmet needs. Mic explained that "if I know that someone is panhandling and their sign says they're hungry, then when I go over there, I'm going to make sure I have food and water with me, so that if they are in fact hungry when I get there, I can fill that need," and through that, begin to build rapport and trust. Residents made community referrals via Facebook, text, Instagram, WhatsApp, and phone. When there were incidents of broad concern, neighbors would share and request Mic's contact information on Facebook and Nextdoor. For example, during an eviction, a neighbor posted online asking for Mic's number to connect the former residents to resources (see Figure 15). C2 herself found Mic's number after posting on Nextdoor about the man in the Sandalwood Park.

Participants shared a number of *challenges associated with making a community referral.* C2 made "dozens" of calls before she came across Mic's number. There are so many public service agencies that participants found it challenging to understand when it was appropriate to contact Mic and for what types of situations. C1 and C8 complained that it takes months "to figure out who's responsible," and C3 admitted that "I know he [the neighborhood social worker] is a resource in the community, I don't know how to utilize him the right way." Interview participants suggested design solutions, such as a decision tree. C3 brainstormed aloud: "if you see this, these are the appropriate actions, Mic [the neighborhood social worker] is the person to call for this scenario, this scenario, this scenario… a process flow document" would be helpful. C2 and C3 hoped for a simple interface to "log a community issue" and automatically alert the responsible

authorities. These examples demonstrate that residents needed more support in determining when and how to make a community referral. Mic shared that he would "really love" to have a "See Something, Say Something" app to support community members with making referrals. This app could inform users about when to contact him versus other public agencies. Furthermore, it could prompt users to share details about unmet needs, enable them to share exact location information, and offer guidance on how to take respectful photos or videos so he would know what to look for when he went out to the streets. While technologies for public safety often draw users' attention to potential threats, the "See Something, Say Something" app suggests an alternative approach to draw users' attention toward people's unmet needs.

When C2 called Mic and made a community referral about the gentleman living in Sandalwood Park, Mic was able to share that the individual in the tent had relocated and was no longer living there. C2 later confirmed that the man "was gone," which she attributed to the fact that the case worker "really knows that infrastructure, and what's available and what's not available." Mic also communicated this update on Facebook, sharing that "the individual is currently in the process of relocating" (see Figure 16). While members of the Facebook group appreciated this update, some individuals also requested more information, which Mic was not comfortable sharing. In an interview, Mic clarified that his official policy when he receives a community referral is not to keep the referrer updated. He explained that, "your right to further information does not exist, because that is a person with autonomy, and that person is also a client of mine. So what happens with me and that client is between us; that's not for public consumption, and I will not be discussing it with you directly or in a public forum because it's none of your business."

Residents struggled to *understand these norms* and expected more updates after making a community referral. Some interview participants wanted a more formal reporting system to log issues and receive a case number (N1) for "tracking" and "follow through," including information

about “what’s happening about it? Is this going to be addressed one month from now, three months from now? Is this a long-term situation?” (C1). Others wanted to see more evidence of progress, including statistics (C1), a “readers’ digest” to show “where he adds value, this is where you involve him” (C3), or other types of data that can demonstrate that “this worked” (B2). B2 “100% guarantee[d] that people think there will be no more unhoused people in Jackson Grove in a year.”

Local leaders shared strategies they used to *manage community members’ expectations*. B2, who was critically involved in organizing the pilot program, shared that he comments “for awareness” whenever he tags Mic on Facebook to emphasize that he’s tagging Mic for Mic’s awareness, and not necessarily expecting updates or a resolution. Mic and B2 both felt that an autoresponder could help communicate Mic’s information-sharing policy while still providing assurance that people’s concerns aren’t going “into the ether” (B2). N1, who runs a local nonprofit, felt that the community holds unrealistic expectations, that most of the progress “isn’t measurable in KPIs or dashboards,” and that the neighborhood needs to cultivate a culture of “enlightened philanthropy” that “entrusts folks to do the work and not put as much administrative burden work on them.” These examples demonstrate that service providers are rarely offered support in managing the public’s many expectations, which can result in frustration and perceptions of incompetency or inefficiency.

This incident demonstrates how an unaddressed need can contribute to a threat to public space. Reporting and responding to those unaddressed needs can foster safety for both the individual (in this case, the man in the park) and those around him (C2 and others). I surface the need for information and communication technologies to 1) draw users’ attention to community members’ unmet needs and 2) direct that information to the responsible service providers. After receiving a community referral, Mic faced challenges in communicating progress and managing expectations about right to information. This further demonstrates an opportunity to 3) make

visible the communication policies of service providers and 4) support services providers in sharing progress and updates while protecting clients' privacy.

Figure 15: Sarah's post on the neighborhood Facebook group about an eviction of a known "drug house."

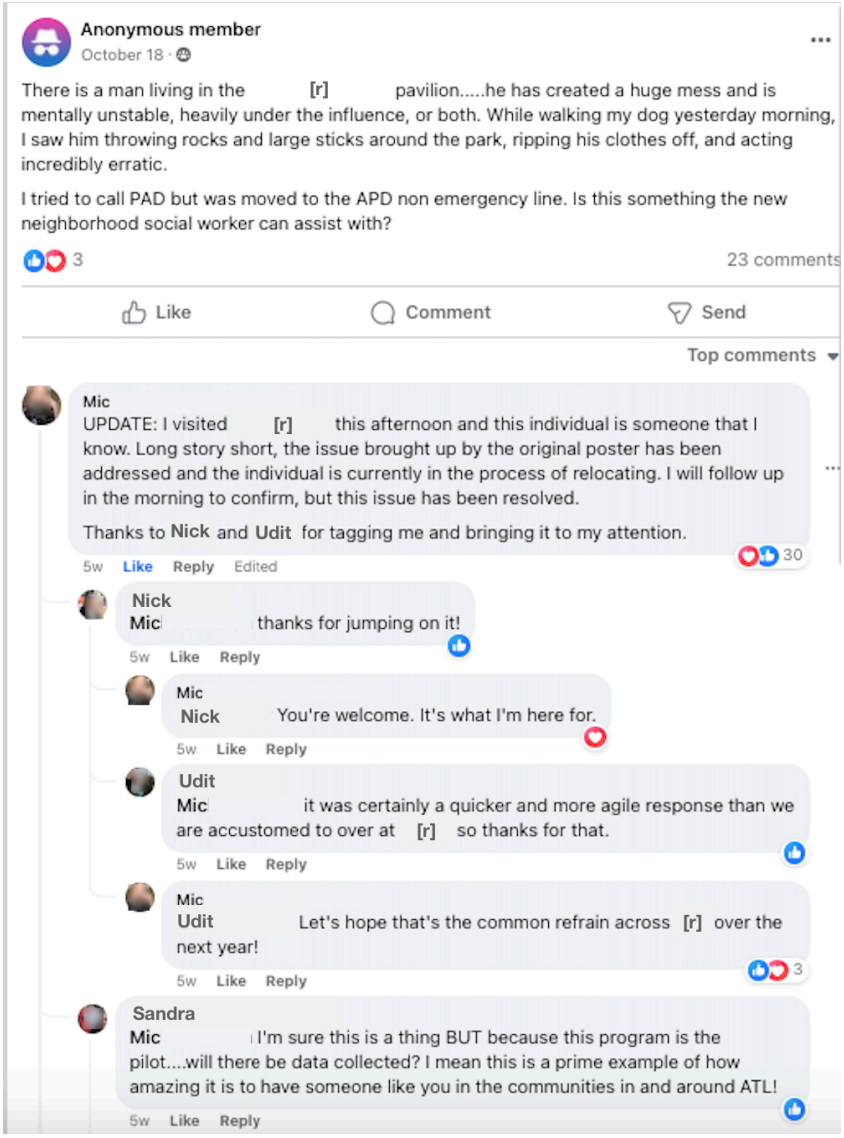


Figure 16: An anonymous member of the Facebook group wonders if the new social worker can support a man who is living in Sandalwood Park.

II. Threat to Community Member's Safety

C5 was driving on I-20, returning home to Jackson Grove on the evening of November 29. As she exited the highway, she saw a little boy and his mom "almost in traffic" asking for money on an "incredibly cold" night. She decided to take a picture and post on the neighborhood Facebook

group because she found the situation "heartbreaking" and hoped that "somebody might have some ideas of some resources" or that neighbors could pool funds for a hotel room (see Figure 17). On the Facebook page, people collectively tried to problem solve, tagging Mic and other nonprofit leaders. Members of the Facebook group also shared information about resources, including a city Warming Center that was open nearby because of the freezing temperatures. This type of *collective problem solving* and support was not uncommon. In other posts on the Facebook group, we saw examples of neighbors contributing to local nonprofits for emergency situations, cheering an unhoused member of the Facebook group who shared she was "12days clean &sober [sic]," and sharing information about local resources, such as a food pantry. C7 reflected that despite the arguing and "animosity" on the Facebook group, "it's still a really good place for people to get to know and almost problem solve together as a group because people will comment and respond and you'll see everyone processing out loud."

Community members, however, also voiced *challenges to providing supporting and collectively problem solving* online. C5 was disappointed in the response she received online about the mother and son in the cold. She was expecting more people to respond, but reflected that people might be "maxed out on all the donations." C5 shared that joining neighborhood groups in wealthier neighborhoods generates more funds and that Nextdoor is helpful because you can post to multiple neighborhoods and "get way more eyes on a thing." In another example, C10, a single mom who is housing insecure, found that she has to reveal personal details in order to get a response to requests for resources or support on Facebook. She shared that it can feel "strange opening up to hundreds of people I haven't met" but that those details help her get the support she needs. At the same time, those details invite "backlash" in the form of "comments telling me [her] to get a job , they make posts saying I'm begging or some might dm me and say I'm using the group for money. I've even had someone talk about my mom and said I need to work on being better than her [sic]." When she does receive support from the group, she feels that it's important to "show

that I [she] can be trusted, proof of receipts, bill ledgers showing the balance is paid." For C10, privacy is the price that she pays for neighbors' trust and financial support. C11, who has been unhoused since the age of 17, has learned to block people who are negative and instead tag specific individuals in posts so that her requests for support reach the people she trusts and knows "will listen or get what I'm [she's] saying."

Both on the Facebook group as well as during interviews, participants shared that seeing neighbors struggling was "heartbreaking" and "challenging to just ignore" (C5). Some participants felt that they are "responsible for other people in the space" (C4, also C3). C5 wondered if it might be helpful to have a *dedicated online space* for residents who want to take more "accountability of the neighbors in our community." A dedicated group for people who "really want to help and are available to show up in that way" would increase the likelihood that posts such as hers don't "get lost as much in an algorithm" and would also focus on taking productive actions rather than on "negative commentary." C6, N2, and C7 are members of a neighborhood Slack group with over 70 members that is used to coordinate daily drop-offs to a local food and clothing closet. N2 loved that members of the Slack group "are genuinely interested in helping." It is a space for more engaged neighbors and many of them interact with unsheltered or vulnerable neighbors on a weekly basis. C6 believed that leaders of local nonprofits could leverage the Slack group to make concrete requests on behalf of their clients. This might also be a space where people are able to offer more than just donations, such as vacant Airbnbs (C5). C5 explained that "people might have different ways that they can give something, and it would be cool to be able to have that offered." C10, a single mom, who has received help for rent and utilities through the Facebook group, shared that "sometimes I feel like I have a whole army of strangers that stands beside me and actually help me without even knowing my first name. Help I couldn't get from even my own family it makes me feel loved and cared for."

C5, B1, C6, N2, C7, and C10 all wanted more *information about local resources*. C6, a member of the Slack group, wanted a "wiki" or list of resources that she could use in real time when she came across vulnerable neighbors, and Mic mentioned that "so many of the community advocacy apps are tied to police," but it would be helpful to have an app that has the state Crisis and Access Line and information about local resources, including shelter. C10 shared that she can go on Nextdoor and "type in free food near me and see hundreds of resource," but that when she contacts these organizations, "most places will just say we don't have funds right now" or if they do have resources, the locations are so far away that she is not able to take advantage of them. N2, who runs a local nonprofit, felt that the availability of resources changes so quickly that it's better to have local people to call. B1 suggested creating a "roster of people to call who have connections to resources." The idea here would be that "if we were to come into contact with someone who needs a specific type of help, we would have one place to go look for those resources." This type of infrastructure could empower everyday individuals to help vulnerable neighbors meet their needs. Furthermore, unhoused members of the community needed in-person access to resources. C11, who has been unhoused "on and off" for the last 33 years, shared that many of the unhoused members of the community cannot read, which is "a lot of the reason why they can't email or Facebook and stuff like that." While C11 can read, she does not have a phone, and relies on library computers to go online. When she needs support with basic needs like medication or identification, she goes directly to Mic's office or to a local church.

In addition to information about local resources, C7 who is an organizer, felt strongly that if you're engaged in this work, you keep *upskilling* and "learning hard skills as well as soft skills." By hard skills, she meant "concrete things" you can do, such as provide first aid or CPR or deliver Narcan. On the Facebook group, Mic posted tips for people who are interested in making sandwiches for the local food pantry (see Figure 18). C5 reflected that such skills are critical because if she ran into the mom and her son again, she still "wouldn't know really how to help

them" and in fact, was nervous that without more training, she may actually cause harm as posting broadly on Facebook might lead people to "get their kids taken away from them if they're unhoused." In addition to the hard skills, C7 also believed that it was important to help people build soft skills and understand "why is this important? What is going on with this person?" B2, a business owner who was instrumental in launching the pilot program, shared that his motivation for this work came when he heard some business owners refer to the unhoused as "cats… if you feed them they keep coming back." One way Mic provided training in those soft skills is by trying to "humanize" a situation. For example, when contacted by a community member who referred to a client as "that freaking homeless crackhead," Mic responded, "so what I hear from you is that an unsheltered person was acting in a way that did not make you happy or comfortable" in order to "personalize" the issue and raise awareness that "that thing they're complaining about is a person… and people should not be discussed as numbers or disposable things."

Finally, a last area of skill-building was around how to support the seven or eight individuals who had been in the neighborhood for a long time, are well known, and for whom, "this is their community. This is home for them" (N2). For example, seven of the participants we interviewed were concerned about "Robby" (anonymized for privacy) who is seen daily, can be hard to communicate with, and can often walk in the middle of the street during peak traffic hours. Five interviewees expressed concern about "Mikki" who requests money for drugs at the busiest intersection in the neighborhood. Mikki and Robby are widely known, and interview participants felt "frustrated" and helpless seeing them in the same situation every day (C1, B2, C8). N1 summarized the challenge, "as much as the community doesn't really love Mikki, I think if they were to pick the number one person they want to get help, it's also Mikki... She's lived here as long as I have, almost 20 years if not longer… as much as they've been bothered by her, they also realize she is in just a cycle of problems." N2, the leader of a local nonprofit, wanted to host a training about how to respond when Mikki or Robby ask for help, and C3 shared that it would be helpful if

someone was able to say, “Hey, this community member’s name is Robby, this is kind of how he is…. If he needs help, this is the proper route for him. And it doesn’t have to be Robby specific, but if he’s a known member in the community.”

Mic reflected on the goal of this type of training and skill-building and how it can empower an entire neighborhood:

> “I’m not emergency services, and I’m one person. But by me working to educate the people here, I’m not one person anymore. I’m one person who has taught a community how they can advocate for themselves, and how we can avoid police interaction. We can connect someone directly to the services that they need, instead of getting them incarcerated overnight where nothing is going to be done.”

This incident illuminates how addressing an emergency threat to a community member’s safety (in this case, the mother and son in the cold) requires problem-solving by a large group of concerned people. I surface challenges around such problem-solving, including donation fatigue and forfeitures of privacy in order to gain community support and trust. This incident also demonstrates an opportunity for NSTs to 1) help organize a dedicated group of people to fulfill requests for support and exchange resources for basic needs, 2) provide up-to-date information about local resources that can be communicated in real time, and 3) serve as platforms to share training and provide opportunities for upskilling. Furthermore, I see the importance of developing offline infrastructure along with online infrastructure given that online resources are challenging to navigate and not accessible for everyone.

C5
November 29, 2023 ·

I just saw a 3 year old little boy sitting with his mom in the absolute freezing cold at the Moreland exit. Is there anyone I can reach out to about this? Frankly the fact this isn't something our government who we pay tax's to supposedly for things that Americans need like housing, and food stamps and a insurance policy when people fall on hard times/ find themselves homesless with a child makes me enraged and want to vomit all at once. I have a toddler myself and am the only one home with her tonight or I would feel a moral responsibility that I had to go help. I know [redacted] at capacity with what she can do. [redacted] Mic [r] . anyone with any ideas?

17 17 comments

Figure 17: C5's post on the neighborhood Facebook group and associated comments.

Mic
October 17, 2023 ·

Often, I'll grab a few loaves of sandwich bread when it's discounted and make sandwiches for the pantry at Eastside Church. This afternoon I made 20 turkey and cheese in about 10 minutes.

If you've been thinking about supporting the food pantry, here are a few sandwichmaking tips:

1. One standard loaf of bread makes 10 sandwiches.

2. When you shop, look for discounted items. Bread is always marked down and often you can find sliced meat and cheese discounted as well.

3. I use old school sandwich bags (they're cheaper than the ones with the zipper) and pack them into the bread bag to make transporting them easier.

4. Leave off the condiments, as they'll make the bread soggy.
5. PB&J may be "kid food", but they are very popular. Don't ignore the classics.

You, [redacted] and 139 others 29 comments

Figure 18: Mic's post sharing hard skills about how to make sandwiches for the food closet.

III. Threat to Personal Safety

On the morning of October 14, 2023, John Sampson (anonymized for privacy) was arrested for seven charges including burglary, criminal damage to property, and battery against a police officer (Dekalb County, n.d). B1, the manager of a local bagel shop, called the police after John had "thrown a pony keg through our [their] window and then thrown a wine bottle through the hole of the pony keg." This was not the first time that John had been arrested; Mic shared that John was stuck in the city's restoration process, which releases individuals who are deemed mentally unfit to stand trial (Baruchman, 2024). He had been cycling in and out of prison since 2004, sometimes staying fewer than 48 hours (Dekalb County, n.d). When John was arrested on October 14, Mic messaged the district's city council representative and encouraged her "to make sure that he's not released… And then we need to have a conversation with them about making sure the behavioral health needs are met." Along with other community members, Mic was frustrated with the existing restoration process and hoped to address the issue of "arresting people in severe unmet mental health need, and doing nothing" to address the underlying needs or to protect the larger community.

B2, C8, and C9 all pointed to the importance of identifying individuals such as friends and family who could hold individuals like John accountable. Years ago, C8 had found John and then John's father on Facebook. A local leader and longtime resident, C8 periodically messaged John's father to share information about John's whereabouts in the hopes that John's family could convince their son to take medication for his mental health needs or find another solution to his violent episodes (see Figure 19). In another instance, when neighbors were concerned about a loud banging in the middle of the night, C9, the chair of the neighborhood public safety committee, tracked down family members who he thought would have "the most ability" or influence over the

situation. This idea of building relationships and "rapport" and then leveraging those to hold individuals accountable is at the core of outreach work (Mic). Transformative Justice scholars refer to this as *community accountability*, a process of building self-reliance where people are intervening, interrupting, and shifting abusive behavior without relying on the criminal justice system for punishment or more violence (Incite, n.d). N2, who runs a local nonprofit, shared that because she has built relationships with the unhoused members of the community, she is able to "encourage and remind them" to do their part to keep the neighborhood clean. Other participants who had built relationships with unhoused members of the community also served as a "bridge" to Mic (N1, N2, B2). N2, for example, spent one month building a relationship with Jorde (anonymized), a new member of the unhoused community. She shared that "through that building, I was finally able to get him connected" with Mic, who started the process of finding Jorde housing.

Identifying family or friends who could hold an individual accountable was preferable to calling the police, who were perceived as "totally dysfunctional" (C2) and ineffective (C1, C4). C8 reflected that in the past, the same police officer would be assigned to the neighborhood for six months or a year and "they knew us, they knew all these guys" but more recently, the police department has had so much turnover that they haven't been able to "interact" with the neighbors and so "there's no sense of community" anymore (C8). The fact that police were no longer *embedded in the neighborhood*, made them less trusted and less effective at keeping the peace. Furthermore, participants felt uncomfortable with the idea of calling the police "on this person, who is mentally ill" (B1, also C4), and N2 shared that calling the police on the unhoused doesn't accomplish much besides "putting yet another notch in that distrust. And it's like a lot of times it's starting all the way over again." C11, a member of the unhoused community, said that she does not really feel comfortable calling the police "being a female and being on the streets and me having my issues." In the past when she's been harassed on the streets, she has called Mic and has also

posted on the Facebook group, tagging individuals she trusts, who then stopped by and checked on her.

In contrast to the police, Mic reached out and met regularly with many local business and nonprofit leaders (N1, B1, N2) because he felt that it was important to *build relationships with individuals who regularly interact with the unhoused*. N1, the director of a local nonprofit, shared that when he first tagged Mic on Facebook, Mic came to the nonprofit in person, "got to know us a little bit and what we do here. And then, he exchanged his number, so now I just text him." Similarly, B1 said that Mic has stopped by her bagel shop a number of times and chatted with her about her concerns, shared his contact information, as well as "the scope of his work and what he actually does and is able to do." These interactions have supported B1 and N1 to keep their corners of the neighborhood safe. For example, N1 explained that Mic is now able to provide context about Robby, who stops by his nonprofit on a weekly basis. If Robby has "had a day where he's actively been using and thrown out of places, I probably need to frame how I talk to him differently than if he's super aware." B1 had noticed John becoming "increasingly erratic and very unpredictable"; she shared that if she had built a relationship with Mic earlier, she would have definitely been texting or calling him about John on a regular basis.

Being able to *share personalized context and information* with local business owners and nonprofit workers who regularly engage with the erratic members of the community creates a network of leaders who are able to adapt their day-to-day behavior to keep themselves and their businesses safe. B1 wanted a "smaller Facebook group for people who actually work in the area… and see this stuff on a daily basis" in order to share and receive relevant information. B1 also believed that such a platform might be helpful to alert one another about threatening situations, such as John's release. B1 once contacted Mic when she was scared that John might have been released early from prison and returned to the store. While prior NSTs use alerts indiscriminately

(Chordia et al., 2023), B1 highlights a specific use case in order to warn a group of individuals who may be directly affected when there are limited other options .

While Mic was able to build relationships with local leadership in person, the online Facebook group was the only space to communicate with the residents of the neighborhood. Mic knew that Facebook was a valuable source of information—members often tagged him or shared information about his clients—but it was also *challenging to build trust online*. With over 10,000 members on the neighborhood Facebook page, including "people that don't live here" (C1), Mic felt that he had to be "very careful and deliberate" with his words knowing that individuals who read his posts may "troll," disagree, or question his authority and experience. He felt that there were a lot of people "complaining" and some interview participants observed that Mic had to work hard to establish his authority and "defend" himself and his professional opinions (N1). Mic found this aspect of his role challenging because he's "here to work with people on the street, not to be a social media manager for the work I do on the street." His experience suggests an opportunity for design to help local leadership signal their expertise and authority in large online spaces and help them manage their online presence.

Mariame Kaba wrote that "you cannot have safety without strong, empathetic relationships with others" (Duda and Kaba, 2017). This incident sheds light on how building relationships and being embedded in a neighborhood creates trust and rapport that can then be leveraged to rein in unsafe behavior, a process referred to as community accountability. I surface an opportunity for NSTs to 1) facilitate personalized and contextualized information sharing for local leaders who regularly engage with erratic members of the community and 2) help professionals such as Mic establish authority and credibility in large online spaces. Furthermore, this incident makes clear that when the basic needs of an individual such as John are not met, and that individual is not embedded in a network of relationships, there is a threat to others' safety.

Figure 19: C8 posts on the neighborhood Facebook group providing an update about John Sampson.

5.4 Discussion

Historically, HCI researchers have conceptualized public safety as the protection of individuals and their property from external violence or threat. This is often implicitly defined, a taken-for-granted definition with little discussion of what is meant or should be meant by safety (Friedman, 2022). In this section, we leverage the work of Transformative Justice activists and scholars to offer an alternative conception of public safety, which shifts the focus: 1) from the individual to the collective, and 2) from protection to basic needs. We discuss how shifting the underlying conceptualization can help us reimagine NSTs.

From Safety as Protection to Safety as Meeting Basic Needs

"Our opponents want to make our experiences of violence into opportunities to expand police, either justified by punishment or indefensible ideas that police, if properly trained and equipped, would prevent violence. We say stop building the infrastructure of punishment, and let's get people's basic needs met. That will increase safety." —Dean Spade, lawyer, writer, and trans activist

The current logic of safety as protection has led to the proliferation of technologies for surveillance and policing. Thirty percent of households in the United States, for example, own a

smart camera or a smart video doorbell (Parks Associates, 2024). Amazon's Ring Doorbell is advertised as a way to "make neighborhoods safer" by monitoring users' front doorsteps. Amazon has partnered with over 2,000 law enforcement agencies nationwide (Shen, 2020), so the installation of their smart cameras and doorbells extends the police state and advances what Calacci and colleagues refer to as "participatory mass surveillance" (Calacci et al., 2022). This conflation of safety and surveillance is not just happening in the home, but across cities and neighborhoods nationwide. In many cities, police departments have installed surveillance cameras on businesses and private properties that use facial recognition software that compares individual faces to "hot lists" in real time (Benjamin, 2019; DTCP, 2019). Online, discussions of local safety on Nextdoor and Reddit default to the policing and surveillance of neighbors, and disproportionately of Black and Brown men (Wu et al., 2022, Kurwa, 2019; Bloch, 2021). Sociologist Ruha Benjamin shares that her lived experience visiting her grandmother in a highly policed neighborhood left her and her neighbors "caught up in a carceral web, in which other people's safety and freedom are [were] predicated on our containment" (Benjamin, 2019).

Our results demonstrate how meeting unaddressed behavioral, mental, and physical needs not only supports the safety of an individual, but also those around them. Meeting John's behavioral health needs would create safety for the entire neighborhood, and providing the man living in the park with housing would increase safety for other park goers. Prior work has found that increasing access to basic services, for example by expanding Medicaid (Wen et al., 2017) or providing after-school programming (Gottfredson et al., 2004), reduces the crime rate. Professor of law Barry Friedman shares a provisional typology of safety as access to: "food, clean water and air, housing, a basic income, and the means to obtain that income through an education and a job. It might include health care, health insurance, and freedom from discrimination" (Friedman, 2022). Focusing on unaddressed needs allows us to account for the chronic conditions that most impact people's welfare rather than discrete events of crime (Hillyard and Tombs, 2004).

The shift from protection to basic needs creates opportunities to imagine alternative designs for safety. Participants described the need for a regularly updated list of local resources or a roster of individuals who could be referenced to meet basic needs in real time, dedicated online spaces for donations and mutual aid (Spade, 2020), and platforms to host and share trainings in hard and soft skills. P0 also described his desire for a "See Something, Say Something" app that guides users to respectfully share details about unmet needs that they notice in the neighborhood. Lu and colleagues describe how this type of "everyday noticing" is an essential skill that enables a co-located group of individuals to keep each other safe. In contrast to surveillance, which constructs boundaries around subjects, isolating them from their context and relationships in order to contain and monitor them, noticing is fundamentally relational and rooted in an ethics of care (Monahan, 2022; Lu et al., 2023). The Abolition and Disability Justice Coalition, however, warn that technologies aimed to support people in meeting basic needs can become monitoring and surveillance systems when they view people as a "crisis to be managed rather than as people who, like all people, best thrive with supportive care systems" (ADJC, 2024). Hence, without careful design, technologies to meet basic needs can become the basis for further containment and policing.

From Me to We

"Violence and oppression break community ties and breed fear and distrust. At its core, the work to create safety is to build meaningful, accountable relationships within our neighborhoods and communities."

—Ejeris Dixon, organizer and political strategist

The current logic of personal safety "creates division" in society, leading to the containment, caging, and separation of those who are labeled as threats and the isolation and withdrawal of those who consider themselves at risk (Lyon, 2003; Miethe, 1995). Safety technologies that adopt such logic perpetuate the victim-perpetrator binary. For example, Nextdoor profits off the idea

that your neighborhood is a "private haven of safety in a world otherwise filled with untrustworthy stranger" (Lambright, 2019), and the Neighbors app relies on the "fear of the Other" to justify the need to surveil the "Other" (Bridges, 2021). Anxiety about crime that these apps inspire can lead users to stay indoors, avoid public transportation, and withdraw from society (Miethe, 1995). Furthermore, a recent case study on the Citizen app demonstrates how the app fuels social mistrust, particularly of Black men and unhoused individuals (Chordia et al., 2023). Collectively, this work demonstrates how the logic of personal safety fuels fear and distrust, resulting in the sorting and segregating of people along race and class lines.

In contrast, our results demonstrate that creating community safety requires a network of relationships that support collaboration, problem-solving, and community accountability. Prior work suggests that NSTs can support a residents' efforts to prevent crime when they supplement in-person efforts and facilitate relationship building (Israni et al., 2017). However, so far, HCI has focused on engaging residents in community policing (Zhang et al., 2020; Israni et al., 2017; Sachdeva and Kumaruguru, 2015b; Lewis and Lewis, 2012). Our findings suggest the need for a neighborhood social media platform that mediates information sharing between a range of stakeholders—community members, business owners, nonprofit leaders, and local officials—with the ultimate goal of connecting people to needed resources. We highlight the following as priorities for designers to support:

- *Make Community Referrals:* Community referrals serve as the gateway to identify and address unmet needs. Structured forms or apps can scaffold appropriate information sharing as well as discourage inappropriate information sharing (e.g., privacy-violating media or information). NSTs could direct information about unmet needs to relevant parties and facilitate joint collaboration. For example, Incident #2 surfaces an opportunity to design a platform that routes information about the mother and son to a neighborhood

mutual aid group for emergency support and an established case worker for long-term support.

- *Form Subgroups:* Within the larger neighborhood, different groups had different information needs. Business owners, for example, wanted a private sub-group to share day-to-day updates and alert one another about critical information, while residents who frequently interact with the unhoused population wanted their own dedicated group to share resources and problem-solve around emergency needs. This suggests an opportunity to help users in these sub-groups assign tasks, create alerts, or inform local leaders about relevant information. Additionally, Mic had the challenging task of delivering the appropriate level of information to the appropriate group; concretely establishing sub-groups with tiered access to information would enable him and other local leaders to share different types of information to different groups, based on the roles they play in the neighborhood.
- *Manage Expectations:* Local leaders needed a space to explicitly state their policies around information sharing in order to manage expectations and increase transparency around responses. Designers could offer standardized UI as a part of the user profile where local leaders could answer questions about response times and data privacy. An NST could also have a global page that pins stories and data points to demonstrate progress.
- *Establish Credibility:* Mic shared his struggles to establish credibility online in a neighborhood group with over 10,000 members. This points to an opportunity to support local leadership in establishing credibility and managing their social media presence. For example, designers could offer the option for local leaders to create “professional” profiles that they can choose to post from or add labels to their posts that make visible their roles in the neighborhood.

- *Build Relationships:* Relationship building is at the core of public safety work (Piepzna-Samarasinha et al., 2020; Kaba et al., 2020; Dickinson et al., 2021). Increasingly, relationships are built both online and offline, as interactions between the online and offline worlds are fundamentally interwoven in place-based communities (Erete, 2015; Mosconi et al., 2017). Online, NSTs can foster discussion, familiarity, and offer scheduling features to support in-person networking. Additionally, features that help make social connections visible can be leveraged by local leaders to build trust and community accountability.

The role of an NST is ultimately to connect people to resources, and without corresponding offline infrastructure, these platforms will not be effective at meeting people's needs. Participants spoke about the importance of a roster of individuals who had knowledge about local resources and physical spaces to get access to medication for those who are illiterate. Furthermore, resolutions to conflicts over public spaces, such as in Incident #1, require professionals who are trained in trauma-informed care and feel comfortable approaching unhoused strangers. Hence, I see the importance of designers interested in fostering safety working in both the offline and online spaces.

Limitations

I was not able to contact John, the mother and son, or the gentleman in the park, and hence the perspectives of the central stakeholders in each incident are missing. While I was able to interview individuals who have struggled with mental health challenges, substance abuse, and/or housing instability, those perspectives are also underrepresented. Our experience suggests that work with this population requires creative recruitment and payment strategies as well as specialized training so that participation in research studies does not create more harm. I see the need for

future work to build on the initial themes of this study and validate them through long-term ethnographic work with the marginalized members of a community.

Summary of Contribution

The goal of this study was to identify design decisions that have the potential to support collective welfare. I conducted a case study of a novel Jackson Grove neighborhood social work program and discussed three types of incidents that impact public safety. These incidents illustrate the ways that residents, business owners, and the neighborhood social worker collaborate to address local safety concerns. This study argues that HCI's existing conceptualization of safety as protection of the individual fails to support collective welfare. I instead leverage Transformative Justice to offer an alternative conceptualization of safety that is focused on the basic needs of the community and offer guidance on how to translate this alternative conceptualization to design.

Chapter 6. Discussion

Across the three studies in this dissertation, I investigate the impact that NSTs have on users and how their design can enhance individual and collective welfare. In Chapter 3, I document how NSTs that equate safety with protection can harm both individual and collective welfare. I present a case study of the Citizen app and find that Citizen employs a set of deceptive design patterns that raise the salience of safety incidents and heighten users' fear of crime. The app encourages users to protect themselves by purchasing premium features, such as Citizen Protect. Collectively, these features contribute to a heightened fear of crime and strengthen race and class-based stereotypes. This study suggests a critical need to redesign NSTs to support both individual and collective welfare.

In Chapter 4, I investigate how NSTs can enhance user welfare by exploring the potential of design to support users who report a heightened fear of crime in developing a more functional response. I identify five concrete design strategies and surface larger theoretical implications, including the importance of prioritizing an accurate and contextualized understanding of risk for users, as well as designing for de-responsibilization. While these design strategies support user welfare, they also have the potential to result in costs to the greater community, which are disproportionately borne by historically marginalized populations. This study suggests that NSTs built on a foundational logic of protection are unable to support collective welfare, and that doing so requires a more radical approach.

There is a fundamental tension between the design of existing NSTs that aim to protect individuals and the context, history, and relationships of the neighborhood environment within which they are used. In my final study (Chapter 5), I ask what justice-oriented NSTs that support safety for the entire community could look like, and I conduct a case study of a neighborhood social work program in Jackson Grove, Atlanta. This work leverages the scholarship of Transformative Justice activists and organizers to reconceptualize safety, not as the outcome that results by protecting an individual, but as the result of meeting the basic needs of an entire community. By focusing on basic needs, NSTs can create a type of safety that is *just*; it does not benefit some populations while disproportionately harming others.

Collectively, these studies bring to the light the immense power that designers wield in shaping user beliefs and behavior. In this final section, I introduce nonviolent design patterns, user interface elements that align users' choice architectures with decisions that are consistent with the principles of Transformative Justice. I claim that such alignment makes it *easier* for people to love one another, even in the face of fear. I conclude by discussing the contributions of this dissertation as well as areas for future work.

6.1 Nonviolent Design Patterns

Ethicist Shannon Vallor reminds us that designing technology in the 21st century is a technomoral practice because "technologies invite or afford specific patterns of thought, behavior, and valuing; they open up new possibilities for human action and foreclose or obscure others" (Vallor, 2016). Chapters 3 and 4 of this dissertation demonstrate the immense power that designers wield in shaping users' beliefs and behaviors. Designers can employ a range of deceptive design patterns, for example, and these patterns can dramatically shift users' choice architecture, and thus, their behavior (Mathur et al., 2019). In the context of Citizen, I found that *forced action* deceptive design patterns, for example, required users to enable alerts, contributing to a heightened fear of crime. Participants reported how their heightened fear inspired them to invest in knives and tasers, move to gated communities, and install surveillance cameras. The design of the app thus made users complicit in larger systems of harm and state violence. This study demonstrates how, by modifying users' choice architecture, designers have the power to orient users toward behaviors that, at scale, exacerbate fear, distrust, and injustice.

I ask how design can instead invite users to orient toward justice. *Nonviolent design patterns* are user interface elements that align users' choice architectures with decisions that are consistent with the principles of Transformative Justice. Transformative Justice scholars ask which systems and structures create harm and how those systems might be transformed (Zehr, 2011). Nonviolent design patterns extend the work of Transformative Justice scholars by translating these questions into the unit of individual decision-making by providing users with the choice to not cooperate with default harmful systems and/or choose to engage with alternatives.

Chapter 5 provides examples of nonviolent design patterns. For example, Sarah tagged Mic on Facebook so that he could find housing for neighbors who, after "terrorizing" her for years, have been evicted (Figure 15). This feature expands Sarah's decision space and affords her the

ability to respond to this situation in a way that does not create more harm. A UI element that is explicitly dedicated to taking such an action expands a user's possible responses, and at scale, transforms the ways that people interact with both the harmful process of eviction and one another. In another example, Mic shares how he rephrases racist or classist language that is used by community members to refer to the unhoused. A feature that automatically detects violent language and presents alternative phrasing can offer users the choice to not participate in the system of racism or classism. Users then have the choice to not be complicit in harm, but rather be active participants in creating a world where nobody is "disposable" (Brown, 2017). These examples demonstrate how nonviolent design patterns invite users to make everyday decisions that resist existing violent systems and help create more just ones.

In contrast to deceptive design patterns, which manipulate users for profit, data, and attention (Narayan et al., 2020), and bright patterns that persuade users to make decisions that are beneficial for themselves (Graßl et al., 2021), nonviolent design patterns invite users to make decisions that are beneficial for society. Figure 20 shows a fabricated example of a *misdirection* dark pattern based on the Citizen app. The image on the left allows users to sign up for Citizen Protect, a premium feature that connects users to Citizen employees who can monitor users' surroundings and contact local police on their behalf. In contrast, the image on the right is an example of a nonviolent design pattern, which enables users to notify a local social worker about the incident. In doing so, nonviolent design patterns make visible alternatives to default behaviors and invite users to consider actions that reduce harm.

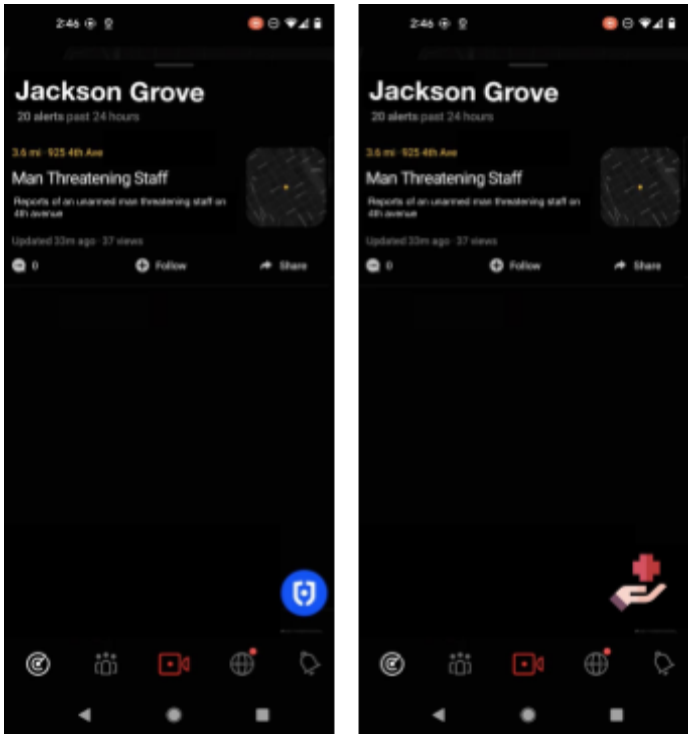


Figure 20: A hypothetical example of a dark pattern (left) and a nonviolent design pattern (right) based on the Citizen app

In the context of safety, Black and Brown people have been denied their humanity. Michelle Alexander observes that, "people of good will—and bad—have been unwilling to see black and brown men, in their humanness, as entitled to the same care, compassion, and concern that would be extended to one's friends, neighbors, or loved ones" (Alexander, 2011). Nonviolent design patterns provide the opportunity to practice relating to one another based on our shared humanity, the belief that all individuals possess inherent dignity and worth (Spade, 2020; Brown, 2017). In doing so, nonviolent design patterns present an opportunity for HCI to contribute to a world where it's *easier* to love one another because there are fewer "contradictions between our deepest convictions" and the choices that we are presented with (Iyer, 1973).

6.2 Contributions and Impact

Research Contributions

My research makes both empirical and theoretical contributions.

1. *Empirical:* Through interviews, survey, dark pattern analysis, and ethnography, I identify the impact of individual design decisions employed by neighborhood safety technologies on the user experience. In particular, I identify a collection of UI elements that together raise the salience of danger, heighten users' fear of crime, and contribute to social injustices. Additionally, I identify and evaluate five concrete strategies that can be employed by designers of existing neighborhood safety technologies to support users in developing a functional fear of crime.
2. *Theoretical:* This dissertation surfaces the underlying conceptualization of safety that designers of neighborhood safety technologies have implicitly adopted and why that is harmful. I leverage Transformative Justice principles to offer an alternative conceptualization of safety that is focused on the basic needs of the community and offer guidance on how to translate this alternative conceptualization to design. Finally, I introduce nonviolent design patterns, user interface elements that align users' choice architectures with the principles of Transformative Justice.

Community Impact

Often, researchers doing place-based work are critiqued for extracting data and then abandoning a community (Le Dantec and Fox, 2015; Harrington et al., 2019). Here, that was not the case. My role as a community member began prior to my research activities and will continue after I complete my dissertation. Through the recruitment and data collection processes, I became very

involved locally and helped organize two new initiatives that have had tangible community-level impacts.

First, I was instrumental in hiring a neighborhood social worker to support the Jackson Grove unhoused population. This program has led to multiple people finding permanent supportive housing, as well as getting access to medication, social security, food stamps, and more. Furthermore, Mic Lona has become a resource for the entire neighborhood and is able to de-escalate, intervene, and broadly engage with unhoused populations in a relational and compassionate way. The Atlanta City Council is considering replicating the Jackson Grove neighborhood social work model in other neighborhoods.

Second, I organized a Slack group to stock the Jackson Grove local food and clothing closet. As of May 2024, this group has over 75 members who stock the closet multiple times a day. This group is currently in the process of adding a refrigerator alongside the closet. These are some of the initiatives that were borne from the relationships I built while conducting research, and I am grateful for the opportunity to have engaged in such a meaningful way.

6.3 Future Work

There is a clear need to develop new NSTs that are built to meet the basic needs of an entire community. My research outlines key considerations and design implications, and there is a ripe opportunity to translate this research into platforms that can be further tested and evaluated. I anticipate needing to design platforms that can be easily appropriated to fit the diverse needs and varying infrastructure of different neighborhoods. It is critical to begin developing these technologies, as users currently have few alternatives to NSTs, the vast majority of which are built on the logic of protection. Furthermore, as outlined in Chapter 3, it is imperative that researchers continue documenting harms associated with existing NSTs to encourage more regulation from the Federal Trade Commission.

To build neighborhood safety that does not privilege some populations over others requires both online as well as offline infrastructure. While the neighborhood social worker is one example, there is a need for more infrastructure and resources, including affordable housing, mental health treatment, restorative justice circles, safe needle facilities, mutual aid groups, and much, much more. Abolitionist Mariame Kaba encourages that "we need a million experiments" that help us learn, fail, and build stronger infrastructure to support safety.

6.4 Conclusion

This dissertation investigates the design of existing NSTs and asks how we might redesign them to support individual and collective welfare. I find that existing NSTs employ a host of deceptive design patterns that harm users by increasing dysfunctional fear of crime and harm collective welfare by contributing to a culture of fear and surveillance that disproportionately impacts historically marginalized populations. Building on this work, I identify strategies to improve user welfare by decreasing dysfunctional fear of crime. While this supports individual users, it still operates within the logic of protection and thus has negative externalities for the greater community. My final study takes a Transformative Justice approach, asking how the design of NSTs can enhance the well-being of the entire neighborhood, including historically marginalized populations. I propose that designers of NSTs reconceptualize safety from "protecting an individual" to "meeting the basic needs of the entire community." Finally, I introduce nonviolent design patterns, user interface elements that aligns the users' choice architecture with the principles of Transformative Justice. In doing so, nonviolent design patterns aim to foster a more loving world, a more Beloved community.

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