Engaging Around Neighborhood Issues: How Online Communication Affects Offline Behavior

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ABSTRACT
This paper describes how online conversations amongst local residents about crime impact offline behavior. We conducted a three-year study in five middle to low-income geographically-bound communities (defined as police beats), where we observed community meetings for two years, interviewed 45 residents, and performed qualitative content analysis on over 7,000 online messages on community-based email lists and web forums. Interviewees reported that community-based online communication influenced how they 1) protect themselves and their property to avoid victimization and 2) participate and engage in local in-person civic engagement initiatives. This paper provides insights into the relationship between online and offline behavior and implications for designing community-based ICTs that effectively address local issues.

Author Keywords
Online and offline behavior; neighborhoods; place-based communities; crime; computer-mediated communication

ACM Classification Keywords
H.5.m. Information Interfaces and Presentation (e.g. HCI): Miscellaneous

INTRODUCTION
For the past two decades, human computer interaction (HCI) researchers have considered neighborhoods to be a rich context to understand how people use information and communication technologies (ICTs) [7]. Much of place-based research (i.e., studies that focus on users in a geographically-bound area) has been viewed as an opportunity to examine relationship building and social networks in a local context [6, 20, 26, 38, 39, 54] as well as an opportunity to examine how people feel about local places and spaces [3, 14, 25].

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Though much of the work in HCI has focused on online relationships and behaviors, it is essential to understand if and how online communication (i.e., digitally mediated conversations) amongst local residents affect offline behavior and in-person interactions. Such in-person behaviors can influence how citizens engage around social issues such as crime [3, 30], volunteerism [53], sustainability [13], health [35], and local activism [10, 32]. Thus, we pose the research question: *How does online communication about crime affect local residents' offline behavior?* We focus on crime to examine the role that technology plays in influencing in-person actions and civic engagement around a topic of shared concern that is essential to neighborhood outcomes [33].

In this paper, we present common themes that emerge across three of five middle to low-income geographically-bound communities regarding how residents engage and interact online and in-person around a local issue, crime. Based on data from observations of in-person community meetings for over two years, 45 interviews with residents, and community-created web forums and email lists, community-based online communication seemed to influence 1) how residents protect themselves and their property to avoid victimization and 2) residents' participation and engagement in local in-person civic engagement initiatives.

This paper makes several contributions. It provides insight into how behavior can be influenced by online communication in a local context, which adds to the growing literature in CSCW that focuses on the relationship between online and offline interactions [19, 24, 25]. Furthermore, it provides insight into how neighborhoods with varying demographics (income, education, race) use technologies to address social issues rather than focusing on a single type of neighborhood. Lastly, it provides implications for designing technologies that focus on civic engagement, building on prior studies about digital activism and volunteerism [10, 32, 53].

RELATED WORK
Neighborhoods play a critical role in shaping the social and economic outcomes of their residents [1, 15, 33]. ICTs have the ability to strengthen neighborhoods by supporting residents' collective responses to social issues that may plague communities. In the following sections, we discuss the role and context of neighborhoods and present prior research that focuses on location-based ICTs that support collective action.

ICTs in Neighborhoods

Neighborhoods have been linked to numerous factors essential to the success and well-being of residents. Issues such as mortality [15], economic mobility [55], health [1, 34], and crime [33, 40] have all been linked to 'neighborhood effects,' meaning that neighborhood characteristics are confounded with these social issues. The effects of neighborhood characteristics are particularly important in lower income areas, where lack of political capital and collective efficacy tend to make these neighborhoods susceptible to continual decline [40, 41, 44].

HCI scholars have recognized the importance of neighborhoods and have shown enthusiasm in understanding the role of ICTs in improving health, education, job opportunities, and civic engagement in the local context [7, 12, 20, 30]. In the 1990s, Carroll and colleagues studied Blacksburg Electronic Village [6, 25, 26] and later Moosburg, which provided "real-time, situated interaction and a place-based model for community information" [8]. Hampton and Wellman [20] explored social capital in local neighborhoods in Netville, a suburban neighborhood wired with high-speed internet. Blom and colleagues created Comfortzone, a shared mapping system that allowed individuals to tag different locations in a city to indicate areas where they did not feel safe [3]. These studies provide us with a foundation regarding technology use in neighborhoods that are not low-income.

There has also been recent focus in HCI to study low-income communities and marginalized populations in the US [12, 27, 56, 57]. In sustainability, for example, Dillahunt et al. found that low-income households are interested in sustainable living practices regardless of the financial benefits [11] and created Community Monitor, an application that allows low-income residents to view their energy consumption in comparison to their neighbors [13]. In health, Community Mosaic, a system that allows local residents to share healthy eating practices, focuses on improving dietary habits in neighborhoods that are disproportionally affected by negative health outcomes. Our paper extends these studies by contributing implications for designing community-based technologies that support local collective action in low income communities around the topic of crime and safety.

Digitally-Enabled Collective Action

Collective action is essential to neighborhood vitality [40]. Despite concerns that people are less civically engaged [37], over a quarter of U.S citizens volunteered over 15 billion hours in 2011, an estimated worth of $296 billion [2]. These hours of service and engagement are not only beneficial to the organization and society, but also to the citizens who participated [37]. Participating in community crime prevention, for instance, decreases fear and anxiety of becoming victimized [28] while also reducing crime and increasing public confidence in the police [45]. Such examples indicate the importance of civic engagement and collective action to address local issues.

Citizens have used ICTs to inform, organize, and mobilize others in local collective action initiatives [36]. Dialup Radio, for example, is a telephone-based information distribution system created for citizens and human rights workers in Zimbabwe to share information outside of the government's tightly controlled media outlets [23]. Smyth and colleagues created MOSES, a mobile kiosk that allows Liberian citizens to record and watch video messages [47]. Other related work has focused on the use of technology in volunteerism [53] and collective digital intelligence and action during crises [48].

Taken together, prior literature suggests that neighborhoods are an ideal research setting to understand how to best design ICTs to support local collective action. While there has been much work done on digitally supported collective action, few have focused on how online communication about crime affects offline behavior, interactions, and collective action, specifically in low income communities. In this paper, we address this gap.

STUDY DESIGN

To understand how online communication influences offline behavior, we took a triangulated approach to the study design using observations, interviews, and qualitative content analysis. We observed two years of community-police (CP) meetings in five geographically-bound areas in Chicago, Illinois, USA. These meetings were sponsored by the city of Chicago and held once a month with local residents and the police. Additionally, we interviewed 45 residents from five communities. We also conducted qualitative content analysis on over 7,000 online messages sent amongst local residents in three of the five areas through grassroots community-created web forums or email lists. The following sections describe the five communities, their technologies, and how the data was collected and analyzed.

The Communities

We studied five communities. We define the geographic boundaries of a "community" as police beat, which is a relatively small geographic area (typically 30 to 40 square blocks) containing roughly 20,000 residents (sometimes fewer in less densely populated areas of the city). We selected beats as the geographic boundaries because 1) in preliminary observations, we found that residents often used the terms "beat" and "community" interchangeably in their online and offline language and 2) when appropriating ICTs for community use, residents typically described the tools as being for those who live in certain police beats. Beats may have been heavily used by residents, because it may be easier to have conversations about crime if the targeted boundaries are mapped onto police beats. We do not refer to the areas as neighborhoods, because in Chicago, the term "neighborhood" is typically referred to as a much larger geographic region that was named in the 1920s, with populations up to 98,000 residents (with a median of approximately 31,000). As many as 9 beats could make up one neighborhood in Chicago. In this paper, we use the term "community" to refer specifically to the beats studied and "neighborhood" to refer to a more general definition open to interpretation by a broader audience outside of Chicago. We acknowledge that the use of police beats may be an area of concern as there is much debate amongst scholars about the geographic boundaries that define community.

Table 1. Demographic information of the communities based on data from Census and the American Community Survey

	Population	Income Level	% White	% Black	% Latino	Index Crime Rate
Community 1	24,200	Middle	54%	12%	17%	1528
Community 2	10,300	Middle-Low	28%	29%	34%	2889
Community 3	22,000	Low	2%	70%	25%	6339
Community 4	23,643	Low	3%	38%	58%	6962
Community 5	17,260	Low	2%	78%	19%	3048

The Index Crime Rate is the number of serious crimes (e.g., 1st and 2nd degree murder, rape, robbery) per 100,000 residents from August 2012 - August 2013.

The five communities were selected using purposive sampling, accounting for crime rates and racial compositions. Crime rate was important to consider, because citizens' behaviors, reactions, and attitudes towards civic participation may be affected by the amount of local crime in their neighborhood [46]; therefore, we selected communities with varying crime rates. Additionally, we considered the racial composition of the communities so the results from this study could be compared to prior crime studies, most of which consider race [43, 52]. Similar to prior studies [33, 43], crime rates and racial compositions were confounded with SES levels. By considering race and socioeconomic status, our study builds on prior work in HCI that provides insights into designing for groups who have traditionally been marginalized [27, 35, 56, 57].

To select the communities, we ordered the city's beats by crime rate, then by the three most prominent racial[1] groups in Chicago: Caucasian (or white), African American (or black), and Latino. We then randomly selected a beat from the 10 highest crime areas representing each racial group. Table 1 displays demographic details about each community. The end result was one majority white, one majority black, one majority Latino, and one community where the racial groups are evenly distributed. We added a second majority black beat (Community 5), because the one initially selected lacked a strong online presence.

Based on Census data, two communities were classified as middle income based on the median income levels per household. The other three communities were classified as low income, with poverty and unemployment rates greater than 21% and 15%, respectively. Index crime are calculated per capita, with the lower income communities reporting higher criminal activities than the middle income communities.

Data Collection

To understand how technology is appropriated to support community crime prevention efforts, we conducted a study that combines observations, interviews, and online qualitative content analysis.

Observations

We observed monthly meetings between the police and community in each of the five communities for roughly two years (2011-2013). The meetings were held at local churches, libraries, schools, and community centers. There was an average of 22 citizens and 4 police officers in attendance at the community-police meetings; there was at least one community facilitator (i.e., a resident who volunteered to be the liaison between the community and police) present. In addition to the monthly community-police meetings, we attended other community events, such as community walks, block parties, and block club meetings. In total, we collected over 400 pages of ethnographic notes from attending over 60 meetings.

Semi-structured Interviews

In addition, we formally interviewed 45 local residents (roughly 9 from each beat) during July - September 2012. We recruited 21 interviewees at the community-police meetings and 12 from invitations sent on the community-based online discussion tools. We recruited 12 interviewees from public places such as local libraries or by word-of-mouth to gather insight from those who live in the community but do not attend the community-police meetings or use the online discussion tools.

Each interview was transcribed in its entirety. Interviewees' ages ranged from 23 to 82, with the median age being 57. Twenty-eight of the 45 participants were women. Sixty-four percent of the interviewees were homeowners. The education level varied as follows: 16% of participants did not complete high school, 16% had high school diplomas or equivalent, 33% had some college or vocational training, and 35% completed college with a bachelors degree or higher. Race varied as well; 53% identified as being black, 38% white, and 7% Latino. Table 2 provides details about the interviewees by community.

Interviews lasted an average of 45 minutes. During semi-structured interviews, we asked residents about:

- their attendance at in-person community meetings and/or participation in online discussions with their neighbors about crime;
- their online and in-person participation and the factors that influence their decision to select either medium;
- their satisfaction with community-police meetings and trust level of the police;
- their use of technology in any other capacity to address crime (e.g., if they send text messages or emails about crime outside of the community-based web forums);

[1]The US Census bureau defines Latino as an ethnicity, not race. For simplicity, this study refers to race based on self-identification as Latino, regardless of race (e.g., White Latino, Black Latino).

Table 2. Demographic information about the interviewees by community

	# of Interviewees	Avg. Age	% Female	Race			% Homeowners	% > High School Diploma
				% White	% Black	% Latino		
Community 1	7	60	43%	100%	0%	0%	86%	100%
Community 2	9	41	56%	67%	22%	0%	33%	100%
Community 3	10	53	80%	30%	60%	10%	50%	60%
Community 4	8	52	63%	0%	88%	13%	50%	25%
Community 5	11	61	64%	9%	82%	9%	27%	36%

- their style of online participation, specifically whether they actively participate (i.e., post messages to the discussion board) or passively participate (i.e., read the forum posts but do not contribute).

Online Qualitative Content

Lastly, we gathered online conversations from "grassroots" community-based ICTs (i.e., created by residents not by the police or other government agencies). We identified such ICTs by asking residents to describe if and how they engage in online discussions about local issues. Based on our in-person conversations with residents, three of the five communities (Communities 1, 2, & 5) had a main method of online communication to facilitate local discussions and share information outside of police-created technologies. We were unable to identify ICTs that were widely used in Communities 3 and 4; however, residents in Community 3 sporadically used Everyblock, an online tool that, at the time of this study, was freely available to discuss local issues. We thereby focus much of our discussion on the three communities that more widely used technology, because we were unable to draw definitive conclusions about the effect of online communication in Communities 3 & 4.

Community 1. Community 1's main method of online communication was a Yahoo! Group that was created in April 2004. Roughly 250 users signed up using their real names, email addresses, and home addresses. Though there was no official affiliation with community-police meetings, citizens promoted the website at the community-police meetings (i.e., encouraged citizens to sign up).

Community 2. From January 2008 - March 2011, Community 2 used an open discussion board, where anyone could send a message to all the members. The posts to the discussion board were publicly accessible, because logins were not required to read messages. To post to the board, real names and home addresses were required. As of March 2011, over 350 residents primarily used a private email list instead of the message board, where members could not see others' email addresses. Like Community 1, the private email list was not officially affiliated with the police but meeting attendees were encouraged to sign up with the mailing list moderator at the community-police meetings.

Community 5. Since May 2011, residents in Community 5 used a private email list to distribute information related to crime. All emails were sent out "blind copy" from the moderator so no information about who was on the email list was shared. People signed up at the community-police meetings, ward (i.e., alderman's) meetings, or by contacting the moderator directly, who reported over 300 emails on the list.

We then developed a web crawler using Python that retrieved information (i.e., forum post, date, subject, author) from the community-based ICTs (e.g., web forums). Using this method, we collected 5,425 messages from Community 1's Yahoo! Group, 1,054 messages from Community 2's public message board and private email list, and 665 from Community 5's private email list. The message dates ranged from April 2004 - June 2013. Below is an example of an online forum post written by a local resident: *"Saw drug dealing on Saturday afternoon @ 2:30 while having late lunch on my front porch. I can identify the car and will look for it now that I know....here's the info: A reddish-marroon Buick (at least 10 yrs old) did a strange move at the stop sign as it was heading south[...] As the Buick went by me there were 3-4 young men sitting - I could not take the license number, but can identify the car again - very shiny!!"*

Though the community-based ICTs in this study were web forums and email lists, we also searched for discussions on using search engines and social media websites (e.g., Facebook, Twitter). While we found announcements about local meetings and resources on social media websites, we did not find ongoing conversations amongst residents. Interviewees stated that they didn't use social media to have conversations with neighbors, because either they did not use social media regularly, or they did not view social media as a tool to have open conversations about the neighborhood. The former could be attributed to age and generational differences in technology use amongst the interviewees (median age was 57). The latter could be related to differences in technology use and skill [21, 22] or fear of retaliation [29, 45]. Our study was conducted prior to the popularity of websites like Nextdoor.com, a private local social networking tool [31]. Future work could examine the extent to which neighborhood characteristics influence the type of technologies citizens use and the structure of information sharing [17].

Analysis

We (the author and a paid research assistant) analyzed the data described above using inductive qualitative analysis [49]. We began by reading each line of the observations, interviews, and the online content; then using TAMSAnalyzer, a qualitative analysis tool, we created codes that described various phenomena. We iteratively applied these codes to phrases in the observation notes, interview transcripts, and the online content (i.e., the forum posts). As additional codes emerged, we reanalyzed the data, applying the new codes. The codes

were then grouped into higher level categories until overarching themes emerged. Interrater reliability was calculated using intra-class correlation coefficient using a two-way mixed model and absolute agreement, which resulted in 81% reliability. In the following section, we present two major themes that emerged based on our analysis along with quotes from participants that illustrate the themes. Quotes are verbatim, with little alteration except to protect the identity of participants.

RESULTS

Twenty-four of the 45 interviewees regularly used a technology to discuss local crime and disorder (e.g., community email list, Everyblock, CLEARpath). Of the 24, 17 (71%) said that the technology influenced how they protect themselves and their property to avoid victimization. Sixteen of the 24 (67%) stated that the online communication affected their attendance and engagement at the community-police meetings and other civic activities.

Behavior Change to Avoid Victimization

Online communication influenced how people protect themselves and their property as well as their interactions with strangers. Seventeen interviewees reported that they changed their behavior in hopes of avoiding victimization against themselves, their family, and/or their personal property. Twelve of the seventeen (71%) interviewees stated that after receiving the online communication, they changed their behavior to avoid being personally assaulted, and 15 of the 17 (88%) changed their behavior to protect their personal property. Furthermore, 11 of the 17 (65%) residents stated that the technology changed their awareness and consequently their behavior as a result of receiving information directly from other residents about scams and crime that they had encountered.

Prompts Change in Self Protection

During the interviews, residents stated that they changed their behavior to better protect themselves from being victimized based on the online communication from the prominent community technologies. One woman in Community 5, for example, described how she changed her behavior after getting an email from the moderator about his daughter's near attack while exiting her garage. The woman described the email and how she subsequently changed her behavior, saying,

> *"It changed how I come into the garage. [Now] I let someone know when I am coming into the garage and ask my daughter to let me know when she's coming into the garage, because I remember [the moderator] sending out this email. [His daughter] was coming home at night [..] So the person that was over the fence, waiting on her to come out the garage. She opened the door and so she had [her] child in front of her. [..] The child screamed [..] So she just shut the door and as she was shutting the door, he was putting a gun in the door, but she was able to shut the door [..] [The moderator] was saying that he had told his daughter to always alert them when she's coming in, so they can just watch out. So when I'm coming in [now] I always call my daughter and say, I'm coming in if it's dark. She will call me if she's coming in. [We] let the garage down. Before [we used to] turn the car in, and [now] we back in. [..] You know, you watch, you make sure nobody runs in with you."*

In this example, the woman vividly remembered details of the email about the attempted attack of the moderator's daughter, which was sent over eight months prior to the interview. The woman stated earlier that she read an average of 30 emails per day. Her detail and accuracy in describing the incident demonstrates the effect that the message had on her. Additionally, she encouraged her daughter to change her behavior.

Other residents also stated that they received online messages that impacted their behavior. For example, another woman from Community 5 said, *"[The moderator] sent me an email one time about when you are in the parking lot, you know and you're next to a van, you know. How if my car is parked here, and I am going to get in here, you know, the person that's in the van can grab me easy, you know. So [now I] enter through the other side."* In this instance, the woman described how she became more aware of large vehicles that are parked near her car because of a message received from the email list. Others stated similar changes in how they protect themselves.

Residents also stated that online communication impacted how they encouraged their family to behave. A man from Community 2, for example, described how he asked his wife to change her behavior, saying *"If something comes up, I'll reference it. Like I say 'People have been doing snatch and grab robberies. Make sure you carrying your mace when you walk the dogs.'"* This demonstrates how online communication may also influence individuals to warn family members about their safety habits, implying the importance of family in crime prevention [28].

Prompts Change in Protection of Personal Property

In addition to personal safety, results suggest that citizens also reported that they sometimes modified their behavior to better protect their homes and personal property based on others' experiences shared online. One woman from Community 1 said that after hearing someone describe how they were burglarized, she learned *"don't leave the windows open when you leave if no one else is home. It prompted me to call my landlord about some broken windows, yeah, definitely. There's an overall feeling of 'I don't want that to happen to me' or 'Let's buckle down to prevent that from happening again in the community.'"* This woman stated previously that she had lived in the same place and had problems with the windows for years but reading about others' experiences prompted her to take action to better protect her home.

Others also stated that they protected home differently based on what they read online. A man from Community 1 said, *"The big thing that I learned on that site, I always keep my doors locked you know because before I would like go out the back of the door, and I would leave it unlocked just to walk the dog down the block or whatever. Now I don't take that chance anymore. My door is [now] locked."* Another man from Community 5 said, *"[The moderator] sent out one*

about people going around taking stuff out of yards and I have my grill out there and I have a wrought iron table. So now that made me put it in the garage because if they're going in people yards taking stuff, I don't want my stuff taken." These statements illustrate how residents changed how they protect their home and personal property based on their neighbors' experiences. These grassroots technologies afford residents an opportunity to share their experiences with a vast amount of people, which subsequently impacts people's behavior.

Influences In-Person Interactions

At least nine residents (i.e., 20% of all interviews and more than half of those who reported offline behavior change) stated that receiving the online messages from other community members impacted the way they interacted with strangers. Interviewees reported this was due to people online sending messages to "alert" residents of certain burglary or robbery scams. One woman from Community 1, for example, described how she became aware of a burglary scam after reading a message on the community mailing list and how as a result, she changed her behavior based on other residents' experiences being victimized, saying *"So I also have gotten information from other people, that are on the emails, telling us of what they experienced. Like there was somebody going around selling this new electricity stuff and we're like, 'Oh, good to know.'"* She continues to say how that made her more cautious when answering the door. She says that after receiving that email, she operates under a new rule. She said if she doesn't *"know who is on the other side of that door, [I] do not open it. They could punch you in the face and they could be in the house."* In this example, the woman described the impact the message had on how she answered the door of her home. Similarly, a woman from Community 2 described a burglary scam that her neighbors posted online: *"Another thing that was big was [..] people ringing doorbells and soliciting or saying that they were from the gas company and they might not be. I don't open my door anymore."* A man from Community 2 said, *"I am probably more aware of certain specific things. Like for instance if someone [online] says there is a guy in a dark blue jacket walking around and is asking people for, you know like, the guy who was asking people for money for an inhaler. I was more attentive to people in blue jackets."* These residents described how the online conversations influenced their in-person interactions with strangers.

Four of the interviewees stated that what they read online changed how they interact with their neighbors. One woman from Community 1 stated that after receiving information that her neighbors were using drugs, she changed her behavior when interacting with them. She said that someone posted online that *"we have got some neighbors who are into drug use, so that concerns me. And so I am always leery around them and pay attention and I probably wouldn't walk, walk past them if it was late at night and they were all hanging out."* Thus, technology may not only influence users' behavior towards strangers but may also affect how they interact with people that they have met in-person. This may be a lesser effect considering evidence of perception change of neighbors were only mentioned by 4 out of 24 interviewees that used the community-based crime prevention technology. However, future work should investigate the degree to which technology influences the perceptions of strangers as well as acquaintances.

Our results suggest that the source of the information is important. More specifically, the information was from neighbor-to-neighbor, which may be extremely effective in influencing behavior, because recipients may view the source more credible or reliable since they live on the same block or street. If one's next door neighbor is assaulted, one may be more likely to identify with the victim; after all, they may walk down the same street during their commute, leading them to feel like "If it happened to them, it could happen to me." Most stated that they changed their behavior to avoid victimization after hearing about another neighbor being victimized. We asked interviewees if they used other sources to receive information about their community. At least half stated that they watch the news or read local newspapers; however, less than 10% of those that receive information about their neighborhood from TV news and/or newspapers stated that it affected their behavior. This suggests that the source matters regarding if and how online communication influences offline behavior. Describing how information from neighbors affects his interaction with strangers, a man from Community 1 said, *"I feel like even if I just keep reading the emails, it's a free society that is able to say, 'Dude there's somebody on a street corner pretending to be a guy who fixes screens. Don't let him in. He's not real,' or 'Dude, there's a guy on the street corner with a clipboard and he actually is a screen fixer. Believe me, he's fine. Dude, let him in.' If I know these people over time, even if it's 'cyber-know-them,' then when that person comes to the door, I'm going to be like, 'I actually do have a screen that needs fixing and I heard you were cool.'"* This statement demonstrates the effect that online messages may have, even when the messages are received from neighbors who have never met in-person. This may be due to the relationships and trust developed online.

Effects on Civic Participation and Local Engagement

Our findings suggest that online communication affects citizens' attendance at community meetings and other forms of civic engagement. Specifically, six interviewees stated that the online messages impacted their participation in community-organized activities such as community walks, vigils, etc. Eight interviewees said they attended community-police meetings as a result of the online communication. Furthermore, the observations and interview data suggest that online communication affects what residents ask and how they participate during community-police meetings. Residents asked questions about what was said online, which led to a more community-driven agenda.

Heightens Participation in Community-Organized Activities

Residents stated that they became more involved in grassroots community crime prevention strategies such as local walks and efforts to curb disorder as a result of reading messages from the community-based ICTs. They stated that the technologies provided additional details about the community events that they may not have otherwise known. Additionally,

technology sometimes made it easier to organize community-created activities. For example, residents in Community 1 identified a deleterious business (a drugstore) and attempted to organize action to address the disorder. During an interview, a woman from Community 1 described that situation, saying that the online messages *"changed how I perceived the [drugstore] on [street name] and [street name] because it was reported that there was violence in that park so makes me think twice about going to the [drug store]."* She continued to say that due to the reports there, she helped organize online to try to stop the drugstore from being able to sell alcohol, saying *"actually, I was part of the group of people who encouraged the [drug store] to not sell liquor because there was already a weird vibe going on around there. They did not stop but they didn't sell it like packaged goods. I think not as broadly but no they did not stop. Man, I think we made a big stink and that's good enough."* This exhibits how residents used the website to not only identify disorder, but also engage in offline activities to address the disorder. In this particular situation, the store did not completely stop selling alcohol but residents were happy that their efforts encourage the store to limit the type of alcohol sold (e.g., no single beers). The woman later said that she would not have otherwise known about the in-person protest without the discussion board. Residents from Communities 2 and 5 described similar situations.

When we asked citizens why did they participate in more locally organized activities, the most frequent response was that they were motivated after hearing about others' participation though online discussions and photos posted. A woman from Community 2, for instance, said, *"I guess it has changed my feeling that there are a lot of people who are watching, who are watching out that you know. We don't just go into our houses and shut the door, that people are paying attention, and that there's a common want to improve."* Online participation influenced people's perception of what was happening in the community, because they virtually witnessed neighbors organizing walks, clean-ups, etc. Other said that they participated more because of the reminders of when and where local activities were occurring.

Increases Community Meeting Attendance

Over 80% of the residents who stated that the technology affected the community-police meetings believed that attendance increased because of the technology. A woman from Community 5 stated, *"A lot of people have gotten on the email [list] plus giving out the information - like I said, we gave out the information that picks other people's interest - so they come [to the in-person meetings] and they listen. And a lot of times, they have not even experienced the problem, but they heard about it or read it on the email so they want to talk about it."* The community facilitator from Community 5 agreed, saying, *"[Messages from the email list] makes them come. What happens is, everyone gets - everyone is hungry for information, they just don't get it. So when you don't get it, you say, 'Man, nothing going on. If nothing's going on, why do I need to go to the [community-police] meeting for? So if you haven't done anything to bring me to the [community-police] meeting, to make me want to come, then why should I come?' "* All of the interviewees who reported that the technology increased attendance were from Communities 2 and 5. No one from Community 1, a low crime area, stated that they felt the same. In fact, attendance at most of Community 1's community-police meetings were low (a median of 15 citizens in attendance) in comparison to the other communities studied. Given the low crime rate in the area, perhaps residents did not feel as compelled to attend the community-police meetings as the other communities. Yet, many residents in Community 1 still wanted to be informed about local crime and disorder.

Catalyzes a Community-Driven Agenda at Local Meetings

Results suggest that the technology allows citizens to actively engage in community-police meetings (i.e., introduce topics, direct the agenda) as opposed to being passive recipients of information from the police (i.e., only asking about issues that the police introduce). At the meetings, citizens asked the police questions about incidents that were mentioned in online discussions or emails. Residents introduced at least one topic from the online website in over 85% of Community 1's community-police meetings and 70% and 75% in Communities 2 and 5, respectively. Citizens said that they had a greater influence on the community-police meeting agenda, because residents would ask questions about the information they read online as opposed to simply responding to the topics introduced by the police.

Though the police have traditionally dictated the community-police meeting agendas [43], some residents stated that the meetings seemed to be more community-driven as a result of online communication. A woman from Community 1, who attended community-police meetings for at least 10 years, described how technology use has impacted her approach to the community-police meetings: *"Well you know it all works hand in hand because when you know you've read it online and then you go [to the community-police meetings] prepared. It may be discussed or it already has happened and it's resolved. Or you may have more questions like, 'What happened with that thing? Did they ever catch the guy?'"* Her statement suggests that the online information affected the questions that residents asked. Another resident in Community 2 said that what he read on the community email list or discussion board *"has driven questions I might ask [at the community-police meetings] about general stuff in the neighborhood."* Similarly, a community facilitator from Community 5 agreed that the technology leads to more "community-driven" discussions, saying, *"They get all this information [online] and then they want to talk about it at the meeting."* His statement referred to those who asked the police at the community-police meetings about incidents that they heard about online.

At times, the person who posted the message online raises the topic at the meeting. The community facilitator from Community 1 said, *"Sometimes it's the people that sent the original [online message] that bring it up to make sure that it actually was recognized and that may be some preliminary work had been done [by the police] and [they] might have an answer."* Thus, people sometimes discuss their concerns online but then follow up their comments by coming to the

meetings to seek answers from the police. Another male from Community 1 agreed, saying,*"At most of our beat meetings, we usually have a collection of things that come in over the websites that may or may not have been part of the information collected by the police [..] There are things that happen, which we don't know if the cops know about or not. But [community facilitators] will discuss it or it will be brought up by the people [at the meetings]."* These statements suggest that the citizens questioned the police about issues and concerns discussed online.

In the two communities that did not have a strong online presence (Communities 3 and 4), citizens discussed issues that they witnessed in-person (e.g., "I heard gunshots last Sunday") or that they heard about via word-of-mouth. Also, more meeting time was spent on the police-led agenda. With most community-police meetings lasting one hour, an average of 35 minutes were spent on police agenda items in the communities that did not use community-based ICTs while only an average of 20 minutes were spent in the communities with the community-based ICTs. The online discussions seemed to provide people with a vast amount of information about what was happening, which became a focal point during the community-police meetings.

Furthermore, some felt that by receiving information about the previous meeting (through the meeting minutes), they were able to more confidently request information from the police and city services about their actions. One woman from Community 5 explained, *"[the moderator] goes and gets those ordinances and [..] when you come back to the next [meeting], you can say 'Well, the city says such and such a thing, but this isn't happening. The police is supposed do such and such thing, but this isn't happening.'"* This woman felt that the emails allowed citizens to hold the police more accountable for their actions. We observed citizens holding the police accountable most often in Community 5, where citizens reported having the least trust for the police and satisfaction with the community-police meetings in comparison to the other communities.

Four interviewees (two each from Communities 1 and 2) felt that the police were more prepared to answer residents' questions at the community-police meetings as a result of the community-based crime prevention ICTs. One man from Community 1 said, *"It used to seem to me that when I would go to the [community-police] meetings that [a police officer] was monitoring [..] the [community discussion] site, because things that we would post on there [..] would be discussed in the meetings [..] The police, then I think, were more prepared for what was, you know, going to be discussed or what people were kind of up in arms about or concerned about."* Though the police never responded online, Community 2's police sergeant said she did regularly check the community message boards but did not respond because of liability concerns from police headquarters.

Overall, most residents felt that the online communication improved the community-police meetings. One man from Community 2 reflected on times before the community-based online discussions were created: *"[The meetings] are a lot better now than it used to be. Everyone knows more. Everyone has more information to everything now and we're all connected a lot tighter than we used to be. Yeah, I mean [the community email list] was really grassroots when we started. We didn't have cell phones. Imagine that? We couldn't even talk to each other. Most, not even just some, most people didn't even have email. They didn't have computers. They weren't online. So there was none of that communication going on [..] So it was a lot harder to communicate."* This suggests that community-based ICTs can be beneficial to local in-person meetings.

DISCUSSION

Towards understanding the influence of community-based ICTs on in-person behavior, this section describes 1) the importance of topic and source, 2) the ICTs' role as supplements to in-person interactions, and 3) the drawbacks of online communication.

Topic and Source Matter

The topic of crime and safety is important as evidenced by the amount of attention it has received in HCI [3, 4, 16, 30, 51]. Given that discussing crime elicits emotions such as fear, anxiety, and anger [18, 29, 50], the topic itself may induce behavior change. Most people instinctively avoid hurt or harm; therefore, discussions about crime may lead to natural reactions of internalizing others' experiences in order to avoid victimization. Community-based ICTs targeted at other social issues (e.g., health, sustainability) may elicit different in-person responses. The differences in emotional responses to these topics should be further explored, as they may trigger in-person behavior changes. By understanding the emotions tied to other topics, systems may be designed to more effectively encourage civic engagement.

Similarly, results suggest that the source of information may be important in influencing behavior. In our study, residents stated that they were influenced by comments from people who resided in the same area. Thus, the geographical proximity, or physical closeness, may be important in influencing behavior change. Also, a community-based ICT may prompt a different response than a government or privately funded ICT. For example, residents may be more likely to trust information coming from a neighbor who lives a few doors away than statistics from the police. Furthermore, online comments from the neighbor a few doors down who experienced a break in may elicit empathy and self-reflection (i.e., if it happened to them, it could happen to me). This aligns with prior studies that suggest the importance of trust when designing community ICTs for crime prevention [3, 5]. Thus, avenues for future exploration include investigating the effects of the origin of information on offline behavior and the impact that trust has on information sharing and receiving. Additionally, by exploring questions like "Should community-based ICTs be designed for a select few blocks or a larger area?," we can begin to understand the potency of proximity on issues like trust. Also, researchers could examine how online communication affects the behavior of indirect stakeholders, which are those whom the technologies were not designed for (e.g., potential offenders). While preliminary work suggests that

burglars rarely use online tools to determine if they will commit a burglary [16], we should continue to explore the consequences of using community-based crime prevention technology by various users (e.g., citizens, potential offenders, city officials).

ICTs Are Supplements, Not Replacements

During this study, we witnessed the complex relationship between in-person community meetings and online communication. Our results suggest that the two are very much intertwined where residents gained information from online discussions and shared it during the meetings (and vice versa). This demonstrates the importance of the in-person meetings as well as the ability for residents to communicate online, which can increase social capital and collective efficacy [25]. Such issues are particularly important in low income communities that tend to have higher crime rates and less collective efficacy [33]. Kavanaugh et al. [25] suggest that communities plagued with less education (typically low socioeconomic communities) may not experience the benefits of community-based ICTs such as social capital and collective action. However, by designing community-based ICTs that allow residents in low income areas to have positive interactions with city officials, social capital and collective efficacy may increase, leading to more collective action.

> "Populations with low socioeconomic status can develop higher levels of efficacy through positive experiences and reinforcement. These positive experiences tend to be external, such as local government's concern and active recruitment of feedback and from underrepresented groups over sustained periods of time...While such responses from community organizations tend to be the exception rather than the rule, they are demonstrated to be effective in raising collective efficacy and fostering optimism in targeted populations" [25].

We observed residents in Community 5, a low income community, hold the police and other city officials accountable, such that the police began asking for residents' input in identifying and solving local problems. This suggests an opportunity for technologists to design experiences, rather than features aimed at increasing collective action online. Our study is an example of how technologies can supplement established in-person meetings, not replace them. Future work could explore if this is a possibility and how we can begin to design technologies that support positive in-person interactions at in-person meetings.

Concerns About Online Communication Regarding Crime

While there are benefits of online communication amongst residents, there are also concerns such as increased fear and negative stereotyping. Residents may feel increased fear and anxiety as a result of reading about neighbors being victimized. Fear caused by online communication is concerning because some react individually to feelings of fear and anxiety by trying to protect themselves using tactics that cause isolation (e.g., not going out, buying guns and locks) [9]. Individual responses to crime ultimately increase fear and distrust [9] and decrease feelings of community and safety [42]. This leads to additional questions about technology design, specifically how to support discussion while also limiting exposure to information that users are uncomfortable with receiving.

Online communication could also lead to stereotyping or having biases towards certain people based on their outward appearance. In our study, residents reported that online communication influenced their interaction with strangers. Future research could begin to unpack how online conversations influence perceptions of others, positively or negatively. For example, all three of the communities that heavily used technology posted pictures of alleged offenders. Of the photos posted, over 90% were of black males. Community 1 sent out the most pictures (over 100 photos on the site), and Community 2 sent out significantly less (roughly 30). Community 5 sent out less than 10 photos, all within local newspaper articles. For Community 1, which is a less racially diverse community, online communication could perpetuate the stereotype that black males are criminals, leading to racial profiling. These photos are an example how the technology may assist citizens in redefining the community's "norms" of outsiders.

Potential negative consequences, such as racial profiling, underscores the importance of design implications that address issues such as group think and stereotyping. Designing more democratic online systems (e.g., people vote on inflammatory remarks anonymously) may result in more users feeling comfortable enough to share their diverging opinions online, which could alter the formation of negative "norms." Moreover, a democratic system may help reduce marginalizing a large group of people who may not have Internet access. Future work should consider those who do not use the community-based ICTs and the effect that online norms (which may differ from a community's in-person social norms) has on non-users. Designing community-based ICTs that do not marginalize those that lack online access or people who are viewed as "undesirable" (e.g., technologies that avoid an 'us' versus 'them' situation in gentrifying neighborhoods) can lead to more effective and inclusive design solutions that encourage building relationships and social capital in neighborhoods.

LIMITATIONS

There are limitations to this study. First, residents self-reported behavior change during the interviews after reflection. Self-reported behavior change may not be as accurate as observed behavior change. Assuming that there was indeed a change in behavior, it may be caused by a combination of receiving online information as well as attending community-police meetings, news media, and/or even word-of-mouth communication. We acknowledge that both of these issues are concerns based on self-reported data. Future work has an opportunity to address such concerns by conducting a study that extends beyond self-reports.

Second, this paper specifically focuses on digital communication about crime, which may have a major effect on the type and rate at which behavior change occurs. Online conversations with neighbors about other topics may have a very different outcome. Similarly, conversations amongst residents at different geographic levels (e.g., block, beat, ward, city) may have very different effects on in-person and online behavior. We used beats, because it aligned with how residents set up their online communication tools and with the community-

police meetings in Chicago, but this may differ in other cities. In addition, the type of people interviewed were those who purposefully signed up for digital communication related to local crime. This raises questions for future exploration regarding those who are not so civically engaged and what effect (if any) would online conversations with neighbors have on their in-person behavior.

Lastly, though more than half of our observations of topics emerging from online conversation were blatantly stated, some were inferences that were made (i.e., We compared the online data to the topics from the community-police meetings). Such an assertion may negatively affect the data analysis. These limitations are opportunities for future studies to conduct a more controlled study to understand the extent to which online communication influences behavior at the community-police meetings.

CONCLUSION

In this paper, we describe how online conversations about crime amongst local residents impact offline behavior. Interviewees reported that online communication influences their behavior to avoid victimization and the interactions that happen during in-person community meetings. Community-based technologies aimed at addressing local social issues should be designed to support online discussions and lead to positive experiences during in-person meetings with city officials.

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