Protecting the Home: Exploring the Roles of Technology and Citizen Activism from a Burglar's Perspective

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ABSTRACT

For decades, HCI scholars have designed technology for the domestic space. Many of these systems aim to protect the home and its residents by requesting help from local authorities during emergency situations. While the use of these systems have been examined, few studies attempt to understand the behavior of potential offenders who can create such emergency situations (e.g., by attempting a burglary). This paper analyzes three panel sessions with 15 people who have been convicted of burglarizing homes, cars, and/or businesses. Participants describe in detail what they looked for when deciding to burglarize a home and what deterred them. Technologies such as security systems, alarms, and cameras do not dissuade burglars. Instead, evidence of neighborhood cohesion was named the strongest deterrent. This paper presents implications for designing technologies that will effectively discourage burglary and support citizen activism.

Author Keywords

crime prevention technology; burglary; domestic space

ACM Classification Keywords

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

INTRODUCTION

The home is not only a place of residence, but also a place of refuge. It is in the home, or the domestic environment, that people create memories with family and friends, store their most sentimental items, and spend a significant amount of time. The domestic environment can be a place to escape the stresses of daily life [31]. Thus, when an unwanted (and many times unknown) intruder unlawfully enters the domestic space, it can have a traumatic effect on victims' financial and mental well-beings [16, 26].

Burglary is a major concern since the majority of serious crimes (i.e., felonies that result in the longest minimum sentences) reported are non-violent thefts of personal property. In 2010, victims of burglaries in the US loss over $4.6 billion, with an average burglary resulting in a loss of over $2000 [16]. Despite a constant decline in crime over the years, burglary remains the second most reported serious crime (behind larceny-theft) [16]. Moreover, these are low estimates considering that at least half of burglaries in the US are not officially reported [42].

Not only does burglary cause a massive amount of financial loss, there are also serious psychological consequences. Long after a burglary occurs, victims experience an increased fear of being burglarized again [34] and are afraid of being home alone [54]. Others have found that victims feel an increased amount of stress because of the fear and anxiety caused by burglary [27]. Researchers have found that long term effects of burglary are uneasiness and insecurity as a result of constantly thinking about the event [26]. Many times there are negative effects to personal relationships, because victims begin to suspect acquaintances of being involved [26].

Though much research in human computer interaction (HCI) focuses on designing technology for the domestic space [21, 23, 48, 53], few studies consider the domestic space a defensible area that should be protected from unwanted physical intrusion. The majority of research on the domestic space focuses on understanding residents' habits [2, 11, 33] and how the technology may affect their behavior or routines [1, 9, 18]. But little is known about how technology protects the domestic space and its impact on potential intruders. Furthermore, much of the technology that is built for the domestic space is meant to help catch culprits after they have committed an offense, not to prevent or discourage an offense from occurring. This study takes a nuanced approach at exploring this topic by asking the research questions: *What dissuades potential offenders from breaking into a home? How can we incorporate such features into technology?* The objective of this study is to identify what burglars look for prior to breaking into homes and to examine the role of technology in deterring burglars.

This paper describes how intruders view technology and other deterrents that are designed to protect the domestic space. In three panel sessions, 15 participants, all convicted of burglary, were asked to describe 1) the factors that influenced their decisions to burglarize one home over another and 2) their perception of crime prevention technologies. The analysis indicates that perception of high community cohesion is the most effective deterrent for burglars and that technologies used to

CHI 2013, April 27–May 2, 2013, Paris, France.

traditionally protect the home (e.g., security alarm systems, cameras) are not major deterrents. Results suggest that when designing and building technology for crime prevention in the domestic space, there should be considerations for features that enhance perceptions of neighborhood cohesion and facilitate in-person citizen activism and engagement.

This work makes several contributions to the HCI community. First, this paper contributes to the growing interest in crime prevention technologies by providing a unique perspective into how potential offenders view technology whereas previous crime prevention literature focused on potential victims [3, 25] or the police [52] as the users. Furthermore, this paper provides guidelines and principles to consider when designing technologies to protect the domestic space. Specifically, I extend previous HCI literature on understanding and designing technologies for the domestic space [23]. Lastly, I describe the role of citizen activism in crime prevention. This builds on prior citizen activism work, which has focused on the environment [14], health [30], and social movements [22, 32, 36].

BACKGROUND

In this paper, I refer to burglary as defined by the US Federal Bureau of Investigation (FBI): "the unlawful entry into a structure to commit a felony or theft, including forcible entry, unlawful entry where no force is used, and attempted forcible entry" [16]. Though a structure could refer to a house, car, business, school, etc., this study focuses particularly on the home. I specifically use the term burglary, not robbery, because robbery refers to the "taking or attempting to take anything of value from the care, custody, or control of a person or persons by force or threat of force or violence and/or by putting the victim in fear" [16]. Thus, the major difference is that during a robbery, the victim is present and is in physical danger; during a burglary, the victim is not present.

Understanding Burglary

Understanding burglary, specifically in the domestic setting, has been a topic of much interest in criminology, urban development, and economics. Much of the literature on burglary uses quantitative methods to understand the conditions under which burglary is most likely to occur. Chiu and Madden, for example, use statistical modeling to study the effects of income distribution on burglary and found that neighborhoods with higher income inequality reported a higher number of burglaries [10]. Results from Tilly et al. suggest that providing the economically disadvantaged with more technology to secure their homes may decrease burglaries, especially in poorer neighborhoods [51]. Other statistical models suggest that the design of the urban environment (e.g., the homes, streets, alleys) predicts burglary rates [7]. These studies attempt to predict factors surrounding burglary using quantitative data; however, it is very difficult to determine the exact cause of crime using statistics alone [44]. Diverging from the literature, this study uses a qualitative approach to examine the topic. I directly ask convicted burglars to describe their rationale for breaking into one home as opposed to another and about their perceptions of various technological deterrents.

Protecting the Domestic Space

Technologies designed to protect the home can be roughly divided into two different types: reactive and preventive [28, 35]. Reactive technologies help the police find those responsible after a burglary has been committed; preventive, on the other hand, deters burglars from attempting a break-in.

The majority of crime prevention technologies are designed to be reactive (i.e., to catch perpetrators after they have engaged in criminal activity). One of the most common reactive technologies used in the home are security systems. In 2009, US homeowners spent $28.2 billion on home security systems [40]. Although home security systems have been found to be effective in increasing feelings of safety [41], no evidence suggests that they actually deter or prevent burglaries. Furthermore, security systems are typically designed to alert the police after the home has been burglarized. Though an intruder may be caught because of the home security system, victims are still very much affected by attempted break-ins and may have increased feelings of anxiety, worry, and fear [26]. Another technology that is frequently used are cameras. Citizens sometimes mount cameras on the inside and outside of their homes. Sometimes the cameras can be remotely accessed by the homeowner or the police using a static IP address. Like alarm systems, cameras typically assist the police apprehend perpetrators who have already engaged in a criminal act. Even then, cameras can be ineffective if the offender cannot be identified because of quality, light, or disguises [5].

Technologies that are considered to be preventive (i.e., that effectively deter burglars) are typically not intentionally designed for that purpose. Owners of home and car security systems, for example, will sometimes post signs and stickers as evidence that there is a security system present with the hope of deterring burglars. Similarly, cameras are sometimes viewed as preventive. Based on crime statistics, Neito's work suggests that police cameras that are mounted on high crime corners decrease crime, because potential offenders are afraid of being caught [29]. However, there are other studies that dispute such findings [6, 15]. Though crime prevention technologies are of interest to scholars, no one has examined the degree to which technology affects burglars' practices. This study addresses this gap by identifying what actually dissuades burglars from breaking into a home.

Crime Prevention in HCI

There has been increased interest in designing technology to address crime in HCI [3, 12, 25, 39]. Most of this research focuses on preventing face-to-face crime and increasing feelings of safety. For example, Blom et al. created ComfortZone, a shared mapping system that allows individuals to tag different locations in a city to indicate areas where they do not feel safe [3]. Others have created handheld personal devices with the purpose of individual safety [4, 39]. Wolfer et al. explored how mobile phones can improve safety amongst homeless youth [55]. This paper differs in that it focuses on non-confrontational crime, which occurs significantly more often than confrontational (i.e., face-to-face) crime [16] but can have similar detrimental effects [26, 42]. Furthermore, prior work focuses on the individual as the user as opposed to this study, which focuses on the potential offender.

Other HCI literature about crime prevention focuses on the police as the user. COPLINK manages crime statistics to improve the effectiveness of the police [8]. Tullio et al. [52] examined the benefits and challenges of police departments using video surveillance in their policing efforts. Yet, this study differs in that it is the first to ask past offenders about their view of crime prevention technology. The objective is to better inform technology design that will proactively prevent crime, not reactively assist the police in identifying culprits. Furthermore, this paper addresses a gap in the domestic environment literature by regarding physical intrusion of the domestic space as a major violation and by suggesting opportunities to design effective technologies that protect the home.

METHODS

This work is a part of a three-year study exploring how various communities in a large midwest city in the US use technology to address crime. During this study, I observed community-police meetings in five neighborhoods that vary in regard to race, socio-economic status, and crime rate. This paper focuses on three of those community-police meetings, where I not only observed but also asked questions during panel sessions with convicted offenders. The panel sessions were co-organized by local community groups and a non-profit organization that aims to reduce recidivism. The panel sessions were open to anyone in the community to attend. Although I did not arrange the panel sessions, the organizers, panel participants, and community members who attended were familiar with the study and aware that I was a researcher taking notes. At the time of the first panel session, I had been actively working in the communities for six months and was familiar with many of the residents who attended. The panel sessions provided a unique opportunity to engage with former burglars, as it is very difficult for researchers to access those convicted of a crime due to special population restrictions set by Institutional Review Boards (IRB) in the US.

There were three panel sessions with a total of 16 participants, i.e., 6, 6, and 4 participants, respectively. The panel sessions were held roughly four months apart in different areas of the city. Each panelist participated in only one session. The following sections describe the participants, the structure of the panel sessions, and the analysis.

Participants

Fifteen out of sixteen participants had been convicted of burglarizing homes, businesses, and/or automobiles. The remaining participant was convicted of identity theft; however, he stated that the personal information used to commit identity theft was obtained from homes and cars that had been burglarized. In this paper, I refer mainly to the 15 participants that had been convicted of burglary. Each participant stated that they had committed at least 30 burglaries prior to being caught. All participants were nearing the end of their sentences, and none had been convicted of a crime in two years.

All participants were male, which may be expected since over 84% of arrested burglary offenders are male [17]. Thirteen of the sixteen participants were convicted of residential burglary, which accurately reflects the fact that 74% of reported burglaries in the US were residential [16]. Participants' ages ranged from 20 to 50. Sentences ranged from 4 up to 21 years. Table 1 provides a full list of the participants' ages, convictions, length of sentences, and how they were caught.

Participants had served time in a formal prison facility and were completing the remaining portion of their sentence in a rehabilitation center, which allowed them to work outside of the prison system. Despite their freedom to interact in society, participants remained wards of the state. There were restrictions on where they were allowed to travel and when they had to return to the rehabilitation center. Since their convictions, the majority of the participants were either taking courses at a community college or in an apprenticeship program where they will receive a trade certificate upon completion. All had been through or were currently in counseling services for any addictions they may have had. Participants were subject to random drug tests while living at the rehabilitation center.

Participants were invited by the non-profit organization that runs the rehabilitation center to attend a meeting, where they would provide suggestions to community residents about how to better protect their homes. Participants were told that they would be asked a series of questions about methods they used to burglarize homes and/or vehicles. Participation was strictly voluntary. Participants were not monetarily compensated, nor did they receive community service hours for their participation. Also, participants were not eligible for sentence reductions because of their participation in the panel, and none had cases pending against them. None of the participants were convicted of crimes that involved physical assault. Furthermore, most openly stated that they avoided face-to-face crimes (i.e., where the victim is present) for multiple reasons including that it is not in their personality to physically hurt anyone, that they did not like confrontation, and that they just wanted to *"make money"* but face-to-face crime was not worth the risk of a lengthy sentence.

Panel Sessions

Acting as the panel moderator, an off-duty police sergeant asked participants a list of questions. The sergeant worked with the non-profit that aimed to rehabilitate convicted offenders so participants had interacted with the sergeant for at least three months prior to the panel session. The sergeant's presence was also necessary, because participants were required to be escorted by an officer when traveling to a location other than work or the rehabilitation center.

The panel sessions began by participants giving their names, convicted crime, and number of years sentenced. Participants were then asked questions about the methods that they used to conduct burglary. They were asked about the type of neighborhood they preferred, whether or not they did surveillance or used disguises, whether they worked in a team, their preferred point of entry, how they searched the home, and anticipated completion time. They were then asked if various technologies were deterrents. Participants were asked specifically about security systems, cameras, and social networking websites. They were also asked about non-technological pre-

Participant ID	Age	Type of Burglary	Jail Sentence (in years)	How They Were Caught
P1	30	Vehicular	4	Concerned citizens
P2	43	Commercial	6	Selling the stolen items
P3	27	Residential	4	Concerned citizens
P4	25	Residential/Vehicular	5	From camera footage
P5	46	Residential	8.5	Concerned citizens
P6	41	Residential	6	Concerned citizens
P7	26	Residential	4	Concerned citizens
P8	35	Residential	6	Police tactical team operation on burglary
P9	20	Residential/Commercial	3	Concerned citizens
P10	50	Residential	7.5	Caught burglarizing a train
P11	23	Residential	5	Concerned citizens
P12	49	Residential	21	Accomplice gave his name to the police
P13	40	Identity Theft	7	Caught driving under the influence of alcohol (DUI)
P14	25	Residential	4	Police tactical team operation on burglary
P15	28	Residential	8	Concerned citizens
P16	40	Residential	6	Concerned citizens

Table 1. This table contains information about each participant including their age, the type of burglary conviction, total jail sentence, and the reason he was caught.

ventive measures such as dogs, fences, and special locks on doors. Finally, they were asked to describe their number one deterrent and how they were caught.

Participants were not asked to disclose specific information (e.g., names, locations) about previous crimes they may have committed; however, all seemed to refer to their previous criminal activity as opposed to what they heard or observed others doing. All participants were given the opportunity to answer each question but could choose to pass if they did not want to answer a question. I asked follow-up questions to clarify responses or to get more details.

There were roughly 40 community members present at each panel session. Community residents were allowed to ask additional questions outside of those asked by the sergeant. Residents typically asked the participants more specific questions about how to protect their homes and garages. Residents also thanked participants for coming and sharing their experiences. After each panel session, participants and community members had the opportunity to meet and talk face-to-face. On average, the sessions lasted 1.5 hours.

Analysis

For anonymity and protection of the participants, none of the panel sessions were audio or video recorded. However, I took detailed notes of the questions and responses. As a precaution, the notes were inspected once again for anonymity, removing all references to city, location of the crime, (e.g., specific neighborhoods), and names of accomplices. There were only three instances that required removal of such references.

Notes from the panel sessions were analyzed using an inductive thematic approach that uses aspects of grounded theory [49]. Each line of each observation was read to identify emerging or repetitive phenomena. During this phase, the notes were iteratively analyzed, and codes were generated and refined. The codes were then grouped into similar concepts. There were 26 codes during the initial phase of analysis that were then grouped into 6 concepts. Examples of codes that emerged are successful deterrents, profits, remorse, and neighborhood characteristics. Examples of concepts are deterrents, motivations, and advice. After no new codes or concepts were derived, the concepts were then grouped into higher-level categories.

The overarching theme most prevalent was risk assessment. When asked about deterrents, participants perceived deterrents as changing their risk of being caught and based on their assessment, they decided whether or not to burglarize a home or vehicle. This is consistent with victimization theory, which suggests that potential offenders assess the risk of being caught, and this in turn, affects whether or not he or she commits a crime [24]. Therefore, the findings in this paper describe how deterrents relate to risk assessment.

The next section presents stories and quotes that illustrate themes that repeatedly emerged during the panel sessions. The quotes are verbatim, with little alteration except to protect the anonymity of the participants and victims.

RESULTS

Consistent with prior research [24], participants described their views of deterrents relative to risk assessment. Specifically, participants described neighborhood cohesion as the most effective deterrent against burglary. They perceived cameras, alarms, and dogs to be low risk. Surprisingly, participants viewed privacy fences and cats as beneficial (i.e., participants thought they decreased the risk of being caught). In the following sections, I describe the burglary process and how participants view deterrents as they relate to risk of being caught.

The Process of Burglary

During the panel sessions, participants were first asked to explain how they committed burglaries. They first chose the

ideal neighborhood. Fourteen of the fifteen participants convicted of burglary said that they preferred quiet neighborhoods. P11 said *"I liked upscale, quiet suburban neighborhoods."* P14 said that he targeted *"suburbs because of the privacy"* that he felt he had. Although not all participants preferred the suburbs, there was a general preference for quiet streets and neighborhoods. For others, socio-economic status was most important. P15, for example, said he preferred, *"middle and upper class neighborhoods,"* because he believed that there were at least some valuables at home and that most residents will be away from home (i.e., at work) for a predictable period of time. The only participant who did not prefer quiet neighborhoods was P2, because he burglarized businesses so he targeted industrial districts.

Thirteen participants then said that they would observe the neighborhood to select the ideal home to target. Eleven used disguises to move about the neighborhood when doing their surveillance. For example, P5, who targeted homes, said, *"I would just want to go see what people were doing. I would dress up as a service provider for the [local newspaper] and would ask people if they would like a subscription for the [newspaper]."* Similarly, P6, who preferred to break into garages, stated, *"I would get up early and shovel snow and rake leaves. I'd be the neighborhood handyman. I would tell people in the neighborhood that I'd like to help out. They would allow me to do it many times. Early in the morning, I'd look in people's garages and see what they were driving and what was in there to see what I could get."* Others said they would dress up as electricians, handymen, construction workers, and even a businessman. P15 was the only person to say that he used technology to help him survey the neighborhood, saying, *"Google Earth was a tool I used because I could see your windows and your neighborhood."* P15 focused on the windows, because he wanted to find a good entry point when breaking into a home. Those who did not use disguises said they either did not need to because they fit into the neighborhood or because they would sit in a car to observe the area. In one instance, P11 did not wear a disguise but said, *"I'd walk around and pass out flyers that I would pick up at restaurants."*

Only P15 said he used social networking websites to determine if people were home or not. He stated that he would sometimes personally know the potential victims. He would look at their social networking status to determine if they were home, out of town, at work, etc. before proceeding with the burglary. He said, *"People will post it publicly that they are leaving out of town."* He also said he liked when people used applications on their phones that would automatically update their location (e.g., home, school, gym). Though I did not ask participants about their education level or experience with technology, it was apparent that P15 was very technology savvy, which was not as evident of other participants.

After selecting a home, participants would normally decide if they were going to commit the burglary alone or not. Thirteen preferred to burglarize alone. Most participants believed that acting alone diminished the risk of being caught. For example, P1, who preferred to break into automobiles, said, *"I worked alone because I didn't want to be suspicious."* This is an example of a participant being cautious of his behavior to avoid being noticed by community residents before or after the burglary. He believed that working with someone else may draw attention to himself and increase his risk of being caught. Others wanted to maximize their profits by working alone. P2, who preferred to break into businesses, said, *"I worked alone because I wanted the money and I didn't want no one else to get me caught."* P3 agreed saying, *"I worked alone cause I was greedy and wanted the money."* Those who worked with others said they usually only hired drivers because they did not want to share the profits.

Next, they would select a point of entry, which was usually a side door or window. However, P9 said, *"I'd just kick in the front door"* of a single family home, especially when he was not concerned about witnesses. Participants said they would typically search in the bedrooms (closets, trunks, safes). Also, a few said they would look in the kitchen for checks and pre-approved credit cards. P15's strategy was more targeted. His search for valuables would depend on the victims, because he would typically burglarize homes of those with whom he was very familiar. He said, *"I would learn the family and figure out where they hide things."* On average, participants said they would complete the entire burglary within 8 minutes. Those who preferred vehicles said they would complete a vehicle burglary in less than two minutes. After the burglary, everyone said that they would either sell the items on the streets or use a *"fenceman,"* a middleman who buys the stolen items "wholesale" from burglars and later sells the items for a higher price.

High Risk Deterrents: Neighborhood Cohesion

Though they were not specifically asked about it, participants identified neighborhood cohesion as the primary factor that deterred them from breaking into a home, business, or automobile. All participants stated that the number one reason why they would not break into a home was *"nosey neighbors."* They defined nosey neighbors as neighbors who talk to each other, ask how the participants are doing, or ask if the participants need help because they haven't seen them before. P14 said that areas with nosey neighbors are areas with *"people looking out windows, people on the street talking to each other, people walking by and speaking to each other."* While these may seem to be simple tasks, participants who did surveillance said that their risk of being caught increases if they can be identified by a neighbor, which is much more likely to happen if neighbors know each other and talk in-person. P8, for example, said, *"when someone from the community stared at me,"* he left because he felt the neighborhood was not one where he went unnoticed. Similarly, P12 said he didn't like *"active neighborhoods because I wasn't trying to work too hard."* This demonstrates how simply looking at or speaking to burglars can dissuade them from proceeding with a burglary.

Similarly, others contrasted cohesive neighborhoods with the types of neighborhoods that they preferred. P5 said, *"I looked for areas where people didn't speak or people that were walking would just be on the phone and didn't talk to each other.*

Everyone is minding their business." In this case, the participant describes the type of behavior that he preferred amongst residents in a neighborhood as he was doing surveillance before a burglary. He later said that if neighbors did talk to each other and seem cohesive, he would leave and go to another neighborhood. P1 agreed, saying that he preferred areas *"where neighbors don't communicate and don't call the police."* These types of communities were targeted not based on what was actually happening but rather what was perceived during surveillance. Though neighbors may communicate online or talk on the phone to each other, that type of communication may not be obvious to burglars who look for face-to-face interactions amongst neighbors.

Low Risk Deterrents: Alarms, Cameras, and Dogs

Participants overwhelmingly viewed security systems, cameras, and dogs as low risk deterrents, meaning that the vast majority of participants said that they would continue to attempt a burglary after seeing these types of deterrents.

Twelve out of fifteen participants stated that alarm systems would not deter them from breaking into a home, vehicle, or business. Participants cited slow police response times, lack of functionality, and an adrenaline rush as reasons why alarms are not a deterrent. P2, who preferred to break into businesses, said that alarms were not a problem *"in a place of business because the alarm company calls in three minutes or so but by that time, I'd have many things and then I'm gone."* P12, a former residential burglar, said, *"I have never intentionally gone into a place with an alarm but I know that they have a 4 to 10 minute response time so I wouldn't run if it went off. I'd just be quicker."* P14 agreed saying, *"I know I have a couple minutes before the police arrive cause alarm companies have to make two calls."* Home security systems typically respond to an alarm by first calling the homeowner, an emergency contact (if the homeowner does not answer), and then the police. P9 learned how alarms worked from a friend, saying *"I had a buddy who worked for [an alarm company] that told me how it worked."* Burglars are aware of the slow response time and can use it to their advantage.

Others said they knew that alarms may or may not be connected. For example, when asked if he would burglarize a home if he knew it had an alarm, P7 said, *"Maybe. [Alarm company] signs are out front but that doesn't mean [the alarm] is connected."* He continues to say that if they are not connected, *'Whose around [to hear the alarm]? There is typically no one around. I've done it many times."* Similarly, P1 said, *"I do cars so they never stop me. I just don't open the door handles to the cars."* Most car alarm systems will not sound unless a door is opened; thus, P1 indicates his knowledge of how car alarms operate and how he worked around them.

Though a burglar may be aware of a security system, that factor alone may not deter them but instead encourage them. In fact, at least three participants said they preferred homes with alarms, because they liked the *"rush."* P10 said, *"I loved it. It was a challenge."* He also said that at that time in his life he was engaged in substance abuse and that he viewed burglary as another type of *"high."*

Only two participants said they were deterred by cameras. The other thirteen participants stated that cameras did not concern them because they believed that most cameras were not constantly monitored, especially police cameras. Although a camera played a role in one participant's capture (P4), others believed that most cameras did not have a high enough resolution for them to be identified. P12 was the only one to describe how he disabled cameras, saying *"I know how to disable [cameras]. I'd spray it and stand on the garbage and go through the window."* Former burglars generally thought cameras did not increase their risk of being caught, which is consistent with prior work [15].

Ten of the fifteen participants stated that dogs were not a deterrent. Most stated that they had methods of *"getting rid of"* or quieting dogs. P6, who has a fear of dogs, described the first time he unlawfully entered a home with a large dog that seemed threatening saying, *"Once I was with my man and he just fed the dog some meat and it was fine. I went the other way while the dog was distracted."* In this case, P6 was still able to enter the home despite his fear of dogs and after that, he said he used the same tactic in later offenses. Participants also stated that if they were concerned about a particular dog, they would just change their point of entry based on the dog's position. P5, who was convicted of residential burglary, said, *"Dogs in the yard are fine because I can get around them and just go through another way."* Similarly P14 stated, *"[Dogs] are typically friendly and I know how to outsmart mean dogs."*

The most common reason that the 10 participants were not deterred by dogs was because they believed that most dogs are not trained to protect the home. P15, for instance, declared, *"Most dogs aren't trained to protect the home so I can do what I want."* P12 said, *"I was raised with dogs so its not a problem unless the dog is trained."* Participants referred to *"trained dogs"* as those that are professionally trained to protect the domestic space by allowing strangers on the premises but not allowing them to leave until the owner gives the dog permission [50]. This type of training can be very expensive.

The other five participants who viewed dogs as a deterrent either burglarized cars or cited that dogs made too much noise. P4 said, *"Once I found a dog in the car and that caused all types of problems so yes, [dogs] are a problem."* This participant reflects on a negative experience with a dog when burglarizing a car, which does not have many points of entry. He later said that the dog's barking drew attention to him. P16, who burglarized garages at night, said, *"[Dogs] make too much noise. They draw too many nosey neighbors."* Although the physical threat of dogs did not seem to be an issue, the attention drawn by barking dogs was a deterrent for a third of the participants. Again, participants were most concerned with neighbors who may notice something suspicious and call the police.

"Beneficial" Deterrents: Privacy Fences and Cats

When asked about physical deterrents like fences that homeowners often use for privacy and protection from intrusion, participants identified fences as beneficial (i.e., aiding them in not being caught). All participants said that they preferred

homes with fences, because it provided them with the privacy that they needed to diminish the risk of being caught. P11 said, *"I'd rather not do it without a fence because it provides more privacy."* Participants mentioned that they would easily overcome a fence. *"I know how to leap and jump so [fences] are not a problem for me"* (P6). P4 mentioned that fences were not a problem *"as long as there isn't barbwire at the top."* In addition to providing privacy, at least two of the participants said that fences helped them with dogs who may try to protect the home. P7 said, *"I like them because they give me an area to lock the dogs in."* Participants viewed fences as beneficial, because it helped with privacy and dogs.

When asked if there were other things that aided them, two participants mentioned (while others agreed) that cats were helpful in finding out if someone was home. P12 said he would check to see if there was a cat sitting in the window, and if so, he would assume that no one was home. Others agreed with him, stating cat and doggy doors were also helpful when entering the home, especially those programmed to open when the pet's collar is near.

DISCUSSION

Participants overwhelmingly stated that they targeted homes and neighborhoods where they perceived less cohesion amongst residents. Thus, neighborhood cohesion is an extremely effective deterrent to burglary, even more so than crime prevention technologies. But what is the relationship between neighborhood cohesion and citizen activism? In crime prevention literature, citizen activism is when residents actively seek to improve neighborhood conditions by engaging with others and participating in local initiatives [38, 43]. Citizen activism can strengthen neighborhood cohesion, decrease fear of crime amongst residents, and lessen neighborhood disorder [43]. Citizen activism takes various forms including building personal relationships with neighbors. I argue that technology can help facilitate citizen activism, leading to increased neighborhood cohesion.

Traditional HCI research on citizen activism has focused on health [30], sustainability [14], and social change [22, 32, 47]. This study extends the literature by identifying the importance of citizen activism in crime prevention, specifically to protect the domestic space. The results suggest that burglary prevention technology should not only protect a physical area (e.g., a house), but also facilitate in-person activism. Technology that aims to address local issues should support collective action as opposed to being individualistic in nature.

The following sections describe the relationship between digitally-enabled activism and crime prevention and how results from this study translate to designing effective technology to protect the home.

Digitally-Enabled Activism and Crime Prevention

There are many instances in which digitally-enabled activism has supported local change by informing, organizing, and mobilizing groups of people who may not otherwise have had an opportunity to participate in such movements [22, 47]. In crime prevention, citizen activism typically operates at the local level, where residents engage in crime prevention strategies that will foster change on their block [45, 46]. Thus, it is essential that we, as HCI researchers, not only consider technology that supports activism at the higher-level (e.g., reducing crime in the city), but also at the local level (e.g., stopping burglaries on *my* street).

Prior work found that community residents appropriated online tools to discuss local crime [25]. Such tools facilitated cohesion and online communication, which may be viewed as digitally-enabled citizen activism about crime. This study suggests that non-users' perceptions of citizen activism are important for deterring crime. Specifically, offenders stated that they look for signs of face-to-face communication as opposed to searching websites to see if neighbors communicate. Thus, online communication, while important, may not prevent physical crimes like burglary. This implies that even if a neighborhood is very active online but is perceived to have little in-person interaction, burglars may still target homes in the area. How can we build crime prevention technologies that influence the perception of citizen activism? Is the perception more important than the actuality of activism? In the following section, I propose design implications that address these questions.

Designing Crime Prevention Tools to Protect The Home

Traditional efforts to stop burglary have focused on the physical area of the domestic space. My findings suggest that technology intended to prevent burglary should enhance interaction amongst neighbors and encourage citizen activism. Furthermore, community residents may not realize that their actions (or inactions) on the street may influence whether their neighbor's home is burglarized. Thus, designing technology that rewards citizen engagement may be beneficial to the neighborhood. Location-aware applications on mobile phones, for example, may encourage prosocial behavior by rewarding citizens with virtual points when they interact with neighbors. This begins to move us away from designing technologies that are limited to the physical area of the home but instead that focus on what occurs outside of the home.

Furthermore, designing preventive as opposed to reactive technology is essential. The former proactively deter criminal activities while the latter help law enforcement apprehend offenders after a crime has been committed. It is important to design technologies to prevent burglaries because once there has been a home intrusion, the victim is already emotionally scarred [27, 34]. This paper reveals that the effectiveness of deterrents are measured by the increased risk of being caught. Despite cameras, alarms, and other deterrents, burglars viewed face-to-face encounters as the highest risk to being caught. Thus, effective burglary prevention technology should heighten that risk.

The following sections describe three implications for designing crime prevention technology that can be broadly applied to activist research. I propose designing technology that 1) promotes the perception of in-person neighborhood cohesion, 2) redefines neighborhood spaces as places where community collaboration occurs, and 3) facilitates collective efficacy.

Perceptions of Neighborhood Cohesion

Findings from this study suggest that perceptions of neighborhood cohesion and citizen engagement are important to deterring burglary. Therefore, crime prevention technologies should exhibit cohesiveness in neighborhoods, whether it is actually present or not. More broadly, activist researchers must consider the importance of understanding non-users and any subsequent effects non-users may have on the issue being addressed. Health activist technology, for example, could inform a city council of a community health initiative and influence their decision to establish a new farmers market that sells fresh fruits and vegetables in a community that does not have access to such foods. Though the members of city council may not be the intended users, the technology could impact their perception of health activism in a particular community and subsequently the community's access to healthy food.

Publics could be used to exhibit local activism and strong social ties amongst neighbors. One major limitation is that publics are typically in one location, making visibility limited. However, publics can be used along with other technologies (e.g., mobile phones) to increase the visibility of local activism. Another caveat concerns the ethics around deception when designing technology that displays positive characteristics of a neighborhood (that may or may not exist). Is it appropriate for technology to be deceptive to benefit the collective? This leads to another area of future research - technology deception, specifically in communities. Nonetheless, the use of outfacing technology that impacts non-users' perceptions should be explored.

Communal Space vs. Collaborative Place

Researchers should consider ways that technology can help residents transform communal spaces (e.g., streets, parks, cul-de-sacs) into places where co-production of neighborhood change occurs. Theories of space and place should be used to design technology that reconstructs space in neighborhoods [13, 20]. Furthermore, urban planning can change the social atmosphere of a neighborhood [19]. Similarly, I recommend designing crime prevention as well as other activist technology that fits into the physical environment such that it supports and facilitates community action and in-person communication.

For instance, I imagine smartphones that connect neighbors with the same interests (e.g., gardening) and suggest times when they can interact face-to-face (e.g., working in the community garden together). Technologies that transform space into places where residents gather may strengthen relationships amongst neighbors, encourage online and offline collective action, and facilitate in-person communication in public places.

Collective Efficacy

Neighborhood cohesion has been linked to trust and collective efficacy as predictors of crime [38].

> It is the linkage of mutual trust and the willingness to intervene for the common good that defines the neighborhood context of collective efficacy... [C]ollective efficacy of residents is a critical means by which urban neighborhoods inhibit the occurrence of personal violence, without regard to the demographic composition of the population [38].

Prior literature in health and sustainability encourages scholars to build technologies that not only support collective action, but also encourage people to become advocates of social change [14, 30]. Similarly, I argue that crime prevention technologies should increase feelings of agency and efficacy, which can decrease crime [37]. Such technologies may highlight accomplishments by the neighborhood as a collective body and perhaps remind neighbors of others' willingness to help, which may encourage reciprocity.

LIMITATIONS

Although this paper provides insight into how burglars view current deterrents, there are limitations. First, this study consists of a limited number of participants that was not a random sample of all burglars in the US. I attempt to address this issue by including burglars convicted of three different types of burglary (i.e., auto, commercial, and residential). In total, participants had committed at least 450 burglaries before being caught; some even stated that they committed two to three burglaries a week without being caught for up to 5 years. With only 12.4% of burglaries solved in 2010 [16], it is plausible that participants did commit unsolved burglaries without being caught. Another potential limitation is that the data is self-reported, which may or may not be completely accurate. There was no compensation or incentives, so there was little reason for panelists to be deceptive in their responses. Due to the sensitivity of the population, I did not record names or other identifying information; therefore, it is not possible to corroborate the participants' responses by examining police reports. Lastly, the fact that I did not recruit the participants may be viewed as a limitation. I did not provide any criteria to the non-profit rehabilitation center, who recruited the participants, and I was informed that anyone convicted of burglary from the rehabilitation center was invited to participate during an open call.

FUTURE WORK

The results of this study suggest a number of areas for future research. First, this paper introduces the concept of viewing the domestic space as a defensible area that can be protected. There are opportunities to design and build burglary prevention technology that seamlessly fits into the domestic environment and that will not interrupt the daily lives of families and residents. Moreover, we should further explore how technology can compliment or facilitate citizen activism, which my findings suggest can affect and even prevent crime against personal property.

A second area for future work is understanding the extent to which non-users are affected by activist research. This paper, for example, focuses on stakeholders that extend beyond the intended users of crime prevention technology (i.e., local residents) and found that non-users' (i.e., offenders) perceptions of cohesion and collective action affect burglary. Thus, activist research on other societal issues beyond crime must consider the degree to which perception amongst stakeholders outside of the immediate users affects the targeted issue.

A third area for future research is methodological. This paper provides an example of how we, as HCI researchers, can ex-

pand our traditional view of stakeholders and how to pragmatically access a vulnerable population. The panel sessions with the community afforded a different type of dialogue to occur between previous offenders and potential victims. After the panel sessions, participants stated that they felt good that they were able to use their expertise to make a positive impact on the communities that they may have hurt. Thus, an important area for future research is to give voice to non-traditional stakeholders, whose opinions may be marginalized.

Lastly, the findings suggest a broader area for future research. Though this paper adds to the growing HCI literature on crime and safety, there are additional opportunities to examine the communities for which activist technologies are being built, specifically considering political, social, and economic contexts. As HCI researchers, we should examine why some neighborhoods have less citizen activism and how digitally-enabled activism can positively impact communities that are disproportionately affected by social problems (e.g., health, crime).

CONCLUSION

This paper provides insight into how burglars view technologies intended to protect the domestic space. Findings suggest that before breaking into a home, burglars perceive neighbor interaction as the highest risk of being caught and avoid homes in such neighborhoods. Technologies designed to protect the home (e.g., alarms, cameras) are viewed as low risk deterrents and sometimes even as motivations to burglarize a home. Crime prevention technologies that enhance perceptions of in-person neighborhood cohesion and citizen activism are more likely to deter burglary. Broader implications for HCI suggest that when designing for citizen activism, it is important to understand the degree to which non-users' perceptions of digitally-enabled activism affect the local issues being addressed.

ACKNOWLEDGMENTS

Thanks to the panel participants and community organizations in the study. I would also like to thank Jennifer Burrell, Ikpeme Erete, Dan A. Lewis, Molly Metzger, and the reviewers for their helpful comments on earlier versions of this paper. This work is supported by the NSF Graduate Research Fellowship.

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