SAFE WALK

Research Summary

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01

Introduction

Problem Statement

Data collected by Gallup indicates that over the past seven years, 36% of U.S. residents have reported that they felt apprehensive when walking alone at night. This percentage increases to roughly 50% amongst women, city dwellers, and the socioeconomically disadvantaged. A significant 18-point gap in perceived safety between the sexes; 45% of the entire female population reports feeling unsafe walking alone at night, as opposed to 27% of men (Gallup 2015). Women tend to be more aware of environmental cues and safety risks, increasing their likelihood to feel unsafe (Bianco & Lawson, 1997). Research has shown that the higher percentage of fear might be restricting the freedoms of women (Pryor et al. 2013).

Despite the fact that design solutions intended to foster safer walking environments for women currently exist, many necessitate cell-phone usage. Attending to a device screen prevents individuals from being mindful of their surroundings, which may increase the susceptibility of becoming a crime victim (USA Today, 2012). Despite the advancements in the field, there are still design opportunities to explore in this space. We are also cognizant of the fact that potential design solutions may introduce the issue of neighborhood stigmatization. Areas with high crime may also be impoverished areas comprised of members of historically marginalized communities. We intend to approach our project through a value sensitive design lens. We want to empower city-dwelling women while mitigating neighborhood stigmatization to the greatest extent possible.

> *45% of the entire female population reports feeling unsafe walking alone at night*
>
> GALLUP 2015

How can we help **female-identifying individuals** *feel and be safer* **when walking alone**?

Target Customer

We aim to help female-identifying individuals in urban environments feel and be safer when walking. Residents of cities are more likely to use walking as a regular form of transportation than those in more rural environments (Saelens, 2003), and as described in the Gallup findings above, city dwellers tend to have an increased fear of walking alone, which may correspond with increased risk (Gallup 2015), making them a fitting population to target. For an in depth explanation of why we chose to focus on female-identifying individuals, see the Gendered Exclusion section below.

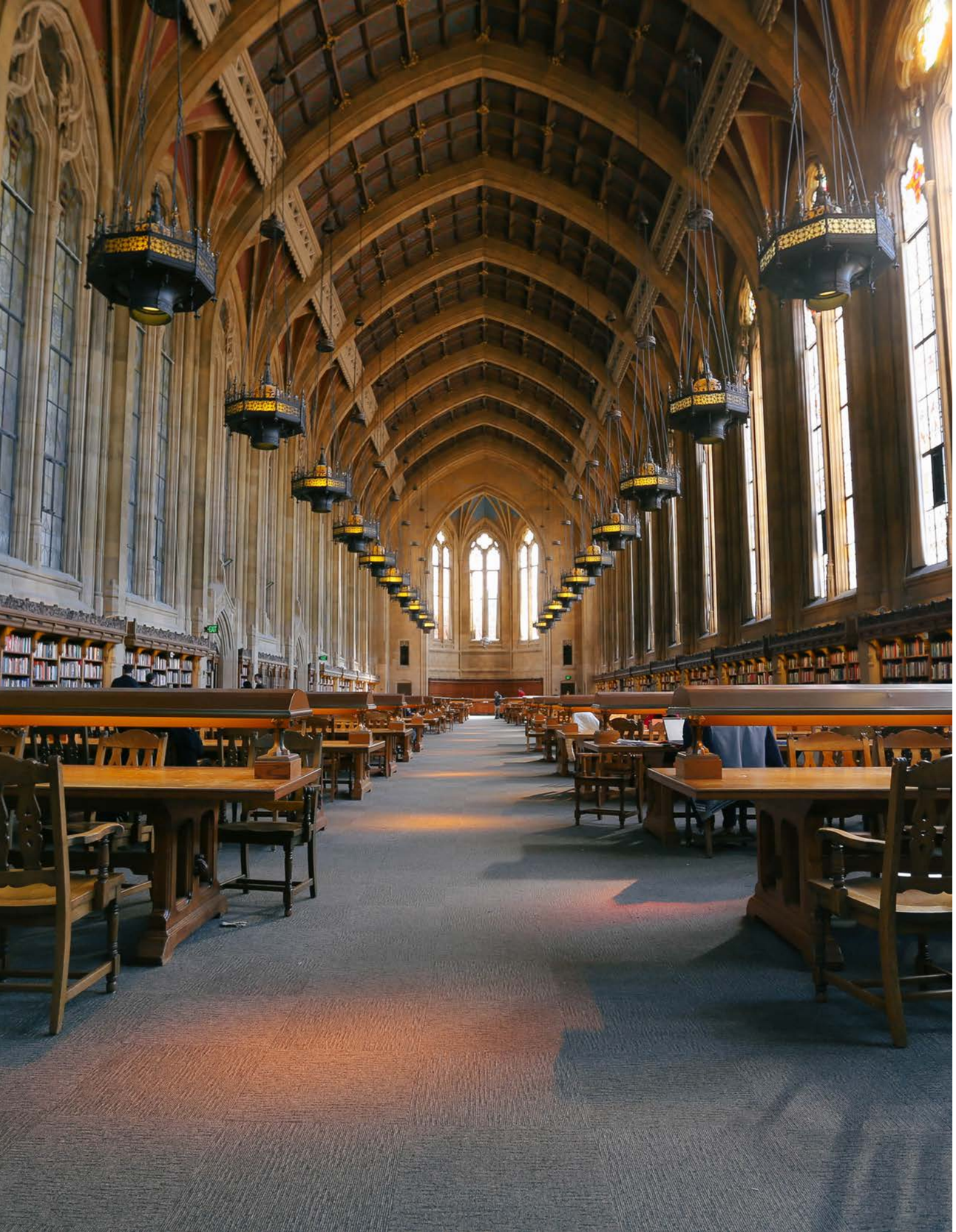
Research Questions

What factors contribute to feelings of safety?

What behaviors do women engage in to feel safer?

What are the advantages and disadvantages of current solutions in this space?

BACKGROUND



02 Literature Review

Our literature review exposed us to a set of common themes.

Environmental Factors

There are different types of environmental factors that may signal to women that there is heightened risk of walking in a certain area. These can be, what researchers refer to as social incivilities, physical incivilities, and properties of the built environment. Social incivilities are disruptive social behaviors (e.g, public drunkenness, panhandling, begging), whereas physical incivilities refer to disorderly physical surroundings (e.g., litter, graffiti, abandoned buildings) (Loukaitou-Sideris, 2006). Features of the built environment can also contribute to fear by decreasing visibility and/or ability to escape. For example, a dark tunnel may increase perceived threat because one may not be able to see if someone is hiding (due to the low light), but also because the tunnel is bounded in a way that reduces options for escape if a threat were to arise (Loukaitou-Sideris, 2006). Large open spaces, that are usually deserted (e.g., parks and woodlands), are also commonly feared (Koskela, 2000).

In addition to influencing perceived threat, environmental factors may also contribute to the potential for crime. For example, criminals may look for areas with a high number of escape routes. Similarly, specific business types (e.g., liquor stores, abandoned buildings) may attract crime to an area. On the other hand, there are environmental characteristics that may work to deter crime by creating “defensible space.” Defensible spaces are areas that have physical characteristics that enable residents to ensure their own security (Sohn, 2016). For example, windows facing the street, sufficient lighting, and neighborhood watch signs both allow residents to play a part in contributing to the safety in their area, and at the same time signal to criminals that they are more likely to get caught (Loukaitou-Sideris, 2006), thereby reducing the likelihood of crime.

Perceived Fear vs. Actual Fear

Safety can be divided into two categories: objective and subjective safety. Objective safety refers to the occurrence of criminal offenses, such as theft or burglary. Subjective safety refers to the perception of safety (Ruijsbroek et al, 2015). This is important because, regardless of whether an actual threat exists, perception is what directly impacts one’s actions and motivation. If people perceive an area as unsafe, they tend to walk less (Hong & Chen, 2014).

Perceived safety is rooted in fear and anxiety and stems from many factors including social and environmental incivilities, and one's risk perception of personally becoming a victim. Perception of safety in an environment is also strongly related to how well one knows and feels at ease with one's surrounding (Loukaitou-Sideris, 2006) and there is a significant lack of correspondence between citizen's perceptions of crime and official crime statistics. People tend to downplay local levels of crime relative to city-wide or national levels, regardless of awareness (Forde, 1993). When outside a local environment, judgments about safety are made on the basis of preconceived images about a place and its occupants and cues from social behavior and the physical surroundings (Loukaitou-Sideris, 2006).

Gendered Exclusion

While women are less likely to be the victims of street crime than men, they tend to be more afraid of it, which is often referred to as "the fear of crime paradox" (Pryor et al, 2013). However, the nature of women's fear tends to be different from men's fear in both its cause and effect: women are afraid of sexual violence/harassment, in particular, leading them to develop preventative strategies of distancing themselves in both space and time from potential attackers. Additionally, the unique vulnerability and powerlessness that women face in society may largely contribute to their fears: women, both historically and currently, experience oppression, lack of democratic control, and marginalization in their communities, contributing to feelings of helplessness (Koskela, 2000).

Gendered exclusion is the idea that women's exclusion from space is tied to social constructs. Women's mobility is restricted by the perception of certain spaces as masculine, a product of women's historical exclusion from these spaces, and by the harassment and violence they face in some spaces. Importantly, what this suggests is that women's fear is both a result and cause of women's inequality (Koskela, 2000). While not going out after dark or avoiding specific locations appears to be a reaction to physical characteristics of space, we must also look for the social origin of perceived risks in the environment. For example, as evidenced by northern regions that experience dark days and sunlit nights, avoiding the "night time" is not necessarily tied to levels of lighting, but instead the social construct that night time is dangerous and that women do not belong outside at that time (Koskela, 2000).

Women are taught that they should be actively protecting their safety at all times. From an early age, women are inundated with information from the media, parents, and from school instructing them to "keep safe." The media often seems to blames a victim's behavior for a violent attack, reporting that they were in "the wrong place, at the wrong time", and as such, they could have avoided their attack (Koskela, 2000). Additionally, women may face "anticipatory shame," contributing to their fear of sexual attack: in addition to fear of the crime itself, women experience fear of the victim-blaming associated with these crimes (Pryor et al, 2013).

Technological Approaches

We researched a number of technological approaches in the space, from critical design projects placing crime data in the context of social media experience (Garbett et al, 2015), to property crime risk assessment applications (Kadar et al, 2014), to the role of mobile services in increasing women's safety and security in urban environments (Blom et al, 2010). While some approaches using crime data, map visualizations, crowdsourcing, and risk calculations face some efficacy challenges, they also have potentially negative social consequences. However, potential remains for new interpretations of data and mapping (Rosner et al, 2015), and the public is generally interested in the topic (Garbett, 2015). Additionally there are many commercial products that seek to address keeping people safe when outside. We will survey these different products in a comparative assessment later on.

Research Practices

Our secondary research provided important insights that will inform our research protocol.

When deciding on our research population, we should be mindful of the ways that factors other than gender affect perceptions of safety in tandem with gender. Not all demographics of women tend to experience the same amount of fear. For example, pregnant women, women of color, differently-abled women, and elderly women, tend to have even higher fear levels than women in general. Additionally, certain fears may affect particular populations of women and not others. For example, sidewalks in disrepair may cause additional sources of fear for elderly women or the differently abled (Loukaitou-Sideris, 2006; Koskela, 2000).

One of our papers stressed the importance of qualitative over quantitative research to understand fear. While quantitative research methods provide information about the fear according to demographics, such as the number of women who report fear of a certain area, they do not offer sufficient insight into the psychological process by which fear is produced. Qualitative research methods explore the experiences of participants, through writing or personal interview, which allows the researcher to investigate the reasoning behind the phenomenon of fear, rather than just the data of where and when it occurs (Koskela, 2000).

Lastly, in addition to researching what makes people feel unsafe, we should also research what makes people feel safe, as environments and behaviors that make people feel unsafe are not necessarily the opposite of those that make people feel safe. For example, bounded areas tend to make people feel unsafe, but so do vastly open areas (Koskela, 2000), so it would be wrong to assume that the opposite of bounded areas (open areas) make people feel safer. Relatedly, we should pay attention to what is referred to as "unique invulnerability," in which people view themselves as less likely to be a victim than others, meaning potentially certain people aren't afraid enough (Pryor et al, 2013).

03 Competitive Analysis

In order to better understand the landscape of available solutions, we conducted an investigation of current products, services, and programs designed to promote walking safety. We wanted to discover who our competitors are targeting, what their main features are, and where there are areas for opportunity.

The Implementation

Through our competitive analysis, we explored a number of technological approaches to increase actual and perceived safety. We conducted a survey of roughly thirty existing products, both directly and tangentially related to the issue of walking alone, and categorized the apps into seven distinct groups based on app features. The categories are as follows:

- Risk and incident prevention, for example, preventing active shooter scenarios
- Apps specifically designed to encourage safe walking practices
- Sexual harassment and assault prevention
- Apps that enable users to share their location, or monitor the location of another individual
- Apps that include crowd-sourced elements
- Physical devices
- Apps that utilize crime data

We then proceeded to conduct an in-depth analysis of the apps we deemed most pertinent to our project. This included an examination of product impressions, that is, how companies present themselves, how the media receives them, and how customers review the products (for an exhaustive summary of our top competitors, please refer to the Appendix). In addition to reviewing mobile applications and wearable devices, we also investigated current services including HuskyWalk and NightRide, as well as personal defense strategies like taking self-defense courses and carrying tools like mace.

There are a number of ways in which the current landscape of products are not sufficiently addressing the needs of our target users, but the most

	LiveSafe	Companion	Circle of 6	Hollaback	Revolar	ROBOCOPP	TapShield
Tagline:	*Making our world a safer place.*	*Never walk home alone*		*You have the power to end harassment*		*The world's smallest SOS alarm*	*Information sharing to pre-vent incidents*
CONTENT FEATURES							
subscription based					x		
one-time payment or free	free	free	free	free	one time payment	one time payment	
Map	x	x		x	x		x
Shows crime data	x			x			x
Crime alert notifications	x						x
Physical action triggers alert					x	x	x
Anonymity in reporting	anonymity	?		x			x
Connection to Hotline or Counselor		x					x
Campus or workplace Integration	x		x				x
Interaction with outside community	x		x	x			
TECHNICAL FEATURES							
App Requires Location Access	Only when using	Only when using	Only when using	Only when using			Always
Emits noise						x	automated voice warning
Sends location info	x	x			x		x
Collects reports	x	x	x	x			x
Smart Sensor		x					x

obvious failure across a majority of these products is that they underestimate the difficulty that female-identifying individuals have in reaching out to others for help. Please refer to our Synthesis section of this document for further detail on the following statements, but our research demonstrated two things. First, participants are very sensitive to taking action that may be perceived as an overreaction. Participants seem to be reluctant to contact emergency services in situations in which they do not feel entirely confident that they are in danger. Many apps operate on the conceit that apps should provide a streamlined system for contacting the local authorities, but we believe that features like this are likely to go unused outside of situations in which a woman is already in danger and unable to protect herself. Our second finding revealed that women have trouble communicating their fear, even to friends and family. Apps that recognize that there need to be “levels of escalation,” so to speak, encourage users to reach out to friends and family in situations in which they feel uneasy. However, we learned that our participants are extremely preoccupied with not wanting to burden or worry others, especially in scenarios in which the perceived threat far outweighed the actual threat. We believe that a product we create should not make the same assumptions about women and their willingness to ask for help that our competitors have made.

04 Heuristic Evaluation

Nielsen and Norman's "Five E's of Usability" were used to assess Revolar, a "smart" panic button (please refer to the competitive analysis in the Appendix for a detailed description of the device), a self-defense tool known as a "travel wrench," and the mobile application, TapShield.

The Five E's of Usability are are as follows:

- Effective: How completely and accurately the task is completed, or, the goal is reached
- Efficient: How quickly the task can be completed
- Engaging: How well the product draws the user into the task and how pleasant and satisfying it is to use
- Error Tolerant: How well the product prevents errors and can help the user recover from mistakes that do occur
- Easy to Learn: How well the product supports both the initial orientation and continued learning throughout the complete lifetime of use.

REVOLAR

General Usability

Effective:	**High**
Efficient:	**High**
Engaging:	**Medium**
Error Tolerant:	**Low**
Easy to Learn:	**High**

1. The one-touch solution is effective, efficient and easy to learn. The product is minimally engaging, and though it is designed to make false presses harder to do, errors are hard to recover from.

2. Discreetly sized with easy loop and a clip at the back make using the product more engaging and effective.

TRAVEL WRENCH

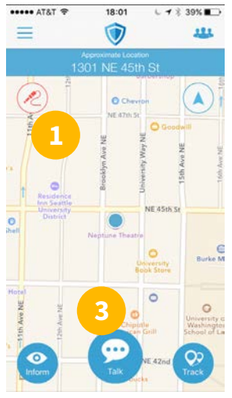
General Usability

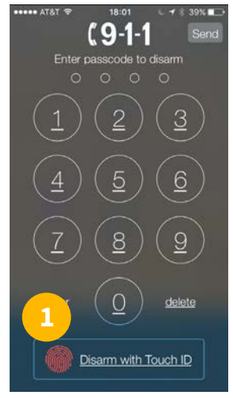
Effective:	**Medium**
Efficient:	**Medium**
Engaging:	**Low**
Error Tolerant:	**Medium**
Easy to Learn:	**Medium**

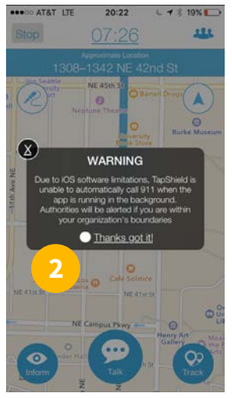
1. This tool is as effective, efficient, and easy to learn if the user is physically capable of striking someone. The tool is also praised for being error tolerant in that it contributes to stable striking and knuckle protection.

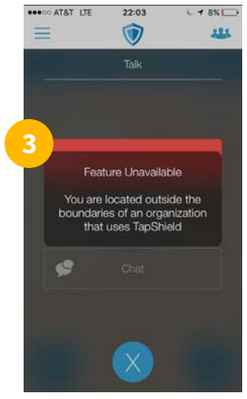
2. The tool is not engaging in design, but holding it provides a tangible feeling of protection for the user.

TAP SHIELD









General Usability

Effective:	**Medium**
Efficient:	**Medium**
Engaging:	**Medium**
Error Tolerant:	**Low**
Easy to Learn:	**Low**

The app is designed to be more engaging with a map homepage and pleasantly colored icons and features.

1. App is not very error tolerant as evidenced by automatic triggering of 9-1-1 calls via headphones pulled from their jacks, and these errors are hard to recover from.

2. Though popups could provide guidance, they are confusing, and hard to dismiss.

3. Effectiveness and efficiency are compromised by lack of information about the parties contacted through the inform and talk icons and the necessity for a local organization to have set up the app.

05

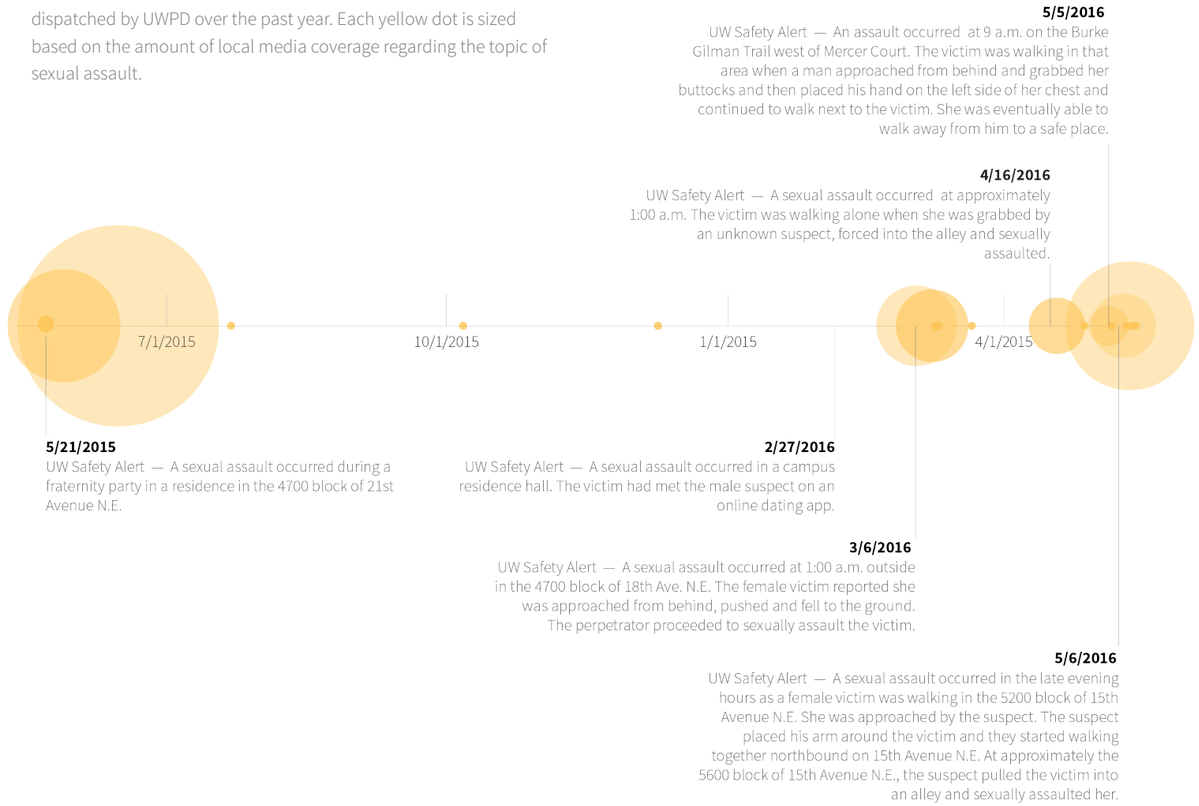
Popular Media Scan

In our competitive analysis, we began by investigating media resources - news articles, UWPD emergency alerts, and the like - in order to learn more about public opinions regarding existing solutions in the industry. In order to supplement this research, we conducted a more in-depth popular media scan exploring how the local media covers the topic of sexual assault.

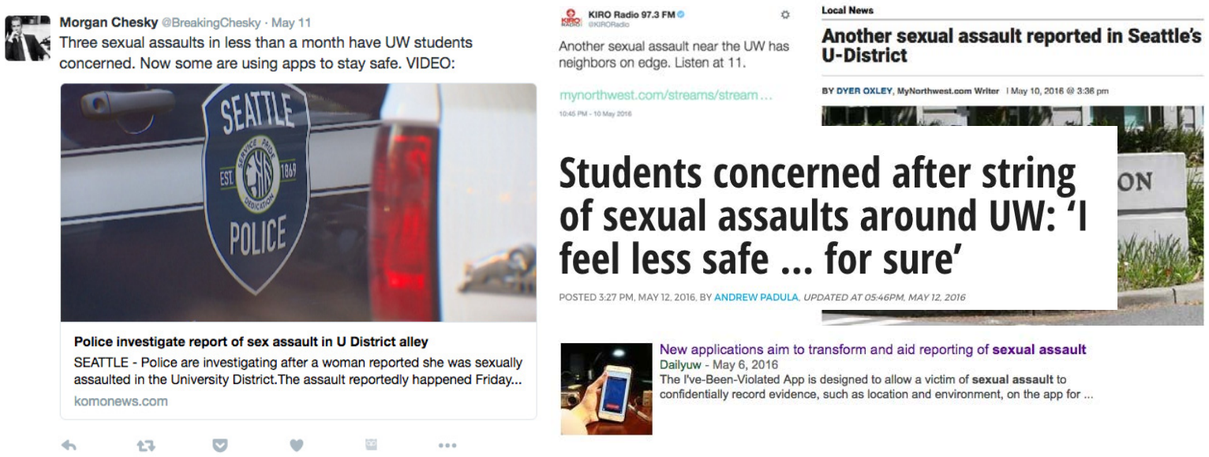
A significant number of articles discussed sexual assaults occurring in the University District. The UWPD released a total of 24 crime alerts over the past year, six of which contained references to sexual assault. These six instances are shown below, plotted alongside the amount of the local media coverage of sexual assault. As shown, almost all of these references were published in the aftermath of a sexual assault. Of course, this coverage includes news about the event and its effects, but this is also the period when the majority of preventative and educational articles are published. In other words, there seems to be a trend indicating that whenever an assault occurs, there is a flood of corresponding articles both about the specific incident, but also about preventive safety measures women can take in order to protect themselves.

FIGURE 4-1 : TIMELINE OF SEXUAL ASSAULT ALERTS

Illustrated is a timeline of all the sexual assault Crime Alerts dispatched by UWPD over the past year. Each yellow dot is sized based on the amount of local media coverage regarding the topic of sexual assault.



A sample of some of the articles discussing sexual assaults in the University District



For example, on May 6, 2016, only a day after the fourth sexual assault that occurred this year, the University of Washington student newspaper, The Daily, published an article entitled "New applications aim to transform and aid reporting of sexual assault". This article discussed two new mobile applications that focus on the "reporting" phase that takes place in the aftermath of a sexual assault: Callisto and I've-Been-Violated by We-Consent. Interestingly enough, despite the fact that both of these apps had been available to download for more than six months, each receiving nationwide press last fall and at the very beginning of this year, local news outlets did not give these tools any coverage until the aftermath of an assault. In the months following the more recent sexual assault alerts, The Daily published three articles discussing preventative information and local media stations such as KOMO News and King 5 also began broadcasting this information. On May 10, 2016, KOMO News aired a news segment describing the series of sexual assaults that have occurred in the U-District. The report shares some of the methods students are currently using to be safe — one being the use of the mobile application, Companion.

This trend illustrates an education cycle that is highly reactive instead of preventative. By the time the media is sharing information about how to be safer in the local environment, it has already become an issue.

safer in the local environment, it has already become an issue.

06

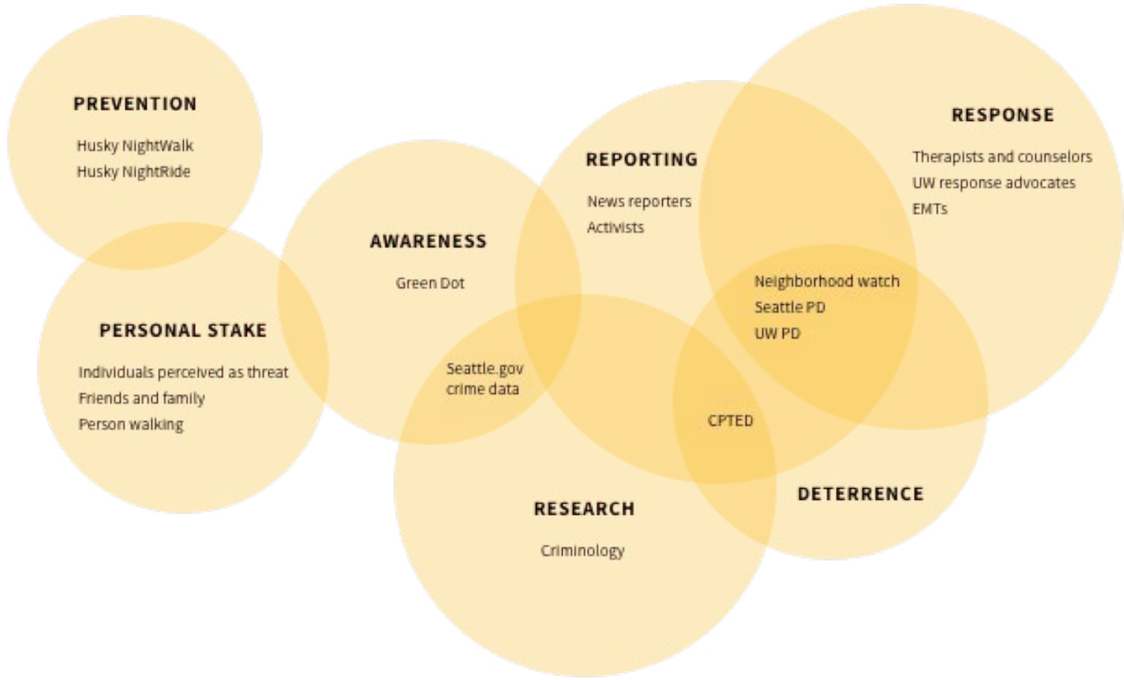
Stakeholder Map

Conducting a stakeholder analysis allowed us to examine and visualize the relevant parties involved in solitary walking and safety and to understand how the needs and values of these stakeholders relate. It is clear from the Stakeholder Map that while all stakeholders share a vested interest in increasing safety in some capacity, safety is a multi-dimensional issue and approaches to improving safety vary as does the timeline of intervention (e.g,. preventative vs. response). Furthermore, creation of the Stakeholder Map illuminated the fact that the various approaches to safety are more nuanced than previously thought (e.g., what we thought of as “prevention” can be further broken down into “prevention”, “deterrence”, and “awareness”).

The Implementation

We began by brainstorming who the stakeholders are, that is, identifying the individuals affected by solitary walking and those who influence or are interested in providing solutions to the problem. Stakeholders included both individuals as well as larger entities like organizations and governmental services. We did not include consumer products or apps in the Stakeholder map because this information was largely covered in the Competitive Analysis.

Ultimately, we identified seven main values common across stakeholders and designated where these values and stakeholders overlap using a Venn Diagram. The seven values include:



Environmental - creating a built environment that deter criminals (e.g., well lit areas may make it more likely an assaulter will get caught)

Systemic - discouraging assault by promoting fear of formal consequence (e.g., knowledge of the judicial system, police regularly patrolling the area)

Individual - warding off assault through personal behavior (e.g., deterring would-be attackers by prominently carrying pepper spray on front of backpack)

Response (to Assault) - acting after an assault has occurred

- Immediate - stopping the crime in the moment, or, responding to the scene of a crime
- Long term - acting beyond the immediacy of assault (e.g., therapy for victim, trial, jail sentence for assaulter)

Research

- Academic - exploring novel approaches to promoting safety from assault
- Governmental - collecting data on assault

Reporting

- News Reporting- reporting to the general public of incidents of assault, punishment for assaulter, and how to keep safe
- Crime Data - providing the public with information and visualization about crime rates
- Protesting - putting pressure on society and the system to change rhetoric and policy

Personal Stake - personal needs and values around safety

- Primary - being concerned with personal well being while walking (e.g., avoiding being assaulted while walking or avoiding being perceived as a threat while walking)
- Secondary - being concerned with another’s well being while they are walking alone

R

RESEARCH

Primary Research

After examining existing literature regarding our problem space, we transitioned into the primary research phase of our project in which we sought to uncover original insights that could shape future design solutions. Our primary research efforts consisted of conducting subject matter expert (SME) interviews, as well as recruiting female-identifying UW students to participate in field research, diary studies, and semi-structured interviews.

Participant Profile

We recruited and conducted primary research with six female-identifying University of Washington students (five participants for the diary study and semi-structured interviews, and one participants for the field study). We plan to conduct field research with a few more participants before concluding this phase of our research. We chose to focus our research specifically on college students because they are likely to walk routinely, and research has shown that female college students may be extremely perceptive and sensitive of the area around them, particularly at night, resulting in increased fear (Pryor et al. 2013). Furthermore, our interview with Natalie Dolci, UWPD Victim Advocate, suggests college students face a unique safety risk because college campuses are a “target rich environment” for people who are intentionally seeking out young women (e.g., people using Tinder presenting as undergraduate age); these individuals know that they will be able to find young women on campus while maintaining anonymity and the ability to come and go without scrutiny, leading to coercive or violent situations. From a data perspective, one final benefit of studying college students is that there is robust literature on perceived fear and walking amongst this population, allowing us to better triangulate our findings.

All participants included in our studies tend to walk alone at night for at least twenty minutes a week. Twenty minutes was implemented as a somewhat arbitrary measure in an effort to recruit students who walk alone at night regularly.

All participants are current residents of Seattle: four out of six participants live in the University District, one participant resides in Queen Anne and one resides in Ravenna, just north of the University District. Of the four participants who live in the University District, three live north of campus and one lives west of campus. By recruiting students who live in different parts of the University District, as well as students who live in neighboring Seattle neighborhoods, we were able to examine experiences from a variety of walking routes.

Additionally, two participants regularly take the bus at night. This was important for our research because waiting for the bus, as well as being in a bounded area (i.e., the bus), tend to correspond with increased risk and fear (Loukaitou-Sideris, 2006).

While our secondary research rightfully cautioned against using a “one-size-fits-all” approach when trying to understand the fears that women face (Koskela, 2000), for the scope of this study, we likely have the most access to UW students. As a consequence of our condensed research timeline, we have limited our research participants to that demographic and will not have a representative sample of any other subpopulations of women. We recognize that we will be limited in our ability to generalize the efficacy of our design solution to other populations, but although we are exclusively studying UW students, we see this as just a starting step. We hope that through our conversations with college students we will uncover insights that will inform a design solution that is suitable for other populations as well.

Recruiting Process

To recruit participants for our studies, we posted a message in the UW Free & For Sale Facebook group, a private group accessible only to those with a UW NetID. This Facebook post included a brief explanation of our study, directing those interested to email us for more information. If, after learning more over email, they were still interested in participating and if they seemed particularly invested in our topic of study (helping female-identifying individuals feel and be safer when walking alone), we then spoke to them over the phone to further evaluate whether they seemed like a good fit for our study. We ultimately included four out of the five participants we called. While self-selecting to participate in a study contributes to bias, we felt it was important to find participants who would be motivated to contribute to this topic because participating in a diary study is a somewhat demanding task and we were concerned with participant retention. In our phone screener, we included questions to assess whether they matched the participant profile described above and to evaluate whether they seemed engaged with the topic and open to discussing their experiences. To view the phone screener we used, view the Appendix. In total, four of the six participants were recruited through Facebook and the remaining two participants were classmates from night classes we were enrolled in. All participants were recruited using the same screener.

06

Subject Matter Expert Interviews

SUBJECT MATTER EXPERTS

Daniela Rosner
HCDE Faculty

Tari Nelson-Zagar
Seattle Neighborhood Group
Senior Program Manager

Gillian Wickwire
UW SafeCampus
Threat Manager

Natalie Dolci
UWPD Victim Advocate

Expert interviews provided us with the opportunity to gather information from individuals who possess in-depth knowledge of issues affecting women's perceived and actual safety; specifically, what makes women feel unsafe and how they attempt to mitigate these feelings. We wanted to understand why women do or do not utilize current solutions. We were able to elicit subject matter experts' knowledge to uncover different dimensions of the issue and provide our team with the opportunity to solidify our understanding of the problem space in an expedited fashion. We used the insights and data collected from these individuals in order to further examine information uncovered through secondary research.

The Implementation

Our secondary research gave us a strong grounding in the theory of perceived safety. In the the next stage of research, we were interested in gaining a better understanding of actual safety in the vicinity of the U-District, as well as the tangible consequences of fear. This insight helped us identify four broad categories of potential subject matter experts: Experience and Environment SMEs, UW Safety Initiative SMEs, Technology Solution SMEs, and Seattle Public Safety and Crime Prevention SMEs.

In order to understand how the construction of urban and digital spaces affects women's perceived and actual safety, we spoke with UW faculty member, **Daniela Rosner**, as well as Seattle Neighborhood Group Senior Program Manager, **Tari Nelson-Zagar**. Our interview with Tari-Nelson Zagar made us realize that our final design solution should be cognizant of the fallibility of anecdotal information and crime data. Avoiding errant information requires designers to frequently check personal biases and maintain good relationships with the user population under study; as designers, we should also take the cultural norms of a community into account before imposing solutions. In addition to this piece of information, we learned that our solution should consider features of the environment that may have different safety and surveillance concerns. Issues of safety are different in private, semi-private, semi-public, and public zones, especially where these zones overlap.

Daniela Rosner made it clear to us that our solution should not contribute to stereotyping and stigmatization of neighborhoods or the people who live there. Additionally, if our solution were to make use of crime data, we could use that data in a way that exposes stigmatization, rather than contributes to it. Daniela also helped us shape our diary study protocol by suggesting that we should have participants take photos during their walk because they won't be able to write during the walk. These photos could then be used during the follow-up interview to help participants relive their experiences with us.

We also met with UW staff members tasked with assessing and preventing violence on campus. These individuals include **Gillian Wickwire,** the UW SafeCampus Violence Prevention Response Program Threat Assessment & Management Specialist, and Natalie Dolci, the UWPD Victim Advocate. **Natalie Dolci** impressed upon us that our solution must be simple, and cannot require much thought or action from a user in a threatening situation; she cited a executive functioning failure as the basis for this suggestion. She also discussed the bystander effect and the idea that if our solution attempts to provide women with alternate, that is, safer, walking paths, then we should consider factors such as open businesses, traffic flow, and possible witnesses. She also talked about the fact that many people are not utilizing existing safety services like Husky NightWalk or mobile applications, but, of the products that are being used, the most impactful solutions are ones that lower the threshold so more people report instances. Gillian Wickwire echoed Natalie's sentiments, stating that our solution would be significantly better if it was part of a larger system bringing about broader societal changes.

We intend on reaching out to the division of UWPD responsible for **Husky NightWalk**, as well as the UW Transportation Services employees who coordinate **NightRide**. Additionally, we have contacted **Karmen Schuur,** a research analyst at the Seattle Police Department working on the Micro-Community Policing Plan. Ms. Schuur has agreed to meet with us in the future to discuss how crime data is currently being used to make neighborhoods safer.

The interviews were audio recorded and the data was analyzed to identify patterns, pain points, and key findings. These findings helped us to explore potential design implications and frame the rest of our primary research.

07 Diary Studies

We realized that our field research activity, which consisted of walking with our participants and eliciting real-time, contextual information regarding their walking practices and feelings of safety, would disrupt their authentic experiences of walking home alone at night.

We viewed our diary study as a substitute for direct observation. We hoped to better understand what causes women to feel safe or unsafe when walking alone at night, as well as the behaviors they engage in to mitigate feelings of unease, without directly intruding on these activities. The diary we created for participants was designed to function as a design probe that would increase the participants' awareness of their own personal walking habits prior to the semi-structured interviews; we believed this strategy could help us avoid conducting interviews that would garner superficial insights. We also hoped the digital and physical artifacts of the diary study would function as recollection tools and points of discussion in our eventual interviews, a method known as photo elicitation. Photo elicitation is a method used to evoke memories that are difficult to recall through verbal prompts. We hoped to exploit this method in order to surface different, and more personally contextual information." If we have the stuff about the brain, we need to cite sources about this & I have a feeling the origin and accuracy of these claims gets into a controversial philosophical argument (ie., not relevant to our project).

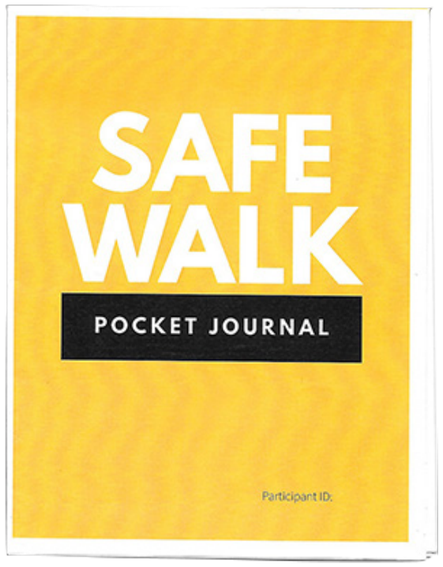
The Implementation

We recruited five participants and instructed them to record 3 - 5 solitary nighttime walking experiences over the course of one week. We instructed them not to embark on walks that they would not typically take because we did not want them to risk their safety for the purposes of our study. As such, we instructed our participants to record daytime walks in lieu of nighttime walks if their normal routine did not include three to five solitary nighttime walks during this week long period. Our recording process was two-fold: We instructed each participant to track their walks via the running and cycling fitness mobile app, Strava, and also had them to answer a brief questionnaire.

Strava Mobile App

We supplied each participant with a unique Strava login and password that was linked to a “master account” that allowed us to monitor whether or not participants were tracking their walking paths. This enabled us to ensure that participants were on schedule for our follow-up semi-structured interviews. During our initial “set-up” meeting with participants, we taught them how to download the app on their mobile device, as well as how to track their walks and add photos to their path.

Safe Walk Journal

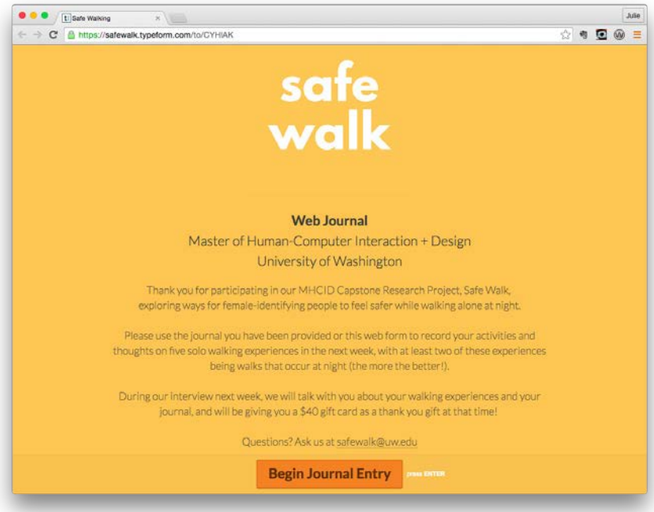


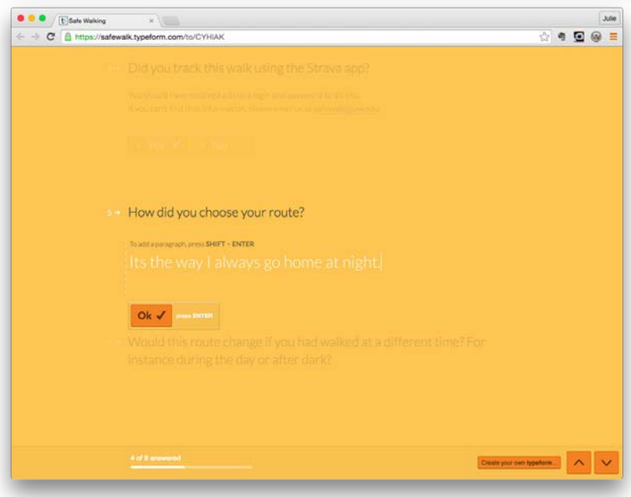
We composed a brief questionnaire prompting participants to record and reflect upon their experiences of walking alone at night after route tracking with Strava. .

We also gave participants the opportunity to record their walking experiences using a webform, but ultimately none of them utilized this option, opting instead for the paper journal. While most participants relied solely on Strava to track their routes, some annotated the fold-out map by hand instead.

Though research indicates that diary studies are problematic when they are the sole method of data collection (due to sample bias, changed behavior, and attrition, that is, participants discontinuing involvement in research), we intended to use the study in conjunction with semi-structured interviews to both motivate participants to complete their diaries (as they knew they would need to discuss them at their interview) and so we could cross-check the validity of diary data and ask clarifying questions as needed.

Safe Walk Journal Web Form





08

Semi-structured Interviews

Although interview participants may speak about their beliefs and attitudes as opposed to their actual behaviors, interviews serve as a “shortcut” to obtaining answers to research questions; we used semi-structured interviews in conjunction with direct observation (that is, field research) and diary studies in order to understand the problem space from multiple perspectives. We conducted semi-structured interviews because they allowed us to gain an in-depth understanding of our target user’s perspective, needs, and desires. Semi-structured interviews allowed us to ask for clarification and follow-up questions, as well as provide us with the freedom to divert from the interview questions as need be. While the diary studies helped us identify the ways in which women negotiate space, interviews gave us the opportunity to ask specific questions regarding data collected in the diary studies, that is, questions about the interviewees’ specific walking paths. In addition to inquiring about their walking paths, the interviews allowed us to better understand the nature and experiences that contribute to participant’s fears as well as how they communicate with others about them.

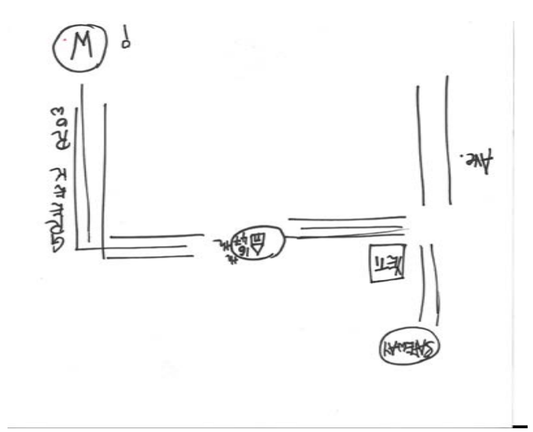
Implementation

Our semi structured interview involved four main activities.

1. Mind-map Exercise
2. Diary study walk discussion
3. Urban Map exercise
4. Semi-structured interviews.

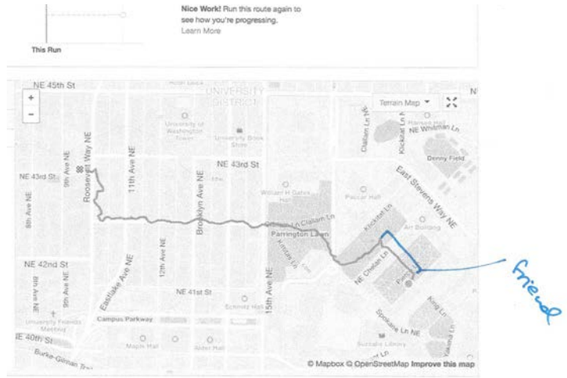
We used a **mind-map exercise** inspired by urban planner Kevin Lynch, as a warm-up activity at the start of our semi-structured interviews.

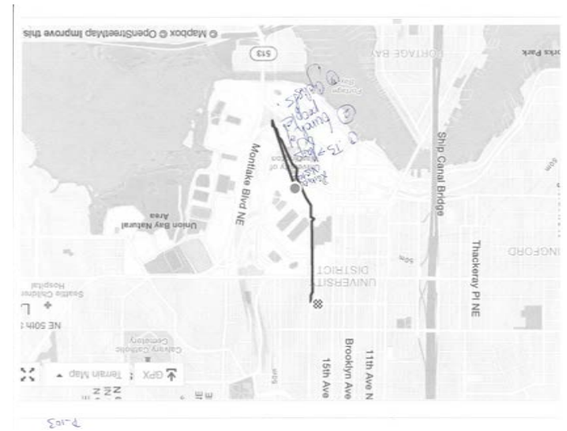
This activity consisted of participants drawing a map of their neighborhood from memory; the goal of this exercise was to understand how they perceive their physical environment by examining emphasized and deemphasized features, as well as features that were entirely omitted. We asked them to start by drawing their home and then directed them to plot out landmarks that they use to orient themselves directionally or that are otherwise important. Finally, we asked participants to show us what areas they perceive as being safe or unsafe, and asked follow-up questions about their drawings.

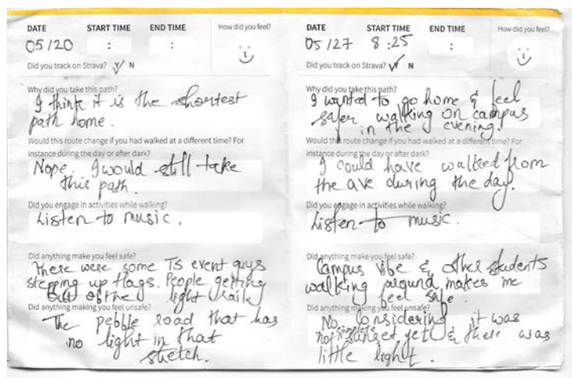


After the mental mapping activity, we discussed the **diary study** tracked in the Strava app and the Safe Walk Pocket Journal questionnaire

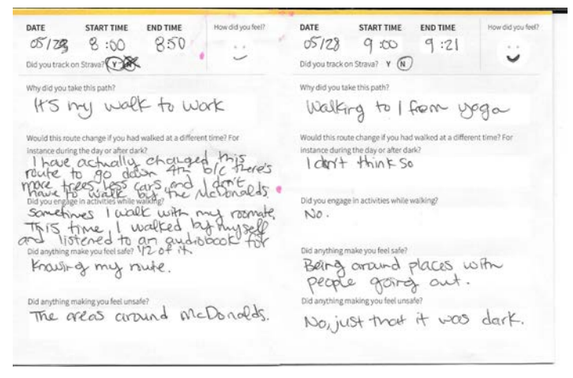
Reviewing the week's walks through routes and images printed from Strava.com, as well as the Safe Walk Pocket Journal, reminded participants of their experiences. Some participants made further annotations on their photos or maps, giving us more information about how they felt and what they saw.





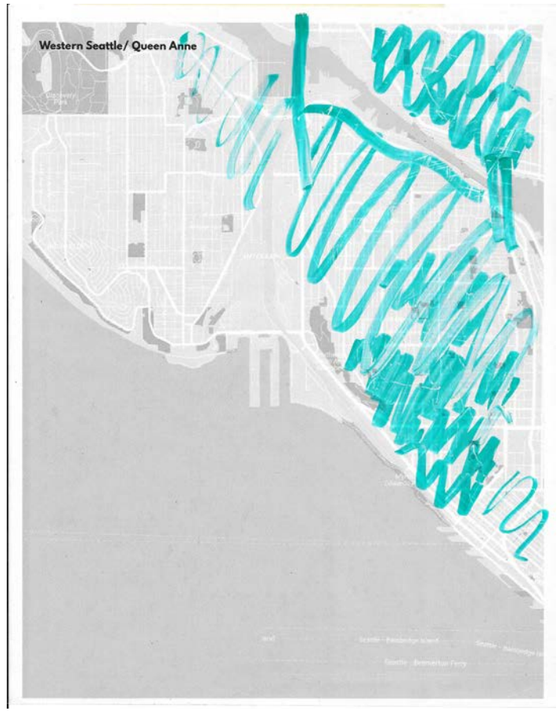

DATE 05/20 START TIME : END TIME : How did you feel?
Did you track on Strava? Y N
Why did you take this path? I think it is the shortest path home.
Would this route change if you had walked at a different time? For instance during the day or after dark? Nope. I would still take this path.
Did you engage in activities while walking? listen to music.
Did anything make you feel safe? There were some TS event guys stepping up flags. People getting off at the light rail
Did anything making you feel unsafe? The pebble road that has no light in that stretch.

DATE 05/27 START TIME 8:25 END TIME : How did you feel?
Did you track on Strava? Y N
Why did you take this path? I wanted to go home & feel safer walking on campus in the evening!
Would this route change if you had walked at a different time? For instance during the day or after dark? I could have walked from the ave during the day.
Did you engage in activities while walking? listen to music.
Did anything make you feel safe? Campus vibe & other students walking around makes me feel safe
Did anything making you feel unsafe? No, considering it was not supposed yet & there was little light.

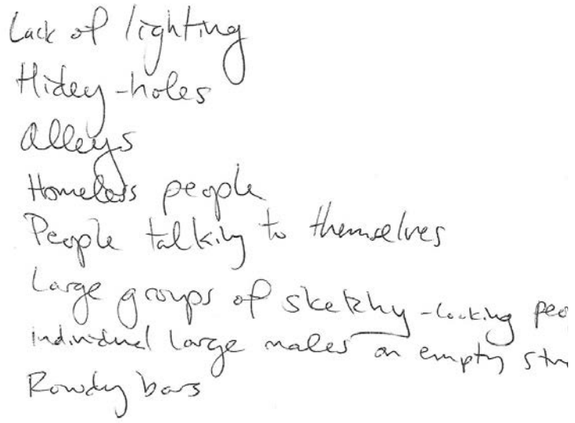

DATE 05/23 START TIME 8:00 END TIME 8:50 How did you feel?
Did you track on Strava? Y N
Why did you take this path? It's my walk to work
Would this route change if you had walked at a different time? For instance during the day or after dark? I have actually changed this route to go down 4th b/c there's more trees, less cars and I don't have to walk by the McDonalds
Did you engage in activities while walking? Sometimes I walk with my roomate, this time I walked by myself and listened to an audiobook for
Did anything make you feel safe? 1/2 of it. knowing my route.
Did anything making you feel unsafe? The areas around McDonalds.

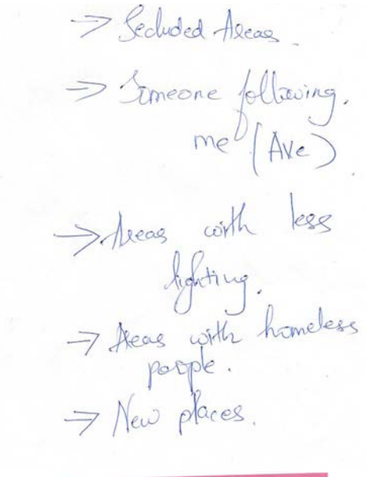
DATE 05/23 START TIME 9:00 END TIME 9:21 How did you feel?
Did you track on Strava? Y N
Why did you take this path? Walking to / from yoga
Would this route change if you had walked at a different time? For instance during the day or after dark? I don't think so
Did you engage in activities while walking? No.
Did anything make you feel safe? Being around places with people going out.
Did anything making you feel unsafe? No, just that it was dark.

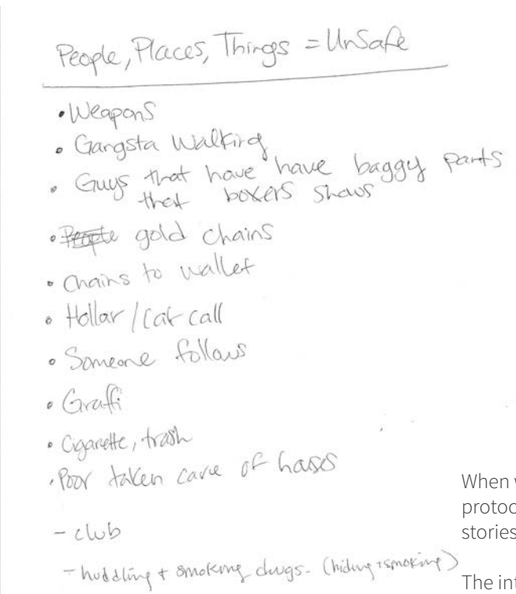
We then provided participants with a **map of the city of Seattle** and instructed them to denote the areas that they are familiar with. Of these areas, participants were asked to annotate the regions they considered to be particularly unsafe. The goal of this exercise was to understand participants' general familiarity with the city, as well as elicit stories from their past walking experiences. It became evident that our participants had varying degrees of familiarity with the city of Seattle, and this realization allowed us to ask more pertinent questions in our semi-structured interviews (in other words, we didn't ask participants about neighborhoods that they do not spend time in).

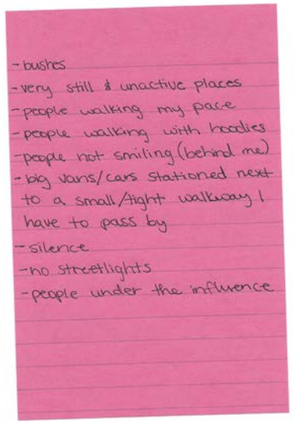


Finally, we asked participants to quickly **list things that make them feel unsafe**—features of the built environment, interactions with strangers, and so on—and asked them to imagine what they would need to feel safer in the face of the items that they had identified.









When we moved into the question and answer part of the interview (see protocol in the Appendix), we were able to reference our prior activities and stories.

The interviews were audio and video recorded and the data was coded, analyzed to identify patterns, pain points, and key findings. These findings, along with opportunities gathered from secondary research helped us to explore potential design implications.

09

Field Research

We are currently in the process of conducting field research in which we walk-along with our participants and elicit real-time, contextual information regarding their walking practices and feelings of safety. We piloted this research activity with two participants in order to determine what questions we should ask participants in order to prompt reflection on defensible walking behavior (for example, avoiding particular streets), as well as to ensure that a lapel mic would be able to properly capture audio. So far, we have conducted one walk-along, but plan to conduct at least two more before concluding this phase of our research.

On our first walk-along, we accompanied one female UW student as she walked home from class at night. During this walk-along, we observed what routes our participant took and behavior she exhibited, asking her questions about it along the way. This allowed us to better understand what contributes to feelings of safety, what behaviors she engages in to feel safe (e.g., avoiding certain streets), and if she has used any products in the space already (e.g., Companion app or carrying mace). Field research allowed us to observe our participant in a natural context, with her organic behavior when walking at night. Unlike our interview and diary study, this field study gave us the advantage of witnessing what a participant actually does, not just what she says she does. Additionally, observation allowed us to be in the actual environment and so we were able to notice problems or behaviors that our participant may not have been attentive to, and ask her about it on the spot; for example, our participant took an extremely inefficient route to get to her final destination, but did not realize it until we inquired about it.

There are some drawbacks of this method: Joining the participants on their walk home makes the activity inherently different from what we are researching, as they won't be walking alone. However, having the ability to actually see their route and ask probing questions to better understand their thoughts and behaviors during their route still made this a worthwhile choice. Understanding behaviors women already have during solitary walking surfaced current design gaps that will ultimately inform our solution.

The Implementation

In addition to the participation requirements listed in the screener, participants were also enrolled in night time courses. Two members of the research team accompanied our participant and observed her on the walk home. We prepared prompting questions (which can be viewed in the Appendix), but we also improvised as appropriate by asking questions about anything that we noticed along the walk that seemed noteworthy.

The specific questions asked were largely centered revolved around route choice, as well as anything we noticed our participant actively avoiding (e.g, if they cross the street to avoid walking next to a construction area, we may ask them about that). We also prepared questions to determine if our participant uses any products, tools, or services to feel safer (e.g., a whistle hanging from their backpack, we would inquire about it). We audio recorded the walks and will annotate a map with the route walked along with anything interesting noticed or encountered.

SYNTHESIS

Insights

Our diary study, semi-structured interviews, and field research uncovered numerous findings that will shape our design solution going forward.

Coding

At the time of writing this, we have not yet coded the audio from our semi-structured interviews or field study. However, we have created and piloted a coding scheme that will be used to find themes in participant responses (please refer to the Appendix in order to view this document)., as can be seen in the Appendix. After concluding each research activity,For all participants, immediately after testing, we wrote up a reflection document highlighting potentially significant information surfaced by our participants. The findings below are based on those reflection documents. Once we complete coding, we will revise the Insights section below with any new findings, as well as provide precise numbers for existing themes (e.g., “6 out of 7 participants felt that walking at night was unsafe”)

1. There are difficulties assessing threat, as well as fear of unnecessary escalation.

Participants expressed concern regarding over-reacting to situations where they felt unsafe, not only for fear of expediting potential conflict, but also for social reasons; reacting in a defensive manner when it proves unnecessary can be an embarrassing experience, as well as potentially offensive for the person who is perceived as the threat.

Deciding whether someone may be a threat is a complex process, relying on both internal thought and analysis of external behavior. For example, participants described determining whether or not a person was following them by using both internal perceptions and biases about what this behavior looks like, but also by employing tests via physical action (e.g., standing off to the side of the path to see if the stranger will pass by, taking an inefficient or peculiar route to see if the stranger mimics this behavior). This multi-faceted process makes it difficult to quickly identify threats with certainty. Interestingly, some participants seemed aware of their own biases embedded in assessing whether someone was a threat, but felt that their biases, while unfortunate, were justifiable in situations regarding safety and self-defense.

The fear of expediting conflict came up in a few different ways. First, some participants expressed hesitation to involve the authorities. For example, one participant, after describing an incident in which she felt threatened, said “We both thought it was super creepy, but [we] didn’t know if it was something worthy of getting the police involved. I don’t know where the lines are for that [are] to be honest.” Similarly, at least two participants were concerned by the possibility of harming another person, expressing that for this reason, they do not carry a weapon. One participant elaborated on this attitude by saying that she doesn’t want to carry a pocket knife or mace because “then you’re hurting the other person - I don’t want to hurt them, I just want to get away?” Another explained that she used to carry pepper spray, but not longer does: “I would escalate a situation more than just defending myself. If I have a weapon, I want it to be something to protect me. Am I willing to put someone else’s life at danger? I feel mentally less burdened without any weapons to keep me safe. I read an article that had to do with shaping the whole perspective, if you are carrying a gun, if someone else has it too and they draw it on you, are you ready for that. Or if they have a knife. Are you actually ready to pull a trigger?”

Design Implications:

Participants can’t objectively assess their own risk, and they are concerned about the repercussions surrounding incorrect judgments. While it may not be possible to provide a design solution that would more “objectively” help them assess threat, there may be an opportunity to lower the threshold to seek help before a situation has escalated (e.g., by connecting them with services or resources that are less extreme than calling 911 or relying upon a deadly weapon, like a gun), or educating them on ways to defend themselves should the situation escalate.

When participants feel at risk of assault, but the situation is not yet urgent, calling 911, confronting the person they feel threatened by, or worrying friends or family feels too extreme. A design solution should empower users to take necessary steps to ensure their safety without shame. At the same time, our desire to make an ethical product, combined with participants’ concern for acting based on bias, requires that we avoid any design solutions that may stigmatize demographic groups or neighborhoods based on racial or socioeconomic biases about crime.

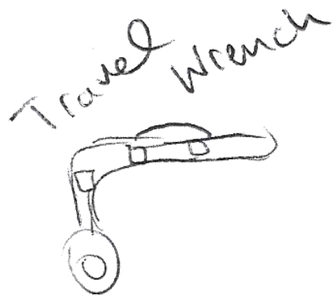
INSIGHTS

2. Women make strategic efforts to protect their own safety

As surfaced in the crime prevention through environmental design (CPTED) literature, women tend to feel safer when walking in built environments with specific physical and social features, and when a built environment is perceived as less safe, women tend to walk less overall (Hong & Chen, 2014). Our diary study, semi-structured interviews, and field study all corroborated this research, possibly to an even larger degree than our secondary research suggested, with some participants taking routes that we deemed surprisingly inefficient in order to feel safer. We have found that participants prefer to travel on well lit streets, construct mental maps of where open businesses are and consciously avoid what they consider to be "sketchy" areas (like the participant who made the below drawing) , and mentally note where crimes have been committed.

These findings support the idea that women may choose their routes based on features of the built environment. At the same time, women do not necessarily have a choice over what route they take. For example, while residents of low income neighborhoods tend to be and feel less safe walking alone than residents of affluent neighborhoods, they tend to walk more on average for utilitary reasons (Loukaitou-Sideris, 2006). Anecdotes in our interviews echoed the reality that women do not always have the choice to decide where and when they walk; for example, a diary study research participant described an instance in which she was arriving at Seattle late at night after being out of town, and because she did not have any food at home she was forced to walk to Safeway.

In addition to planning routes perceived as being safer, women employ personal strategies to promote their safety. As one participant said, "You have to think about it. At the end of the day you are responsible for your own safety. No one else is going to do it for you." Participants reported using a wide range of strategies such as carrying weapons or tools that can be used as a weapon, dressing conservatively when they know they will be walking alone, actively attending to their surroundings (that is, staying alert), holding their keys between their knuckles, walking less at night, and even avoiding walking alone entirely.



Interestingly, while there are clear themes in the features of the built environment that tend to correspond with perceived safety (e.g. avoiding dark, narrow areas like alleys), the participants' specific strategies outside of route planning are somewhat idiosyncratic. For example, some participants communicate their routes and walking plans with others while others don't, and some participants carry weapons, while others don't. Relatedly, women's planned responses to attack vary: some would run, some would call for help, while others would try to fight back. Interestingly, two participants described using a tactic of engaging with the person they feel threatened by to 'throw them off,' with one saying "I joke it off, laugh along. I don't ignore people if I feel threatened. I try to play along or confuse them. Giving off a negative or pushy response is very dangerous."

Further complicating the issue is the fact that an individual's response may be affected by their understanding of why something may be a threat. For example, one participant referenced feeling less safe around homeless people because they are in need and thus might want to steal something from them, while another believed that homeless people were unsafe because they suffer from mental instability. While we did not directly test for this in our research, we believe that it is a logical assumption that the attributed source of fear could influence strategies to respond to that fear (e.g., it seems likely that you would respond to someone differently based on whether you think they are harassing you due to mental illness versus . whether they plan to rob you).

Design Implications:

Given the high tendency to plan routes based on features of the built environment and the common opinion of what features constitute a safe route, providing users with knowledge of the features of the built environment may help women plan routes that they feel and are safer in. Importantly, women are attempting to solve the problem, but experiencing trade-offs between safety and freedom of movement. We should be careful not to strip women of their autonomy in society by putting limits on the places they feel comfortable in and by further contributing to the societal problem that women only belong in certain spaces at certain times (Koskela, 2000).

The fact that women are actively taking steps to promote their own safety means that a design solution should leverage this desire, but also potentially attempt to compliment and accentuate these existing strategies. Given the individual differences in personal strategies, we should be mindful not to create a one-size-fits-all solution and should either narrow down to a specific target user or allow for personalization in a design.

Lastly, a design solution should recognize that women do not always have a choice of what route they take. For example, if a user lives or works in an unsafe area, she doesn't have the option of simply avoiding it- therefore a design solution should suggest the safest course of action, rather than one that meets a uniform criteria of "safe" (Koskela, 2000). Similarly, design solutions should provide options for individuals who have no control over the direction of their route by offering functionality or resources independent of route planning.

3. Women feel safer around and seek out the presence of other people.

Not surprisingly, what makes our participants feel safer when walking alone is feeling less alone. For example, all of our participants described strategically planning routes that would place them in more populated areas. This notion of being around others feeling safer is also backed up by a robust amount of academic literature that has found that people tend to feel safer walking on more populated streets (Hong & Chen, 2014; Brown, et al. 2007; Loukaitou-Sideris, 2006).

Unexpectedly, efforts to reduce aloneness went beyond walking in more densely populated areas. Multiple participants mentioned that when they feel uneasy while walking, they will use their phone to chat with someone during their walk. Interestingly, this was not necessarily to let others know they felt afraid, but simply being on the phone with someone helped them feel safer. Similarly, some participants involved others (typically a roommate or romantic partner) in keeping track of their safety and whereabouts by letting them know when to expect them to arrive at their destination.

Decreasing aloneness while walking may be the single most important factor to feeling safe while walking. In all interviews, participants, often unprompted, mentioned attempts to be less alone while walking, typically bringing it up several times.

Design implications:

A design solution should leverage the comforting power of having others present, if possible. Both in the moment of perceived threat and, more generally, there is an opportunity to target the increased comfort that women feel while walking with an increased presence of others (e.g., a solution may help women be in touch with others when they feel uneasy, or involve community walking efforts to decrease walking alone in general). A design solution should not ignore or underestimate how important social presence is to feeling safe. If a design solution does involve incorporating strangers, it should take measures not to put women at risk by doing so.

4. Communication of fear is an ongoing issue.

Contrary to participants feeling safer when less alone, we have found a general silence around women openly communicating their fear. Citing reasons like being embarrassed about being afraid, an insecurity about whether their fear is justified, not wanting to worry people (e.g., when discussing whether her parents were aware of her late night walking behaviors and the high number of UW Alerts she receives, a participant said, “I didn’t want to worry them. The less you know the better you sleep”), female-identifying individuals may not reach out for help.

Participants are afraid of others knowing about their fears in all parts of the walking timeline: they are embarrassed to communicate to others before their walk that they don’t feel safe being alone, they are embarrassed to communicate to others that they feel afraid during their walk, and after an incident occurs, they are embarrassed to report it or discuss it with friends and family.

Part of this problem might be related to the information that women receive from an early age that they are responsible and accountable for their own safety and are exposed to news media which frequently blame victims for assault (Koskela, 2000). For example, one of our participants told her mother about an incident in which she and her cousin were followed by a car when walking at night, prompting her mother to respond by saying “I told you not to go out at night.” This incident caused our participant to resolve not to communicate with her mother about incidents of this nature in the future. For fear of this same response, her cousin never told her own mother about the incident.

Additionally, we learned that the nature of individual relationships, as well as previous social contact prior to the moment of fear, may influence an individual’s likelihood of reaching out. For example, one participant explained that it’s not a convention nowadays to call someone out of the blue and so if she felt afraid while walking, she would only feel comfortable calling someone if they had already been talking on the phone earlier that day and she could just continue the conversation (yet, she would still not explain that she was afraid, she would just call them to feel less alone). Similarly, a participant explained that she may tell her boyfriend that she feels afraid, but not friends. Another participant was not in open communication with her fiancé or friends about her fears while walking, while another participant felt comfortable and was able to overcome hesitation and ask her male friends to help her get home safely by either driving or walking her to her end destination. Another example demonstrating variability according to relationship type is depicted by a participant that said she felt safer walking with men than women because of a prior incident when she and another woman were followed; the other woman panicked rather than trying to escape, and so the participant learned she couldn’t trust women to respond to fear in a practical way.

Design Implications:

There is a clear opportunity to lower the threshold for women to communicate their fears around walking. More broadly, there may also be an opportunity to grow the conversation on a community scale, thereby normalizing the conversation. In both of these situations, we should allow users to define their own relationships and communication styles and we we should not assume that there is a one-size-fits-all approach to relationships like “parent”, “best friend”, or “boyfriend”.

CONCLUSION

Next Steps

We are currently in the process of coding our semi-structured interviews in order to surface additional findings. We intend to use this information to create visualized user experience maps. We intend to map out the potential solution space and represent how individuals behave, as well as what interpersonal activities they engage in and how social and governmental entities respond to female-identifying individuals' perceptions of fear. Individuals may choose to engage in defensible behaviors, like carrying mace, or, they may choose to reach out to friends for support, the police for intervention, or engage in a community dialogue regarding hostile walking environments. We believe that once we examine these different levels of response we can focus on ideating for each specific category, as well as identifying solutions that span categories. We also intend on creating a more intuitive visualization of our competitive analysis so that we may more easily identify patterns across existing products. We believe visualizations of our synthesized findings will aid us tremendously as we attempt to brainstorm potential design interventions.

RESEARCH

Continue Field Studies

Observational Activities

Solution Space Analysis

SYNTHESIS

Code Interviews

Competitive Analysis

Visualization

Individual Synthesis

Group Synthesis

Sources

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APPENDIX