

Wearable Identities: Understanding Wearables' Potential for Supporting the Expression of Queer Identities

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ABSTRACT

Queer identity research largely overlooks wearable technology. Most work exploring sociocultural considerations of wearable technology determines what is “socially acceptable” based on privileged bodies, excluding queer perspectives. We address this by establishing the foundations of a knowledge base for wearables that support queer expression. We conducted a two-phase qualitative study exploring queer expressive practices and wearable technologies through 16 semi-structured interviews and 15 body mapping workshops with the queer community. We observed themes framing the queer community’s understanding of queer expression, wearable technology, and wearable technology for queer users. Providing design considerations and discussions on the potential of our methods, our work enables the creation of wearable technologies that offer meaningful user experiences for the queer community. CAUTION: This paper discusses topics that could trigger those with histories of homophobia, transphobia, gender dysphoria, racism or eating disorders. Please use caution when engaging with this work.

CCS CONCEPTS

• **Human-centered computing** → **Empirical studies in HCI; Human computer interaction (HCI); User studies**; • **Social and professional topics** → **Sexual orientation**.

KEYWORDS

Sexual and Gender Minorities, Inclusive design, Queer Interaction, Self-Presentation, Identity Management, Wearable Computing, Body Mapping, Speculative Design, Design Fiction, Somatic Design

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1 INTRODUCTION

As of 2018, openly identifying queer Canadians accounted for an approximate four percent of the population, a percentage nearly

doubling in the United States [21, 63]. Despite growing public perception, queer Canadians continue to have quality of life concerns due to discrimination and a lack of acceptance [7, 30, 84, 105]. Despite these tragic realities, the queer community continues to practise diverse methods of community-wide resistance [6, 7, 21, 30, 63, 84, 105].

One of the pivotal aspects of queer lived experiences is thus the expression of one’s queerness. When we use the term queer, we understand *queer* as “relating to a sexual or gender identity that does not correspond to established ideas of sexuality and gender, especially heterosexual norms” [111]. Authentic expression thus allows queer individuals to experience a heightened sense of community, mental well-being, and a feeling of assertion, accuracy, and joy in one’s gender and physical bodies (i.e., gender and bodily euphoria) [1, 8, 50, 103]. As the body has always been one of the largest canvases for queer expression [12, 59, 103], it is unsurprising that body-worn technology (hereinafter referred to as *wearables*) has begun to offer numerous explicitly queer components [2].

The queer-inclusive nature of commercial wearables, however, is being called into question for its reliance on “rainbow capitalism” that focuses on white, able-bodied, and cisgender queer experiences [39, 111]. This causes certain members of queer communities to become more marginalized by comparison, leading to feelings of isolation and invisibility [51, 78, 122]. This is particularly relevant in the growing calls for designing technology to subvert the marginalization of underrepresented users [39, 51, 74, 78, 109, 110, 122].

Queer HCI research has grown in recent years, making particular strides with the online queer persona, often through topics such as identity disclosure [37, 96] and social media usage patterns [4, 22, 33, 52]. Yet, we have noticed a lack of existing HCI literature investigating queer expression outside of online contexts. Wearables, devices worn on, near or even within bodies [48, 124], as an emerging style of technology are particularly fascinating for their extremely varied application potential in fields like healthcare [73], athletics [81], and accessibility [100]. From smart garments to e-textiles, wearables are being explored for their potential to be small, discreet, methods of personalized computing capable of helping enhancing the wearer’s quality of life [48, 71, 106]. While some wearable research has begun exploring the social acceptability of wearables [29, 38, 80, 81], these works largely determine what is “socially acceptable” based on privileged perspectives [36, 44, 128].

Given this background, we sought to bridge a gap in how wearables can be used as technologies for queer identity expression by establishing the foundations of a knowledge base for wearables design that authentically supports queer experiences. Motivated by Haimson et al.’s [54] work in investigating technologies the trans* community desires, our goal was to influence a shift in more

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meaningful wearables design for the queer community. To achieve this goal, we posed the following research questions:

- R1. How can body mapping as a research activity generate new knowledge regarding the experiences of queer expression and wearables?
- R2. What types of future expressive queer wearables does the queer community envision?
- R3. How can wearables be designed to support queer lived experiences?

To address these questions, we conducted a two-phase qualitative study exploring queer expressive practices and wearables. In phase one, we performed semi-structured interviews with 16 queer individuals who shared their experiences and opinions on identity expression, wearable device usage, and digital and wearable expression. During the second phase, we carried out 15 individual body mapping workshops with members of queer communities to gain a deeper understanding of the relationship between queer expression and bodies and the potential of future queer expressive wearables. While we recognize the importance of discussing queer experiences on a global scale, we must acknowledge that our work, and thus use of *queer community*, focuses on Western queer experiences.

We provide three main contributions by offering a knowledge base regarding queer wearable design through a series of design recommendations. Secondly, we provide a series of user-generated queer wearable designs to provide a direct insight into the types of wearables the queer community envisions and would benefit from serving as inspiration for future queer wearables from a human-centred perspective. Finally, we provide a methodological contribution in our execution of a body mapping user study examining queer wearables and identity expression. Our adaptation to traditional body mapping is a reflection of our epistemological positionality of queer theories as an explicit pursuit to challenge and shift existing heteronormative means of understanding, collecting, and disseminating knowledge [104, 113]. The method can be easily replicated to answer similar research questions for other populations and encourages future HCI work that veers away from the marginalization of underrepresented users. Using our contributions, wearable designers will have the resources to improve existing practices for queer expression in wearables and create more meaningful interactivity for queer users.

2 RELATED WORKS

In addressing our research goals of establishing a knowledge base for the improved design of wearables that support queer expression, we explored existing literature on four key domains. These fields include queer identity management and expression, designing for queerness, wearable aesthetics, and social considerations for wearables.

2.1 Queer Identity Management and Expression

Queer expression is a diverse practice that has managed to preserve its roots while simultaneously evolving over time. To better offer recommendations regarding the implementation of queer expression in wearables, we analyze prominent examples of queer expression while offering insight into contemporary HCI research studying queer identity management.

2.1.1 Relating to the Bodies. Dress is one of the most prominent manners of queer expression and is often a source of both elation and stress when learning how to negotiate it [25, 102]. We note early historical examples in the popularization of the “hankey code”, in which predominantly queer men would choose colours, patterns, and pant-pocket locations of handkerchiefs to discreetly communicate intimate desires [120]. In more recent years, Reddy-Best et al. [103] highlighted queer dress as a volatile space in which queer women negotiate degrees of displayed queerness, relying on gender performativity to communicate overall queerness [101]. Clarke et al. [25] affirmed their findings, including queer men, in that dress often comes from a substantial need to highlight one’s queerness while also joining queer culture.

Another popular means of queer expression lies in the practice of bodily modification (e.g., piercings, tattoos), offering the queer community an opportunity to subvert societal norms [14, 70]. For instance, Pitts [97] highlights practices of queer bodily modification done with the intention of explicit queer expression that can bring a sense of pleasure. This amalgamation of literature alone demonstrates the role queer bodies play in queer expression. However, to our knowledge there has been limited research around how wearable technology can potentially affect queer expression.



Figure 1: Intersex-Inclusive Pride Progress Flag (Left), Leather Pride Flag (Right)

2.1.2 Queer Semiotics. The use of symbols to represent lived experiences within the queer community has always been a popular practice. Arguably one of the most prominent examples of queer semiotics lies in the use of pride flags. Pride flags represent any subset of the greater queer community and, as such, encompasses dozens of colour and pattern combinations to represent different communities from the greater queer community to special-interest groups like the leather community (Figure 1) [6].

Iconography also plays a vital role in much of the queer community’s expression. One of the most prominent examples of queer iconography is in the inverted pink triangle reclaimed from its Nazi Germany roots during the height of the gay liberation movement [62, 98]. Similarly, the lambda has a history as a queer symbol used during the gay rights movements. Queer semiotics has also taken on the form of images such as the labrys and a double-sided axe that serves as a shared symbol for feminism and lesbian pride [88, 123]. Figure 2 displays the aforementioned queer semiotics. Historical and modern applications of queer semiotics highlight the potential application of visual means representing queerness through a shared aesthetic. Though some technology does showcase queer iconography (for example, wearing a rainbow flag wristwatch strap on an apple watch), little research have explored at the potential of

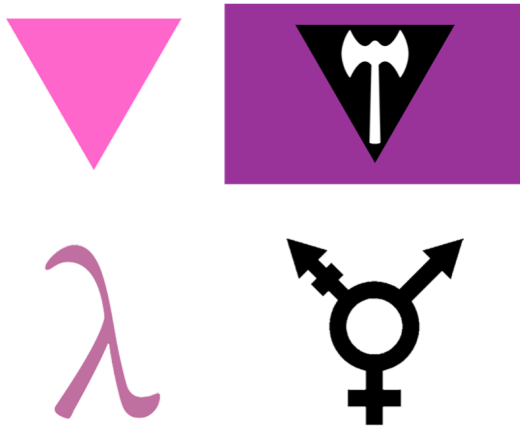


Figure 2: Pink Triangle (Top Left), Labrys Flag (Top Right), Lambda (Bottom Left), Transgender Symbol (Bottom Right)

iconography and how it would be used by western queer cultures in wearable technology.

2.2 Designing for Queerness

Queering heteronormative standards of knowledge and design in HCI has been a domain of growing importance [75]. With the growing popularity of online communities, prominent user experience discussions for queer communities have begun to focus on the online queer persona [4, 31, 55, 82]. These works have observed social networking sites (SNS) as a beneficial avenue for identity disclosure [22, 33, 37, 96] and discovery [4, 20, 40, 52, 53].

We shift focus, however, to non-SNS based work exploring queer design considerations [6, 34, 109, 116]. A substantial amount of design work has focused on designing with gender diversity in mind, particularly through the exploration of what Haimson et al. [53] define as “trans technologies” to support different aspects (e.g., multiplicity, agency) of gender transition [3, 9, 53, 54]. Acknowledging multiple identities and experiences has also been an extremely important recommendation when designing for gender diversity [18]. For instance, Jaroszewski et al. [60] present a series of survey design recommendations, such as contextually informed language, to gain meaningful responses for non-cisgender participants. Augustaitis et al. [5] reported similar design implications for gender diversity, emphasizing the importance of avoiding a “singular narrative” on online health platforms. To our knowledge, limited work has been developed on understanding the social implication and future use cases for wearable technologies for the queer community.

2.3 Speculative Design

Within HCI, a common practice is to contribute to the academic discourse through material and technical knowledge. However, an uncommon way to conduct research in HCI is by exploring social and even political ideologies of the future technologies [114]. Bruce Sterling, one of the founders of speculative design, defines it as “the deliberate use of diegetic prototypes to suspend disbelief about change” [13]. Speculative design focuses on narratives and understanding through a user’s experience in their own lived experiences

allowing them to imagine what future technologies could support their values and environment. This approach has been very successful in bringing marginalized groups into information conversations about how their ideal society will be and how we can design technology to support them. For example, Bray and Harrington [17], and Harrington et al. [57] speculate the ideal future around black feminism, whereas Haimson et al. [54] discuss future technologies for the trans* communities. Both researchers argue that scholars and researchers need to include people from marginalized groups in speculative design conversations [17, 57]. Our work will continue this discourse by discussing how speculative design strategies can include queer voices and bring more minorities into conversations in speculative design.

2.3.1 Embodied Speculative Design and Body Maps. Within speculative design workshops, the methods used encourage a positive discourse and creative output to develop and ideate technologies around the users’ utopian, dystopian, and more realistic near futures [24]. Within speculative design, there is a subset of the research method called embodied speculative design. The method focuses on understanding technology futures and how they affect the users’ embodied experience [10]. One way to collect embodied experiences is to use body maps. Body maps are an artistic qualitative method which encourages users to map their lived experiences on an outline of a body [28]. Though drawing is the main data collection method, body maps are often used as a projective tool to encourage conversations around felt experiences and understanding the potential of tangible and wearable computing [28]. For example, Cochrane et al. [26] used the body map in their autoethnographic study to determine how emotions affect their body. Through the data, the researchers designed an interactive scarf to support the positive coping strategy of deep breathing when the researcher was experiencing stronger negative emotions. However, as Spiel [110] notes, there is limited embodied research on minorities, and they encourage that more research and scholarly discourse are needed in the space. Our work continues this discourse by exploring how body maps can be used in the speculative design process and by bringing queer voices into the embodied speculative design space.

2.4 Wearable Aesthetics

Given the nature of our research questions, it is essential to explore wearable design, particularly as it relates to aesthetic considerations. Along with functionality and security, aesthetics remain one of the key design traits that can heavily influence the adoption of a wearable [61]. As superior design aesthetics have been observed to increase wearable adoption [89], Juhlin et al. [66] and Pateman et al. [93] observed that wearable design that ignores fashionable and well-crafted aesthetics poses the risk of causing disinterest [35, 36, 92]. The customization of wearables has been observed for potential to offer users the opportunity to create personalized aesthetic experiences that encourages wearable adoption [58, 61, 66, 93]. The choice of colours, designs, and materials play a significant role in deciding which wearables users choose to wear [42]. However, to our knowledge, limited work has been conducted on understanding the importance of aesthetics for minority groups, especially within the queer community.

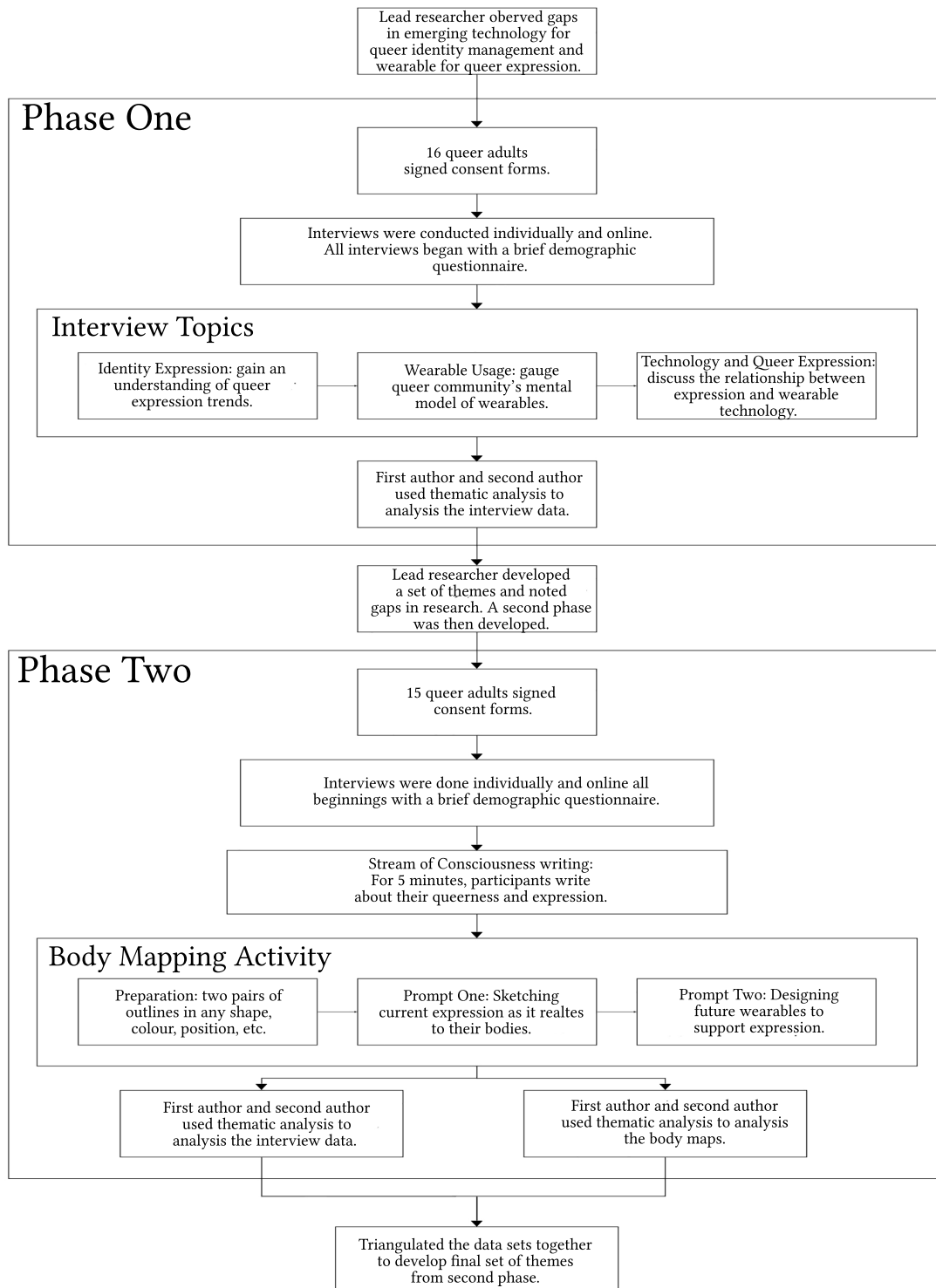


Figure 3: Full study methodology.

2.5 Social Considerations for Wearables

There has been an increase in works investigating what Kelly [67] defined as socially acceptable wearables [72, 99]. Design implications for the social acceptability of wearables tend to focus on conversations surrounding bodily locations and gestural interactions [128]. Designers should place wearables on non-distracting areas like the wrist or forearm while, context-dependently, avoiding locations typically associated to sexual activity or bodily waste [107, 128]. Dunne et al. [36] also suggest that interaction design should consider societally accepted gestures, such as commonly used swiping over less popular shaking motions. Social acceptability has also extended toward what Buenaflor et al. [19] describes as the “social aspect” of wearable design. Kelly et al. [67–69] developed the Wearable Acceptability range to assert the social acceptability of a wearable based on how the device either fulfills a user’s goals or meets their fears. Nam et al. [90] refined the WEAR scale to focus on four factors of design and aesthetics, self-expression, consequence, and reflection by others. However, these suggestions did not consider the cultural and social needs of minority groups which have the potential to change locations and use cases of wearable technology.

While less numerous, there do exist several prominent studies on the design of expressive wearables. Epp et al. [38] explored of the relationship between wearables and Finnish identity practises suggesting future expressive wearables consider utilizing multifaceted components to stand out. Genç et al. [45] demonstrated the expressive applications of social wearable design through their DecoLive Jacket, an electrochromic smart jacket powered by NFC tags to communicate wearer social availability. Investigations into social considerations highlight the potential for wearables to enhance social interaction. A more solid foundation of the social implications of queer expressive wearables, however, requires a greater understanding of the general experiences of users with non-privileged lived experiences.

To answer our research questions, we developed a two-phase study to gain a deeper understanding of future technologies that can address the expressive needs and desires of queer individuals (Figure 3).

3 PHASE ONE: INTERVIEWS METHODOLOGY

We carried out the first phase of our overall project by conducting a series of sixteen semi-structured interviews with a diverse representation of the queer community. We begin this section by highlighting the methodology we carried out, including our participant pool, data collection, and data analysis techniques. Secondly, we share our discovered findings. We discuss wearable barriers experiences by queer communities and modifications to digital devices participants highlighted as having potential to support queer expression.

3.1 Participants

We recruited sixteen participants via different SNS platforms (Slack, Instagram, Facebook), networks within the queer community and snowball sampling techniques. As our research goal was to explore an initial broader scope of queer lived experiences, our sole

inclusion criteria was for adult participants over the age of 18 comfortable with the English language who identified as a member of the 2SLGBTQIA+ community or any other lived experiences that fall outside of cisgender and heterosexual. Table 1 displays a summary of our participants’ demographics. It is important to note that all demographic information provided is as stated by the corresponding participant and not assigned arbitrary categories by the researchers (e.g., P106 identified their trans* history as “Unsure”). Participant pseudonyms for those who participated in the interview phase of the project follow the format “PI#.” We compensated participants for their time with a CAD 20 electronic gift card to the online retailer of their choice. Our institution’s research ethics board approved the study.

3.2 Data Collection

We collected data via online semi-structured interviews with each of the participants. We recorded all interviews, and they lasted, on average, 49 minutes. Our interview questions explored three themes: identity expression, wearable usage, and understanding technology and queer expression. Following the interview, the lead researcher shared an ethics board-approved debrief letter with each participant. The debrief letter ensured ethical practices by providing additional details of the project and local, national, and international resources should participants have found the session content emotionally upsetting.

3.3 Data Analysis

We transcribed all recordings using the transcription software Trint [117]. The lead researcher reviewed all transcriptions for accuracy and familiarization and exported each to individual Microsoft Excel sheets. After breaking each transcript down into relevant quotes and themes, the lead researcher combined all meaning segments in one sheet to aid data retrieval and comparison.

The first and second author conducted a process of inductive thematic analysis on transcript data following established guidelines of Braun and Clark [15, 16] and David R. Thomas [115]. To determine the necessity of further recruitment should findings vary greatly, we conducted an initial thematic analysis on three transcripts from diverse participants. The lead researcher created summarized descriptive coding for each meaning segment, followed by a more condensed latent coding, then provided final codes for the three transcripts, establishing an initial code frame. The recurrence of several common codes indicated no need for further recruitment. To verify the coding process, the lead researcher and another research team member repeated the process with a fourth transcript to collaboratively review the code frame. The lead researcher then independently repeated the process for all transcripts at each stage, reviewing and redefining the code frame until further changes were not necessary.

Finally, using the online whiteboarding tool Miro [86], we visually organized codes into larger themes according to the degree to which they were central organizing concepts that encapsulated different aspects of our participants’ queer expression and wearable experiences. The thematic organization of codes lent itself to thematic relationships when discussing the connection between the design of wearables and queer expression.

Participant	Age	Gender	Trans* (History)	Sexuality	Race/Ethnicity	Session Location
PI01	23	Man	No	Gay	White	Canada
PI02	34	Non-Binary	Yes	Queer	White	US
PI03	36	Agender	No	Gay, Queer	White	UK
PI04	37	Non-Binary, Genderqueer	No	Pansexual	White	US
PI05	57	Man	No	Gay, Queer	White	US
PI06	26	Non-Binary	Unsure	Lesbian	White	Canada
PI07	20	Man	No	Gay	White	Canada
PI08	24	Woman	No	Bisexual	White	Canada
PI09	24	Trans-masc, Non-Binary, Fluid	Yes	Bisexual	White	Canada
PI10	18	Woman	No	No label, Non-male identities	White/Peruvian	Peru
PI11	31	Woman	No	Lesbian	East-Asian/Indian	India
PI12	18	Woman	No	Bisexual	White	Canada
PI13	23	Genderqueer	Yes/No	Bisexual	White	Canada
PI14	31	Non-Binary	Unsure	Queer	White	Germany
PI15	23	Woman	No	Gay	White	Canada
PI16	21	Something like "woman"	No	Biromantic, Asexual	White/Philipino	Canada

Table 1: Phase One Demographic

4 PHASE ONE: INTERVIEW FINDINGS

4.1 Wearable Barriers for Queer Communities

Participants emphasized a multitude of barriers that limit access to wearables with two noteworthy barriers including high costs and technological literacy. Shared by nine participants, we found cost to be the most common barrier to wearable access. PI03 shared that being able to afford wearables would block many within the community: "I now work in tech, so a well-paying job. That's definitely not going to be available to a huge portion of the [queer] population so I do think cost is a big factor." Four participants also shared expectations surrounding technological literacy arise when trying to use wearables. PI03 characterized this knowledge with a reliance on technological language: "There's a lot of jargon and it's hard to pick out what's going to be useful, what's going to be interesting because a lot of these technologies are so new. It's like 'Do I really need that? Will it be a distraction?'"

We also found critical barriers surrounding both physical and data safety. For three participants, there were explicit health concerns when using wearable devices. PI14 defined this ability to facilitate self-destructive behaviours, particularly with eating disorders, because fitness wearables pursue a sense of self-optimization: "I feel like a lot of these wearables, especially when it comes to fitness, are going to push you to do even more steps and more things you always have got to keep optimizing. And I don't agree with that, I don't think that's good." In a like manner, three participants also discussed data safety as being a barrier to wearable use. PI07 shared a fear of not knowing what is being done with their data as a barrier to wearable use: "We're plugged into this extreme biometric

system where every movement and conversation is measured and tracked and catalogued and that creeps me out."

Additionally, participants discussed barriers attributed to a lack of queer options and inclusivity. Five participants shared that queer expression through wearable devices is particularly challenging due to a lack of meaningful queer options. PI03 stated that many fitness wearables are limiting because of a reliance on sex binaries forced upon the wearer: "When you set up a device, something like [my Garmin watch], you have to pick whether you're male or female, it's like 'wait what are my other options?'" Three participants additionally highlighted barriers associated with underrepresented bodies. PI13 stated: "for a lot of people it's just not an option in terms of like gender expression. Like if you're AFAB and trying to look more masculine, finding clothes that fit a curvy body but also look masculine is a struggle."

4.2 Expressive Modifications for Digital Devices

PI02 stated that including multiple expressive options for things like pronouns could help in alleviating barriers surrounding a lack of public knowledge: "Allowing the option to put in what most resonates with us like having examples [of pronouns] because not everyone knows what they are." Seven participants shared that the customizability of these options were necessary for being able to easily change devices to fit personal identities, desires, and lived experiences. PI13 said: "being able to have opportunities to make them your own and exactly how you want to because queer expression is so varied."

Four participants shared how device hardware, through colour and shape, can support queer expression. PI02 and PI08 discussed

Participant ID	Age	Gender	Trans* History	Sexuality	Race/Ethnicity	Country Session Completed
PB01	22	Man	No	Bisexual	Filipino-Chinese	Canada
PB02	25	Non-binary	No	Pansexual, Queer	Black American	US
PB03	30	Trans woman	Yes	Gay	East Indian/Asian Indian	US
PB04	34	Man	No	Queer	South Asian	Australia
PB05	24	Woman	No	Bisexual	Mixed	Canada
PB06	21	Man (Trans Masc)	Yes	Queer	Asian	US
PB07	31	Non-Binary	No	Queer, Bisexual	White	Germany
PB08	32	Man	No	Queer, Bisexual	Indian	Australia
PB09	23	Non-Binary	No	Queer	Arab	Australia
PB10	30	Genderpunk, Genderqueer	Yes	Demisexual	White	Canada
PB11	23	Non-Binary	Unsure	Lesbian	White	Canada
PB12	36	Non-Binary, Trans Masc, Demiboi	Yes	Queer, Pansexual, Gray, Ace	Black/Indigenous	Canada
PB13	26	Woman	No	Queer	Mixed	Canada
PB14	57	Man	No	Gay	White	US
PB15	31	Non-binary	No	Biromantic, Asexual	Asian (Canadian-Chinese)	Canada

Table 2: Phase Two Demographic

the colour of devices that communicate different penchants for stereotypically masculine or feminine preferences. For PI02, they utilized colour to combat these stereotypes: “I’ve been experimenting a little bit more with colours [of my devices] ... I want to challenge toxic masculinity.” Similarly, we found device shape important for queer expression. PI11 shared that their camera reflects their queerness because of its utilitarian appearance: “It’s heavy, it’s big, and, if I had to gender it, it would definitely be masculine.” We additionally observed hardware modifications using accessories like straps, stickers, and cases (n=9). PI06 stated that utilizing stickers is not only a successful way of queering their tech, but also facilitating social interaction: “I’m big into stickers, I have a lot of stickers on all my tech... My tablet has a whole bunch of queer stickers that often generate great conversation with my colleagues who wanted to learn more.”

Additionally, nine participants highlighted the importance of adaptability to easily and quickly adjust expressive elements for different contexts. PI01 exemplified this as necessary for preserving one’s safety: “There will need to be a discreet feature if someone feels unsafe with displaying to an individual who might be aggressive or violent.” Three participants specifically discussed adaptability in allowing for varying degrees of visibility for expressive items.

5 PHASE TWO: BODY MAPPING METHODOLOGY

While the first phase of our study was beneficial in eliciting rich insights into experiences and opinions on queer expression and wearables, we observed challenges in design ideation in an interview setting. Thus, we began a second phase of the overall project to explore further wearables the queer community desired. In our second phase, we held fifteen individual online body mapping workshops with a diverse representation of the queer community. We begin this section by discussing the methodology explored in the second phase, including our participant demographics, data collection, and data analysis techniques.

5.1 Participants

Utilizing the same recruitment methods as the first study, we recruited fifteen participants to participate in our online body mapping workshops. As with the first phase, our inclusion criteria were for adult participants over 18 comfortable with the English language who identified as a member of the 2SLGBTQIA+ community or any other lived experiences that fall outside of cisgender and heterosexual. Table 2 displays a summary of the participants’ demographics. Aside from two participants (PB07 and PB14), all participants in this study did not participate in the first phase. To help differentiate from previous participants, pseudonyms for those who participated in the body mapping phase of the project follow the format “PB#.” It is again important that we state that all demographic information provided is as stated by the corresponding participant and

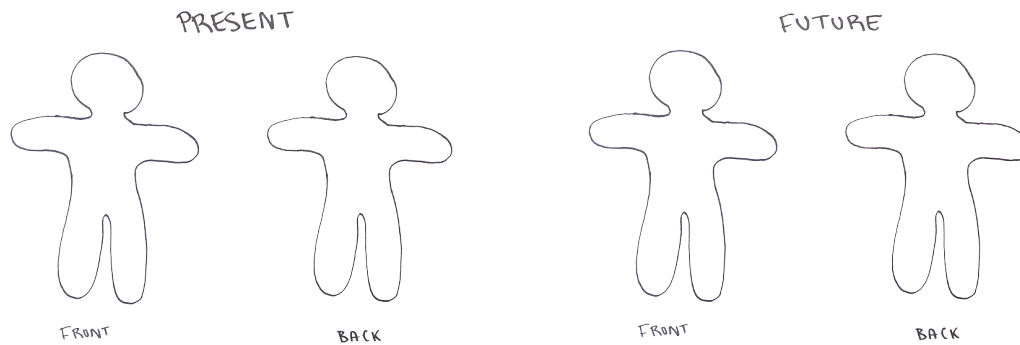


Figure 4: Example of an empty body map drawn by the first author.

not arbitrarily categorized by the researchers. We compensated participants for their time with a CAD 20 electronic gift card to the online retailer of their choice. Our institution’s research ethics approved the study.

5.2 Data Collection

We collected data via one-on-one, online body mapping workshops with each participant. We recorded all workshops, which lasted, on average, 40 minutes. As with the first phase, following the session, the lead researcher shared a debrief letter with additional project information and resources should participants have found the session content emotionally upsetting.

The lead researcher facilitated each workshop using a four-section structure which included questions around demographics, stream of consciousness writing, body maps and reflections around the drawings, and finally, a set of directed questions.

5.2.1 Demographics. We began our workshops by asking the participants for demographic information, which included age, gender, trans* history, sexuality, race/ethnicity, and the country in which they currently live (Figure 2).

5.2.2 Stream of Consciousness Writing. Stream-of-consciousness writing exercise, often used in first-person diary studies exercise [27, 112, 119]. In our exercise, we gave our participants 5 minutes to write about their lived queer experience without worrying about writing structure, grammar, or judgement of others reading their work. The exercise was used to encourage creativity and get initial thoughts out of the way so they could focus on the body mapping activity.

5.2.3 Body Mapping. Participants were then walked through a series of detailed instructions to prepare for the main body mapping research activity. Drawing two pairs of body outlines to represent the front and back of their present and future bodies (example is in Figure 5), the only constraint we gave participants was to create outlines large enough to sketch within. We encouraged participants to create their outlines in any colour, shape, or position they deemed meaningful to increase the likelihood of receiving artifacts that better represented a diverse set of bodies and queer experiences.

Slightly different than traditional body maps in HCI research, where users are encouraged to draw abstract symbols, and words on

their body map to help describe their embodied experience during activities [28], our body maps focused on two prompts. The first prompt encouraged participants to draw their present bodies to express their queerness. We probed them further by encouraging them to consider how their dress or physical bodies might connect to their queerness, how their expression may have changed over time and the reasons they might choose to express themselves.

The second sketch, we asked participants to envision their future bodies and how technology could affect their own queer experience. Some aspects we asked our participants to consider include how the new wearable technologies would work, if they would only be used for expression or what were additional features, what would these new garments look like and where on the body would they go, how would you describe your experience with it, and finally, are there any special considerations that could be highlighted (for example, safety or accessibility).

Following the sketching, participants were asked to reflect on their sketches with the first author. This allowed participants to explain their sketches in detail while the first author could probe them for further information on complex concepts discussed by the participant.

5.2.4 Post-Workshop Directed Questions. To conclude the workshop, the first author asked the participant three final directed questions. Question topics cover the relationship between their present expression and the envisioned wearable(s), the role that queer semiotics play in present expression and the devices they designed, and barriers their wearable(s) might address.

5.3 Data Analysis

As a result of the generation of body map artifacts, we coded the visual body maps separately from transcript data. We followed the same process of transcription, data review and organization as in the first phase.

Following the workshop sessions, each participant provided the research team with photos of their body maps. Utilizing the online whiteboarding tool *Miro*, the lead researcher uploaded and recreated the participants’ body maps using genderless body outlines to aid with data comparison amongst participants and veer from heteronormative conceptualizations of bodies.

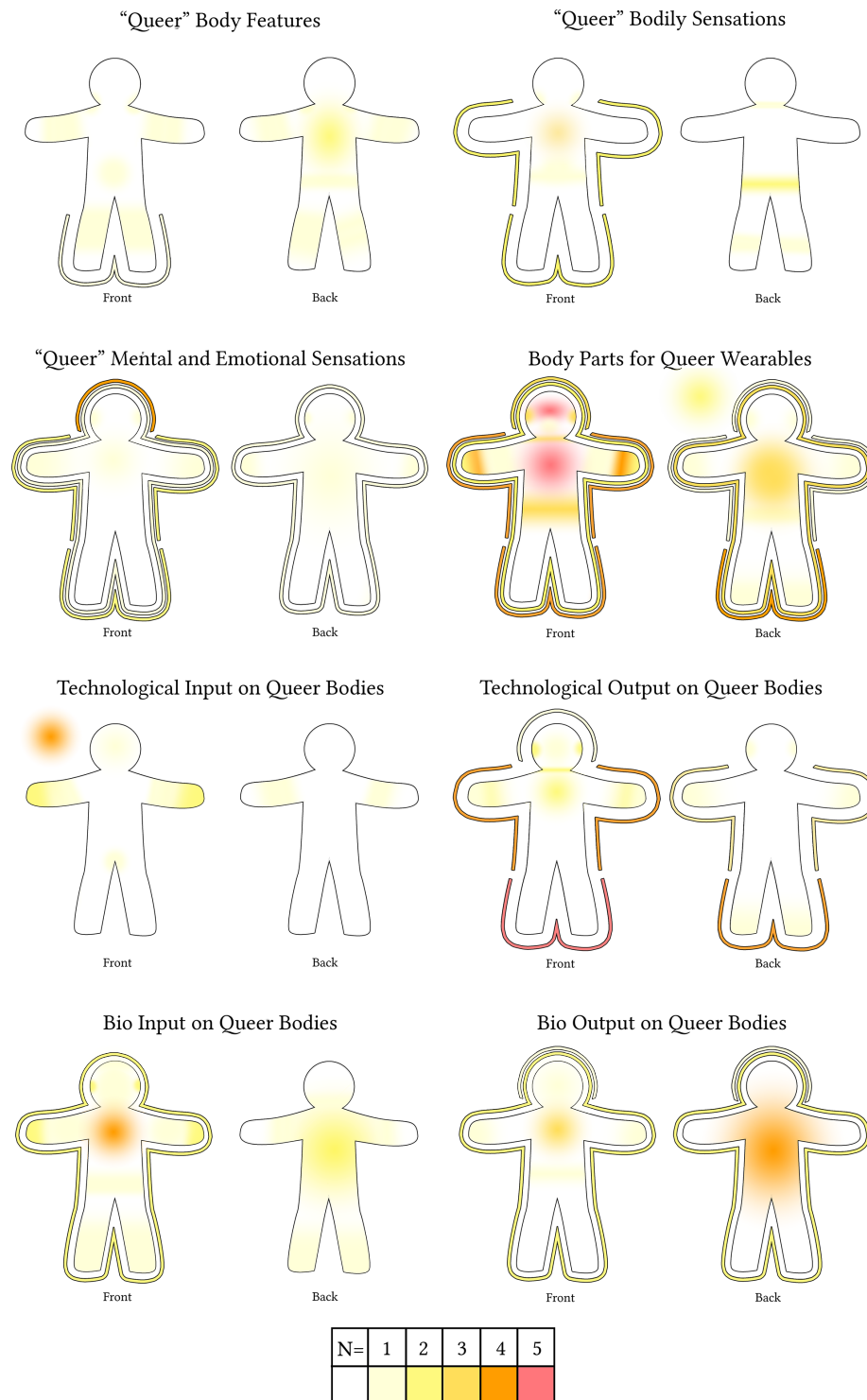


Figure 5: Each visualization displays a heat map overlaid onto a body map demonstrating the different areas of queer bodies associated with eight observed themes. Each visualization has a legend displaying the correlation between colour and frequency (e.g., red represents the highest possible frequency of five).

We analyzed body maps separately to textual transcripts inspired by the polytextual thematic analysis developed by Paula Reavey [47]. Using a visual approach, the first author used an inductive thematic approach to create codes based on different aspects of participant body maps and visually connected the relevant codes. To ensure the validity of the approach, the first author and the second author began the process independently with two sets of body maps, each establishing a relevant initial code frame. The two then reviewed code frames collaboratively. The lead researcher repeated the same process independently for the rest of the data, at each stage reviewing the code frame until further changes were no longer necessary. Codes were then visually organized into larger themes based on how the themes organized concepts established during thematic analysis.

6 PHASE TWO: BODY MAPPING RESULTS

6.1 Queer Experiences

6.1.1 Queer Semiotics. Seven participants discussed characteristics of queer semiotics relating to the practice of queer expression, particularly in their recognizability. PB11 and PB12 agreed that queer semiotics offers the benefit of an easily recognizable means of expression. PB12 stated: “If you put a rainbow on something, [cis-het] people will look at it and question if it’s gay. We know that it’s a symbol.” It is worth mentioning, however, that two participants discussed pitfalls regarding the use of queer semiotics. For PB07, queer semiotics, particularly those associated with rainbows, are often overused: “I think a lot of times with how we express ourselves and how we wear things, I hear a lot of people saying they’re sick and tired of seeing rainbow stuff. I get that, it *can* be obnoxious.”

6.1.2 “Queerness” as Physical Features. Our participants discussed parts of their anatomy associated with their queerness and queer expression. Common areas participants noted include their outer extremities, jaw, shoulders, back, waist, and abdomen.

6.1.3 “Queerness” as Physical Sensations. Participants similarly shared different physical sensations that correlate with aspects of their queer lived experiences. Examples include PB10’s association of their socio-masculine jawline as carrying a feeling of “strength” while PB08 discussed the feeling of “freedom” when wearing clothing that expressed their queerness.

6.1.4 “Queerness” as Mental and Emotional Sensations. The sensations included examples such as PB04 drawing the feeling of their chest housing queer compassion while PB02 experiences mental conflicts with expression in their mind. Participants noted the head (n=4) more often when discussing mental and emotional sensations but highlighted the whole body, lower body, and upper body.

6.2 Queer Wearables

In envisioning different queer wearables, our participants highlighted different parts of queer bodies that would feature, utilize, or benefit from queer wearables. The head and chest were the most popular individual wearable locations, where wrists, waist and back were also highlighted. Participants also highlighted the lower, upper, and whole body as potential locations for wearables.

6.2.1 Technological I/O. Participants mentioned various I/O techniques for queer wearables, both technological and biological. External examples of technological input included one use of environmental temperature (PB03) sensing and three references to application-based input. Examples of technological inputs include discussions of wrist-based input centred on using an external smart-watch to provide input for the main device (PB04, PB06). Examples of technological outputs include identity displaying devices situated on the chest (PB10), a shirt with a customizable display on the upper body (PB14), and height-adjustable shoes on the feet (PB02).

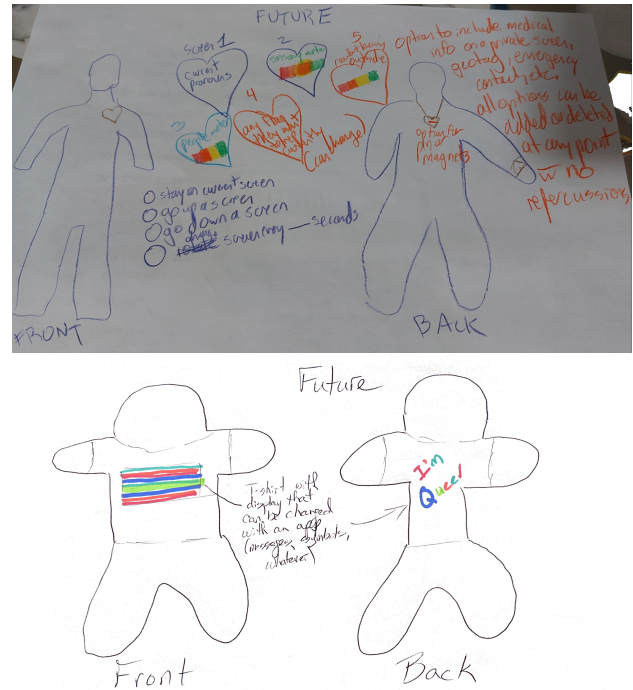


Figure 6: Body Map of PB10 (Top) and PB14 (Bottom)

6.2.2 Biological I/O. In a like manner to technological I/O, participants highlighted different parts of their queer bodies that would feature biological I/O. Biological input included taking the user’s chest and shaping it with a tech shaper or binder, altering the user’s voice through a wearable inserted into the mouth, and collecting emotional data through a device placed on the biceps. Examples of biological output included readjustments of the user’s spine or chest, aesthetic customizations of the user’s hair, and emotion-reflective tattoos implemented through the body.

6.2.3 Envisioning Wearables for Queer Communities. We now present our participants’ wearable designs. We use specific examples of the user-generated designs to highlight our participants’ desire for future wearables as they fall into one of four major categories of designing for: (1) expression and communication, (2) changing bodies, (3) managing queer health, and (4) finding others. We build off participant reflections to highlight important design qualities of queer wearables along the dimensions of supporting queer lived experiences, expression, bodies, and functionality. We note barriers

our participants shared regarding queer wearables, such as data safety and poor aesthetics.

Wearables for Expression and Communication. Most participants desired customizable clothing to enhance their queer expression. PB02, PB04, and PB14 all envisioned this style of queer wearable allowing the user to customize the fabric of the clothing for aesthetic purposes (Top Figure 6). PB04 shared: “Having clothes in the future that can change colours according to what you feel that day or your mood would be a great way to show your expression.”

PB03 and PB08, however, conceived adaptive clothing that grants the wearer the opportunity to express themselves through more functional means. For example, PB08 discussed clothing that could change in tightness to shift between athletic and casual forms: “like a cloth which is tight, and you can wear it while cycling, but when you push the button, it automatically makes it a dress.”

PB04 and PB11 both focused on the aesthetic qualities (e.g., semiotics) that could be given to different wearables to make them expressive. PB04, however, envisioned a greater breadth of devices: “So you can have headphones, glasses, any technology that can show on your queerness that would be great. Even Bluetooth earpieces can have those expressive colours as well. You can have a set of pride flag headphones as well.”

Identity and Metric Displays. PB04 and PB10 created complex designs of queer wearables used to communicate queer identities to those around them explicitly. PB04 conceptualized a customizable badge that would allow users to display various dynamic elements of their queer identities: “Why not have badges that can change their display? People now have pride flag badges and gender badges with pronouns, so it’d be great if you can have a badge that’s a screen, and you can have any display you might want to have that day.” As one component of a larger intricate system of personal displays, PB10 designed a similar display for queer identities: “The first screen would be whatever your pronouns are that day, because some people, they switch from day to day or event to event.” They additionally created designs for displays of personal metrics they found fundamental to their queer experiences, such as displaying social availability (Top Figure 6).

Three participants designed mood-reflective queer wearables that could express emotional states they deemed as being deeply connected to their queerness. PB01, for instance, designed “colour-changing tattoos or even a colour-changing jewelry [that] match the emotion you’re feeling”.

6.2.4 Wearables for Changing Bodies.

Exoskeleton/Mechanical Limbs. One of the two most common wearable ideas was the design of an exoskeleton or mechanical limbs that would attach to the user’s body. Three participants emphasized the importance of these wearables as beneficial to alleviating common complications the queer community faces, such as an “exoskeleton to support you in your life” (PB07) affording the wearer a heightened sense of agency, support, and safety or addressing physically inaccessible spaces (PB13) (Top Figure 7).

Binder/Body Shapers. The other most common example of wearable devices envisioned to support queer community was three

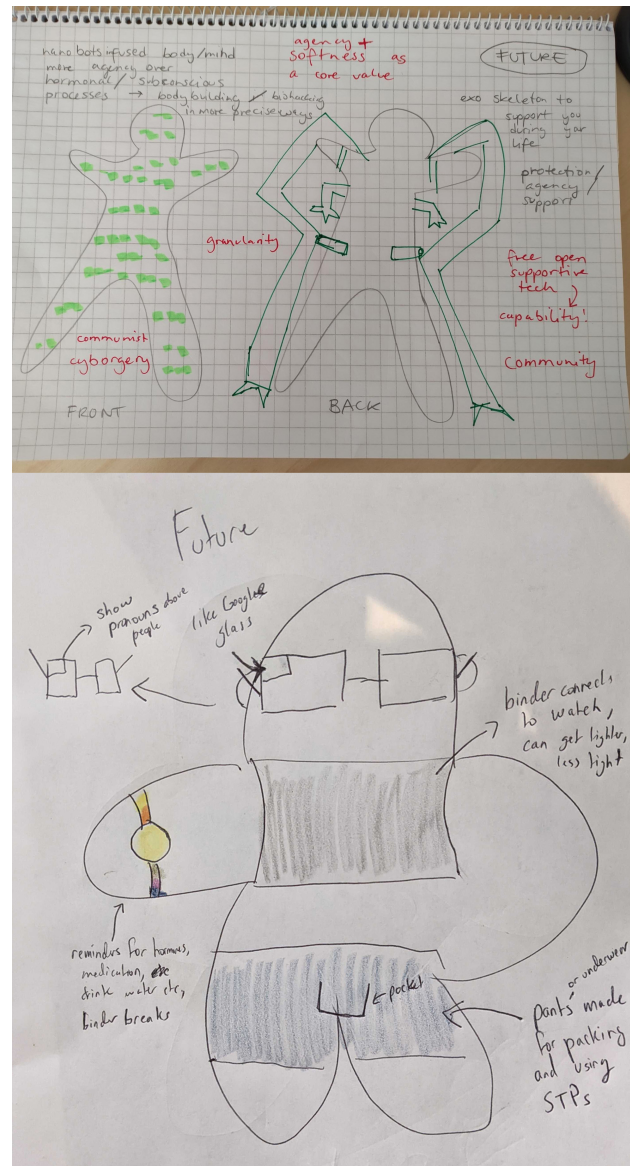


Figure 7: Body Map of PB07 (Top) and PB06 (Bottom)

distinct designs for binders and body shapers. PB15 designed a vest-body-shaper to help addressing body dysphoria that would allow the wearer to have “their body appear more or less feminine by enlarging or flattening their breasts.” They also designed this with the desire to improve safety for queer individuals entering spaces where their physical bodies do not align with standard societal expectations (e.g., female bodies in a woman’s restroom). PB06 similarly conceptualized a binder wearable with an accompanying smartwatch that would allow the user to control the binder’s tightness and provide notifications (e.g., informing the user if the binder has been worn for too long) (Bottom Figure 7).

Queer Body Modifications. Several participants designed wearables

with the intention of modifying queer bodies. PB12 envisioned queer wearables that could serve as body modifications akin to additional limbs. Firstly, they envisioned a set of horns or ears “that respond to your brainwaves” signalling different emotional states and could be personalized to communicate different queer identities or aesthetic preferences. Secondly, they also suggested the creation of “a tail that has full mobility,” to respond to stimuli in their environment and even offer a level of social interactivity with others by “poking them with the tail” or wrapping it around others to communicate affection (Bottom Figure 8).

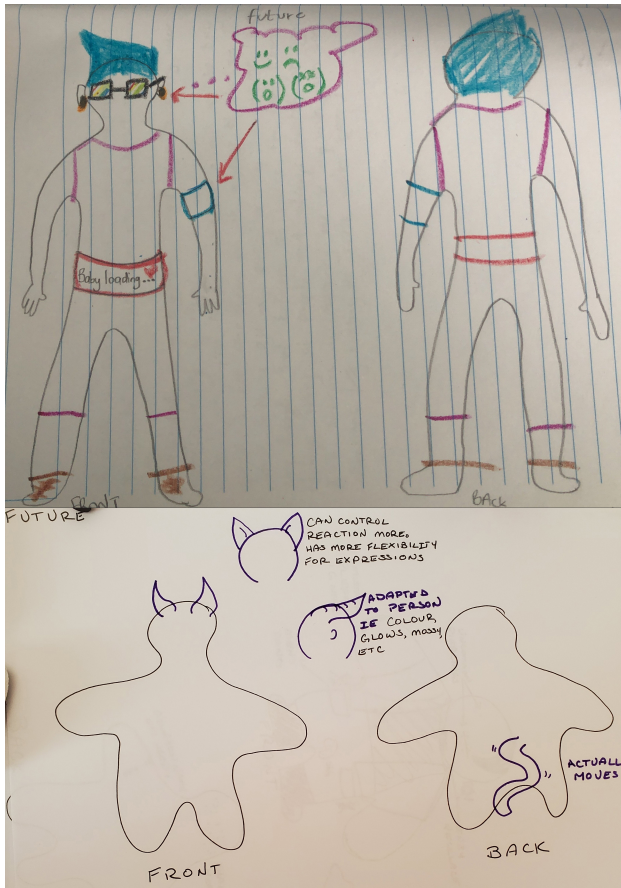


Figure 8: Body Map of PB05 (Top) and PB12 (Bottom)

Finally, PB02 developed a design for a voice-changing wearable aimed specifically for trans* individuals seeking euphoria through their voice. They stated: “I would want to see for my trans* brethren, an automatic voice changer. I wouldn’t make my own voice higher or lower, but I think as a wearable for trans* people, that would be amazing to just be able to like instantly like change their voice.” Other examples included PB02’s designing a wearable to quickly change their hairstyle in a way that circumvents labour barriers they associate with the styling of certain Black hairstyles and PB06’s wearable to support gender-affirming prosthetics worn in clothing.

6.2.5 Wearables for Managing Queer Health.

Hormone Delivery Regulators. Three participants conceptualized

wearable devices that would cater to the needs of the queer community by offering the functionality of hormone delivery regulation. PB06 (Bottom Figure 7) envisioned a smartwatch that offers “reminders for hormones, medication and hydrating” for the user as they believe, “queer people have a lot more things to worry about, it’s better to have something that can [offer reminders]”. PB07 also designed a series of nanobots infused inside the user to provide control of the endocrine system that would allow queer users full control of their bodily presentation. As a result of current difficult experiences with the process of in vitro fertilization (IVF), PB05 also outlined a wearable belt that would help alleviate many pain points associated with IVF.

6.2.6 Wearables for Finding Others.

Queer Community Detecting Wearables. We observed the final category of wearable devices envisioned by our participants to centre on the concept of being able to identify other queer individuals easily and safely in shared spaces. PB02 and PB05 created solutions that focused more on being able to discern the queerness of others around them. PB05 designed smart glasses as “a way of finding queer people around you. So that when you wear them, [you know someone is queer] instead of having those awkward moments of ‘I think you’re queer, but I’m not sure’” (Top Figure 8). PB02 did, however, stress the potential misuse of these devices by malicious third parties and insisted on using selective disclosure functionalities that allow individuals to turn on and “off different queer transmission signals.”

6.3 Designing Wearables for Queer Communities

6.3.1 Designing for Supporting Queer Lived Experiences. The most common type of wearable qualities we observed was those that strengthen queer experiences, often addressing different barriers queer individuals endure. For instance, six participants emphasized their wearables as designed with the user’s safety in mind. One of the core functionalities of PB05’s mood tracking device was the ability to call a support network when danger is detected: “[The device would] give you options to call a friend for mental health-related [issues]. It would also make sense if you felt like you were in danger, and it would ask if you wanted to call a friend.” PB06 and PB14 similarly stressed bodily safety associated with tightening binders, with PB06 designing cautionary warning measures: “[The wearable] should notice how long you’ve been wearing it and remind you to take it off, where it asks “Do you want to loosen it” or something like that. Or like let’s say even your watch notices you’re sleeping, and you have your binder on it then it will buzz and wake you up, so you’re not sleeping with it on or maybe make it looser.”

Queer wearables enabling a heightened feeling of independence were also very important for five participants. These conservations all found their roots in having the devices alleviate the user from a sense of labour experienced in their lives. PB02 and PB07’s generated their exoskeleton designs with the goal of carrying out physical labour, such as carrying heavy items, rooted in the sense of “hyper independence” caused by a lack of support systems for queer individuals. Two participants additionally characterized their devices as being able to support the wearer in managing emotional

labour. For PB03, they discussed their designed hormone delivery monitor as offering the opportunity to understand their own emotions better and make informed decisions for how to proceed in social situations: “It’s a way of knowing if I’m experiencing mood swings, I could ask myself ‘should I have personal space’ or ‘do I want to go outside or just walk by myself?’”

Four participants shared that helping navigate social settings and interactions was a beneficial feature that future wearables should offer. Three participants outlined devices that would afford the wearer greater environmental awareness. For PB03, a wearable device like PB02’s bionic eyes would be particularly useful for establishing safe spaces amongst queer individuals: “Let’s say if there is a device that shows there is another trans* or queer person in this space, it might make me feel safe to go to those spaces.” Two participants proposed designs to forge connections between individuals. PB12’s designed their wearable cat tail with the intent to interact with others through “poking them with your tail... [or] wrapping your tail around them.”

6.3.2 Designing for Expression and Visual Presentation. Participants emphasized enhancing user’s expression and visual presentation through design qualities like customizability, queer semiotics and selective disclosure, and desirable aesthetics. We noted certain design considerations for queer wearables that pertain to specifically queer experiences via queer semiotics and selective disclosure. For instance, four participants discussed the inclusion of queer semiotics in their envisioned devices using pride flags (n=4) and pronoun labels (n=1). Two participants also discussed the idea of building selective queer disclosure into their devices. While discussing their design of bionic eyes and smart glasses that could pick up on other queer individuals, PB02 emphasized the importance of this device allows users to “turn off queer transmission signals” at a moment’s notice.

For eight participants, the important design quality of wearable devices was in the customizability. While three participants discussed customizability in terms of selecting characteristics like colour palettes, two participants emphasized fluidity and designed their device around the notion of providing “a very malleable, changeable technology interface” (PB15). PB10 exemplified this idea using pronouns: “And the first screen it would be whatever your pronouns are that day, because some people, they switch from day to day or event to event.”

6.3.3 Designing with Queer Bodies in Mind. Three participants emphasized designing queer wearables to afford users a sense of bodily euphoria. In fact, for PB09’s body modification device, euphoria was the motivating factor in its design: “I wrote euphoria because I feel like a lot of it has to do with gender euphoria... and I think that [my device] would definitely address body dysphoria or dysmorphia.” PB10 and PB13 extended the idea of bodily euphoria when highlighting the importance for designing queer wearables with accessibility in mind: “This [exoskeleton] is meant to [help me] walk in a way that I’m familiar with and in the way that I connected with my queer identity since there’s a lot of like physical barriers in being able to be with my community.”

6.3.4 Designing for Functionality. Upon reflection of their wearable designs, five participants emphasized the importance on the

functionality the device offers, which PB02 described as “being more functional” than purely aesthetic. PB03 similarly discussed the importance of their designed hormone delivery monitor as less of an aesthetic prop but rather a “personal manager” to help reduce concerns of anxiety and stress.

Additionally, participants reflected on what functional capabilities make their designed queer wearables worthwhile such as user control, external device connectivity, and personal metric visualization. Four participants stressed the ability for the users to have substantial “agency” (PB07) with their wearables, allowing the user to decide what aspects of their queer identity are noticeable from the device and when (PB02, PB14). Three participants also touched upon user control as it relates to I/O in expressing interest in wearables incorporating compatibility with external devices. PB06 and PB14 suggested a smartwatch and app as an external interface to control the operations of the main wearable functionalities. Other noteworthy functionalities discussed by participants included the collection and presentation of personal metrics (n=3) and simple device maintenance (n=2).

7 DISCUSSION

Through semi-structured interviews and body mapping workshops, we explored the opinions and aspirations for expressive wearables as highlighted by the queer community. Following our two-phase study, we observed five major themes: (1) wearable barriers, (2) designing for queer expression, (3) queer bodies and expression, (4) envisioning wearables for the queer community futures, and (5) guidelines to support future design of wearable technologies. Our study elicited rich insights into how to design for expression and wearable usage in a way that is meaningful for the queer community.

Our work addresses a lack of research investigating wearables for queer users, highlighting future wearables’ potential for queer expression and the associated benefits. Based on our findings, we leverage our participants’ mental models of queer expression and wearables to discuss considerations for designing expressive wearables. We now offer a series of design recommendations for queer wearables followed by a reflection on our application of embodied speculative design body mapping as a queer research activity.

We must first recognize, however, the cultural context of our work. We acknowledge that both the research team and seventeen participants hold what Linxen et al. [77] refer to as a WEIRD (Western, Educated, Industrialized, Rich, and Democratic) perspectives. As queer experiences vary greatly between WEIRD and non-WEIRD countries [56, 87, 94], this undoubtedly influenced our findings and discussions. We were fortunate to have four participants who explicitly shared non-WEIRD cultural lived experiences such as PI10 (Peruvian and Canadian) and PB03 (Sri Lankan and American), as well as others with inherently non-WEIRD lived experiences, but our interviews and workshops did not elicit many substantial conversations on cultural connotations of queer lived experiences. This is addressed further in our discussions on future works and limitations.

7.1 Design Opportunities for Queer Wearables

We offer our design considerations to prevent user marginalization along the first stage of Sin et al.'s [109] framework Digital Design Marginalization, *Design Decisions*. By utilizing our insights, designers can follow Light's [75] call to pursue "how to design so that we do as little as possible to hamper the evolution of variety," ultimately preventing the further digital exclusion of queer users [109]. We offer initial design considerations for expressive wearables for queer users. As it is speculative, we encouraged our participants to imagine their futures, however, we will also highlight a few works that have the potential to be implemented into practice in the coming years.

7.1.1 Queer Aesthetics. Despite our assumptions of queer semiotics being a beneficial means of queer expression for wearables [12], we observed a rather substantial hesitancy to adopt them. While certain participants highlighted their benefits, most shared an aversion to queer semiotics citing reasons such as being overused and aesthetically displeasing. Building off Tuch et al.'s [118] observation of poor aesthetics leading to a perceived sense of diminished usability, it is vital to understand the implementation of queer aesthetics to support queer user experiences.

What we observed was a reconceptualization of queer semiotics. For many of our participants, the idea of symbols used to represent queerness were not standard queer aesthetics, rather elements that showcased personal characteristics and experiences (e.g., *Stephen Universe* clothing highlighting a fondness for queer-coded media). We observed a perceived sense of utility for queer semiotics to signal one's queerness to establish social signals like safety. This coincides with Petersen et al.'s [95] framework of Pragmatist Aesthetics designed with consideration of their context and usage. We differ from Petersen et al. and other existing works in aesthetic research [125, 127], however, in offering perspectives on aesthetics that do not rely on binary conceptualizations of gender to inform interpretations.

7.1.2 Functionality versus Expression. When discussing queer wearables, we note that our participants largely emphasized the device's functionality as being a priority over expression. Designers must create devices that serve a distinct purpose that fits within the user's lifestyle and needs, with queer expressivity as complementary to main functionalities. Expressive wearables designed for utility are a common endeavour in HCI [80, 81] but have yet to be fully explored through explicitly queer perspectives. We similarly observed that the wearables our participants designed for what they speculated as a quality of life improvement (e.g., administering/monitoring hormones) would also enhanced self-perceived queerness. Our participants desire for these wearable suggests that one's queer quality of life is in itself a form of queer expression, allowing users to feel like a more realized version of themselves.

Additionally, we highlight that the queer community we interviewed was extremely knowledgeable of devices that extended the standard conception of wearables, particularly screen-based smartwatches. Our participants indicated desires for wearables that explore bodies through features like the chest and eyes. This suggestion is beneficial as expressive devices could be designed to offer

useful functionality while simultaneously providing expressive options in areas commonly used for queer expression, such as the hair [101, 121, 126]. However, similar to other communities, we cannot generalize that all of the western queer community has this knowledge on wearables.

7.1.3 Customizability and Adaptability. Designers must consider topics of customizability for queer wearables. Epp et al. [38] made calls for the customization of expressive functionality to "allow people to create meaning through their practices and to avoid predefined labels." We argue that customizability is particularly important for queer users, especially as hardware qualities like shape and size have been observed to facilitate gender expression [3]. Wearable designers must address the need for meaning-making in personal practices by incorporating a greater capacity for user-managed content. Our reconceptualization of queer semiotics is particularly important as by curating wearable content, queer users can engage in more authentic device interactions.

Wearable designers must also create expressive wearables with adaptability in mind. Our participants' emphasis on showcasing different aspects of their queerness for specific contexts, such the use of PB02's queer transmission signals, is noteworthy in its mirroring of existing selective visibility conversations in queer SNS literature [33, 52, 53, 55]. This highlights how the importance of selective visibility for SNS expression can be applied to wearables. For instance, an expressive wearable device can have a toggleable discretion setting that dims or hides queer elements with a single input that users can adjust in various environments.

7.1.4 Accessibility. As there is a noteworthy overlap between the queer and disabled communities [43, 85], it is unsurprising that wearable accessibility is a key concern for the queer community. Though the core purpose of this paper was heavily focused on the western queer lived experience, it is impossible not to draw parallels between the two communities. It is also important to note, within our participants, there were a few who identified with being part of both communities.

Though there is limited work of wearable prototypes designed specifically for the queer community, there are many parallels in disability HCI research that our participants mentioned that could support the future technologies in the queer community. For example, Golgouneh et al. [49] designed an exoskeleton to support upper limb mobility issues. Our participants discussed exoskeletons and mechanical limbs which would support agency, independence and safety in their daily lives. We want to highlight this work as there is potential to explore exoskeletons outside of healthcare to increase both independence and safety for communities at risk. Whereas, another suggestion from the participants were hormone delivery regulations. There are already smart phone applications for medication reminders and information on medication dosage such as Cherian et al.'s [23] work designed for the elderly as well as the increased usage of automatic insulin pumps [64]. Though some of the suggestions from the participants are a bit out of scope (for instance, PB07 suggested to use nanobots inside of the user to provide control of the endocrine system) of HCI research at the time of this publication, hopefully the work can inspire the design of future wearable technologies.

Wearables should be easy to obtain and operate regardless of users lived experiences as, for many of our participants, actively expressing queerness can already be laborious. Through this work, we argue that building queer expression into assistive wearables would cater to queer disabled individuals and contribute to the management of societal expectations [100]. We do, however, suggest deeper investigation into the specific intricacies of building queer expression into assistive wearables through an exploration of the Stigma and Social Weight dimension of Deibel's [32] heuristic model for assistive technology adoption.

7.1.5 Safety. In designing for the queer community, it is essential to consider user safety. Blackstone et al. [11] and Simpson et al. [108] both found that commercial fitness wearables can negatively affect the user's emotional and physical health by promoting behaviours linked to eating disorders such as compensatory behaviours for fitness goals. This is particularly relevant for a group like the queer community as eating disorders have been observed to disproportionately affect queer individuals, especially queer women and gender-diverse individuals [65, 79].

Another safety concern for the queer community regarding wearable usage lies in data safety and privacy. Many queer individuals fear over-connection and large corporations harbouring their data due to societal risks such as exclusion and physical violence [82, 84]. Queer wearable designers must ensure they are transparent with their data usage policies and, whenever possible, allow users to control their data usage, storage, and dissemination. We refer to Devito et al.'s [33] call for designers to explore evolutionary data safety practices and ensure data privacy policies evolve alongside queer users.

7.2 Body Mapping as a Queer Research Activity

In HCI, body-mapping is typically used to kinetically visualize an experience with their bodies to generate information on in-the-moment experiences [28, 41, 46, 83]. In following our epistemological operationalization of queer theories, we offer a queer adaptation of body-mapping that not only adds a greater element of embodied speculative design, but provides a decisive challenging of heteronormative practices relating to bodies. Our approach questions HCI's implicit understanding of the body as a singular, perfect entity and rather places the focus on highlight the plurality of bodies as encouraged by Spiel [110]. This allows for a richer exploration and design of wearables that serve a more numerous and diverse group of users.

In addition to Spiel's call for greater explorations of non-privileged bodies in HCI research, our motivation for pursuing a unique take on body mapping was also grounded in Haimson et al.'s [54] work in designing trans technologies "to identify salient oppressive societal factors and ways technology design may help to address" them. Similarly, our work not only aligns with Dombrowski et al.'s social justice design dimension of recognition [34], but offers a substantial methodological contribution in its potential for quick reproducibility for other marginalized communities. For our work, we showcased the usefulness for queer communities, however, we hope other researchers look into the potential for using it with other underrepresented groups.

The speculative nature of our design-fiction body mapping method allowed for richer ideation of expressive wearables not constrained by technological feasibility [91]. We believe our procedure (which alongside body maps used stream of consciousness writing and interviews) as well as the flexibility of the method (i.e. the freedom to draw the bodies in any colour, position, and shape) helped develop a strong method to support meaningful discussions on future technologies for the queer community. This offered opportunities to explore critical conversations surrounding ethical expressive wearables and marginalized bodies emerging in HCI using what participants described as a "fun and therapeutic" means of exploring their queerness (PB03) [76, 110]. The nature of our body mapping activity was fruitful in supplementing the findings of our first phase, in which design ideation attempts yielded few meaningful results due to constraints with the interview format. Several participants shared hesitations regarding body mapping due to a perception of being too removed from their physical expression. When you ask participants to draw, they sometimes get nervous or feel judged from their artistic skills. It's important for the researchers to support participants to encourage them that this activity is not about artistic prowess. Participants often exemplified this difficulty as a challenge in visually representing abstract elements of expression (e.g., emotions, sensations) in a visual, two-dimensional format. We anticipated these concerns and initially expected to receive a single design per participant, totalling in 15. We sought to address these hesitations by giving our participants the opportunity to brainstorm their lived experiences through a stream of consciousness and design with no limitations (e.g., shape, colour, functionality). The speculative and creative nature of our body mapping activity thus led to participants being eager to design. As such, we collected over double the anticipated amount of designs with 34 unique concepts.

8 FUTURE WORK AND LIMITATIONS

We have gathered insights into queer expression and queer lived experiences, with further considerations and designs of wearables to support these experiences. The logical next step in our work is prototyping designs provided by our participants. While several designs reflect devices that are currently not technologically feasible, wearable research is investigating several similar devices and their potential to be implemented in the near future.

Additionally, we note the numerous connections made to non-explicitly-queer lived experiences. This demonstrates the potential for our methodology to elicit similar findings related to how wearable design could support quality of life for other marginalized communities. As such, we make calls for HCI research to conduct similar studies with explicitly non-WEIRD perspectives, both researcher and participant alike, to ensure the full breadth of queer experiences and feasibility of wearable technology is ascertained.

While we acknowledge the rich findings brought on by our work and participant contributions, we recognize demographic limitations in our study. Regardless of the increased diversity of the participants of phase two, we acknowledge that only five participants were above the age of 35 and 93% of phase one participants identified as White. This unfortunately excluded perspectives informed by different racial backgrounds and older queer community members. While we seek to provide a high-level insight into the needs

and wants of the queer community as a whole, we also recognize how the presentation of the heat maps poses the risk of homogenizing the experiences of queer individuals (e.g., cisgender and transgender gay men). Due to time and recruitment limitations, we also acknowledge that our findings only cover Western experiences as they relate to queerness, a factor that changes drastically internationally. It is for these reasons that we further implore future work to conduct similar studies with more nuanced participant pools to gain an even richer insight into their particular experiences.

9 CONCLUSION

Our work provides an in-depth examination of the intersection of queer expression and wearables. Our study advances research on queer identity management by providing an insight into an emerging technology that has yet to be thoroughly explored as a medium for queer expression. By leveraging the lessons from our participants' first-hand accounts and envisioned designs, wearable designers can create devices that provide richer, personalized, and authentic user experiences for queer users.

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