

(Re-)Framing Menopause Experiences for HCI and Design

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ABSTRACT

Informed by considerations from medicine and wellness research, experience design, investigations of new and emerging technologies, and sociopolitical critique, HCI researchers have demonstrated that women's health is a complex and rich topic. Turning these research outputs into productive interventions, however, is difficult. We argue that design is well positioned to address such a challenge thanks to its methodological traditions of problem setting and framing situated in synthetic (rather than analytic) knowledge production. In this paper, we focus on designing for experiences of menopause. Building on our prior empirical work on menopause and our commitment to pursue design informed by women's lived experience, we iteratively generated dozens of design frames and accompanying design crits. We document the unfolding of our design reasoning, showing how good-seeming insights nonetheless often lead to bad designs, while working progressively towards stronger insights and design constructs. The latter we offer as a contribution to researchers and practitioners who work at the intersections of women's health and design.

CCS CONCEPTS

• **Human-centered computing** → **Human computer interaction (HCI); Scenario-based design;** • **Social and professional topics** → **Women;** • **Applied computing** → **Health informatics.**

KEYWORDS

Menopause, design framing, scenarios, women's health

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1 INTRODUCTION

The burgeoning field of health HCI has developed systems and approaches that benefit people experiencing a variety of health-related conditions, their families, healthcare professionals, and society at-large. In some cases, it involves developing a system or a feature set to address a problem or need as articulated in the medical literature. For example, technologies are designed for individuals with diabetes to measure their blood sugar. But with the turn to wider formulations of health, such as wellness [18], self-care [5, 34], and a focus on social structures and environmental factors that contribute to health inequities [35], problems and solutions are not always easily coupled together. In women's health HCI research, these wider formulations of health have recently been taken up through topics such as pregnancy [20], abortion [33], incontinence [1], and intimate self-discovery [2].

We build on that work by focusing on menopause, which we understand as an era of life qualified not only by diverse physiological changes but also by changes in social, sexual, and even self-relations. The authors—two design researchers, a computer scientist, and a health technology researcher and expert on anti-ageism—intuitively felt that HCI could do something about menopause but didn't know what. Our review of the literature showed a few potential pathways—to use health sciences research to inform design and to build on existing health IT agendas, such as tracking. But as self-identified feminists, we also intuited that the lack of research on menopause was partly political. That is, we believe that the experience of menopause is not only shaped by hot flashes and irregular periods, but also by taboos about menstruation and menopause, the ways that women's health has been marginalized in medicine, and societal images linking female desirability and fertility. This intuition was confirmed through literature on menopause and our past empirical work [30]. Our starting point thus entailed a desire to

leverage HCI's strengths to improve certain experiences and a belief that menopause experiences are shaped as much by sociology as they are by physiology.

We assumed that the physiological and the sociological come together in the embodied experiences of actual women, and we were concerned that some of these issues would be difficult to confront via tracking. Yet besides tracking-based systems and a handful of critical/speculative designs, we could find few design exemplars for women experiencing menopause. There is no shortage of research knowledge about menopause

—in the medical literature and in feminism and gender studies, and in our own empirical study of women's menopause experiences [30]. But how such knowledge might translate into the language of design was much less clear.

In their influential work on research theory, Edmondson and Mcmanus [14] propose a developmental model of theory, which transitions from *nascent* (exploratory, new constructs, invitation to future work), to *intermediate* (mixture of novel and established constructs), and finally to *mature* (established constructs, formal hypothesis testing) theories. Applied in the design context, it seemed to us that design problem frames might likewise proceed via nascent, intermediate, and mature versions. In the design research literature, design frames refer to how a situation is defined as a design opportunity, comprising “the decisions to be made, the ends to be achieved, the means which may be chosen” [39, p.40]. In the case of designing for menopause experiences, taking into account medical knowledge, women's health experiences, structural marginalization, current and rising technological possibilities, market economics, and so on, the design space overall is not well understood.

This paper contributes our efforts to exploratively develop nascent design theory of women's health in the form of menopause experience design frames. To do so, building on prior research, we iteratively use What-If scenarios [21] and design criticism [6] to develop concepts for new products, services, and environments. From this we eventually converged on four design frames, and our critical reflections on them surfaced a number of recurrent themes. These themes include the following: during menopause, women often experience their bodies as if they are not their own, as if the body is possessed; it is difficult to take physiological symptoms seriously without reducing menopause to them; many people fail to acknowledge the agency and responsibility of (often male) partners for shaping women's menopause experiences; and most societies celebrate other life phases (e.g., birth, marriage, retirement) but not menopause. The design constructs, and the themes that we embodied and varied through them, can support future work by researchers and practitioners who work at the intersections of women's health and design, that is, professionals committed to health

sciences, to political emancipation for women, and to design as a way of knowing and doing.

2 RELATED WORK

Women's Health in HCI

Women's health is underexplored in HCI, and most research concerns itself with information systems for maternal health [1]. Recent work begins to consider menstruation and menopause. Lee et al. conducted focus groups and interviews to identify design considerations for mHealth (mobile health) to support women experiencing menopause [31]. This project envisions an application that, among other functions, supports women in easily recording the dates of their periods in order to inform them of what stage they are in with menopause [31]. Another project engages in participatory design to envision an adaptive, tracking and visualization-based application that can coach people through menopause [42]. Another considers an iPad application to capture women's menopause symptoms as a way of identifying symptom clusters [28]. Irwin proposes a design concept that considers how home heating and cooling systems might respond to the different temperatures in which individuals experiencing menopause and undergoing chemotherapy feel comfortable [27].

Menopause marks the end of menstruation and often involves several years over which menstrual cycles become irregular: therefore, it is useful to consider HCI work on menstruation as well. Epstein et al. examine how and why people track their menstrual cycles [15]. Critical HCI work has focused on menstruation to ask broad questions about the role of intimate technologies and design [7, 41]. Another is PeriodShare, a speculative design fiction [40], which provokes readers to reflect on political and cultural dimensions of self-tracking and sharing of intimate data.

HCI is increasingly taking up these sociopolitical dimensions of women's health. A workshop at CHI 2017 took a hacking-led approach to confront taboo, power, and prejudice surrounding women's health [4]. In looking at women's urinary incontinence, Almeida et al. argue that women's healthcare is shaped by taboos associated with women's bodies [1]. Researchers are beginning to study how to design technologies that account for and push back on taboos within women's health [2, 3]. A parallel research direction recognizes the burden that technologies designed for the individual place on women, investigate systemic or collaborative approaches to women's health [3, 11].

Design Problem Framing

The challenge that we confront in this research—an underdeveloped design space for women's experiences with menopause—calls for design problem framing. “It is central to modern thinking about design that problems and solutions

are seen as emerging together, rather than one following logically upon the other,” writes Bryan Lawson [29, p.124]. The challenge is that *design problems are never given, but must be constructed* “from the materials of problematic situations which are puzzling, troubling, and uncertain” and so the designer “must make sense of an uncertain situation [...] in which geographic, topological, financial, economic, and political issues are all mixed up together” [39, p.40]. We can see how all of this applies to menopause, which features experiential, medical, sociological/ideological, economic, cultural and other qualities all mixed up together.

Design framing establishes a structure of concepts, possible moves, and actors. More specifically a design frame is

an organizational principle or a coherent set of statements that are useful to think with [...] Frames should therefore be actionable—that is, they should be capable of leading to realistic solutions [...] Good frames ideally manage to create an image that spans and integrates a broad range of issues [...]. Good frames are coherent, and provide a stable (noncontradictory) basis for further thought. Good frames are also robust, in the sense that the images they conjure up in the minds of participants are sufficiently similar to provide a ‘common ground’ for the discussion [13, p.64].

In the context of menopause, tracking is a design frame: it is actionable, addresses a range of issues, offers coherence, and functions as a common ground for diverse stakeholders.

Design research literature also characterizes how designers develop frames. An early strategy involves abstraction and deconstructing to move away from literal problem-solving and towards “an exploration of deeper situational values” [13, p.64]. This exploration is conducted as a form of episodic dialogue, “a series of skirmishes,” a “to and fro movement between areas of concern,” as well as “period of unfettered speculation, followed by more sober and contemplative episodes during which the designer ‘takes stock of the situation’” [36, p.34]. As we document in the following section, our design process engaged in an iterative episodic dialogue between our intentions, the results from our empirical study on menopause [30], and major findings in health informatics and HCI research on the one hand, and the progressive envisioning of design images—products and scenarios in particular—on the other.

3 DESIGN PROCESS

Approaching menopause as a concern for HCI and design, we wanted to focus on menopause as it is holistically experienced, taking into account some of the sociological dimensions of gender. We contrast this with approaches that work from a well-defined and understood problem toward a direct solution (Fig. 1). For example, design starts with a well-defined problem in the literature, such as memory loss that affects activities of daily living for people with dementia, and ends with a technical solution for that problem, such as a system that guides someone through handwashing. However, the political and experiential consequences of dementia are not well addressed, making such approaches vulnerable to the criticism that they are technosolutionist.

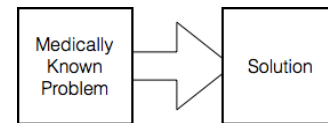


Figure 1: The literal problem-solving approach

Instead, we sought to destructure this coupling. Our design process (Fig. 2) starts with experience statements derived from empirical research and pivots to design, opening up a divergent, iterative, and dialogic process of proposing design frames and solutions, which subsequently converged back onto a smaller number of more mature frames. Our design process had four primary stages, represented as boxes in Figure 2 and described as follows.

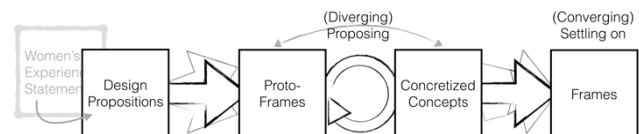


Figure 2: Our Design Process

Stage 1. Empirical study of menopause experiences.

Our prior research includes an empirical study centered on women’s lived experience with menopause [30]. We used feminist social science data collection methods [23] as well as critical-hermeneutic [6] approaches to analyze and interpret the data to generate women’s experience statements. Our goal in doing so was to situate our work directly in women’s experiences. High-level outcomes of this prior work are that menopause experiences were complex and holistic, frequently blending physical discomfort, uncertainty, curiosity, humor, frustration, wishful thinking, and reflection. While women’s experiences tended to be more negative than positive, many did relate experiences with at least some

positive dimensions. The experiences also had strong social dimensions, including social embarrassment and marital conflict.

Stage 2. Translation of empirical results into design propositions. The empirical results helped us understand different aspects of menopause experiences, in particular the interweaving of the physiological and the sociological, the individual and the social. However, while the results can inform design, they do not specify it, because designing requires a creative leap characterized by a shift from analysis to synthesis, and from deductive and inductive reasoning to abductive reasoning [13, 17]. We thus translated the study results into design propositions, that is, a set of normative statements that could help shape design work.

Stage 3. Iterative frame exploration via concretized design concepts. Next, guided by the design propositions, we engaged in an iterative, dialogic process proposing proto-frames and What-If scenarios. By “proto-frames” we refer to our earliest attempts at framing, which we expected would be unrefined initially (hence the “proto-” prefix). We used What-If scenarios to help us generate and concretize design concepts, because they tightly couple empirical insights with design imagination. Each scenario begins with a concrete data point from our empirical study (e.g., a direct statement or an excerpt from women experiencing menopause), followed by a simple sketch illustrating a counterfactual What-If scenario stemming from women’s menopausal experience (examples will be illustrated later). We cut 8.5” x 11” white cardstock in half for each of scenarios. The weight and size of the cardstock made it sturdier to handle and also constrained our sketch to prioritize the most salient aspects of a given scenario. After each of round of scenario creation, we critiqued the scenarios in relation to relevant literature on menopause, our prior study results, and our own values and ideological commitments.

The scenarios were not so much about proposing serious products, nor envisioning “‘what will be’ or even ‘what might be’ but ‘what potentialities beg interrogation’” [16, p.147]. For example, scenarios that made it easier for a woman to hide a menopausal experience were rejected as reproducing misogynistic social structures. Other scenarios seemed too far-fetched or not interesting enough. The most successful scenarios brought into view possible social practices around menopause, providing us in effect what Jamer Hunt calls a “distorting mirror” through which to see our present [26].

After iterating and curating, we finished with 29 What-If scenarios. We then conducted an in-person, two-day design retreat to critique the scenarios and the futures that they propose. We held nothing back in the critiques, often disagreeing with each other, and we are honest with readers about the problems with each throughout this paper as a matter of intellectual rigor. We then affinity diagrammed

the scenarios according to themes. Additionally, we debated how what we were learning might contribute tangibly to design: did this scenario embody a design frame, build out a design implication, or feature a design quality? We selected four design frames as nascent design constructs to the design researchers, health informaticians, and practitioners.

Stage 4. Converging on design frames. The iterative development of proto-frames and scenarios was characterized by an “episodic structure,” that is, a “to-and-fro reasoning” [36] that resulted in many dozens of situations, product ideas, requirements, and design qualities. Over time, certain clusters of problems/opportunities, design ends, and means began to emerge; the design frames we had been looking for had begun to come into view.

4 DEVELOPING MENOPAUSE DESIGN FRAMES USING WHAT-IF SCENARIOS

We illustrate our process as well as our insights and design proposals that emerged along the way, using the same four-part structure we just introduced.

From Experience Statements to Design Propositions

The empirical study is reported on elsewhere [30]. Briefly, we used feminist social science methods to study a US-based online forum on menopause, in order to understand menopause experiences in the words of those who have them. We found that menopause became meaningful in the shifting relations between the experiencing self and the social world—a social world in which women’s experiences are marginalized. In other words, menopause is meaningful not because of physiological symptoms that a woman privately feels, but rather because her bodily change is enacted in the social world; it is intersubjectively experienced. We further analyzed this into a set of common (though not universal) experience claims about menopause (Table 1, left column). We then unpacked these experience claims and re-articulated them as design propositions (Table 1, right column).

The transition from research result into design proposition still does not specify any design, but it helps by providing goals and constraints for our next steps.

Divergence: Proto-Frames and Design Concepts

In pivoting to design, we sought to envision—via proto-frames—products, services, and situations that were responsive to one or more of the preceding design propositions.

Supporting Self-Expression and Articulation. Our empirical work suggested that women were not always able to articulate their experiences to their satisfaction. Part of the problem is finding those willing to listen, and part was a limited expressive vocabulary. As a result, women felt isolated, feeling that the clinic was one of the few situations where

they could talk about menopause, but again, in a way limited by the discourses of the clinical setting. We were curious about ways that we might be able to support social interactions featuring menopause. Inspired by social media's role in providing a "networked sisterhood," we wondered about alternative technologically mediated opportunities—map APIs, co-presence, etc.

Table 1: Pivoting from empirical results to propositions

Women's Experience Statements: Menopause often experienced as...	Design Propositions: HCI/Design can intervene by...
A mostly negative phenomenon	Distinguishing experiences that are negative physiologically vs. ideologically Alleviating negative physiological experiences Challenging ideologies that contribute to negative experiences of menopause
An individual experience; an isolating experience	Supporting sociability in menopause-relevant situations
Difficult to put into words	Supporting self-expression of menopause-relevant experiences
Taboo and shameful	Calling out taboos as ideologically repressive Celebrating, rather than hiding, menopause
No big deal in the eyes of others; a form of hypochondria; totally normal and no cause for intervention in the eyes of medicine	Legitimizing/acknowledging women's experiences Taking pain and discomfort seriously even if it is not medically unusual or threatening
Trouble for sexual intimacy	Addressing symptoms (vaginal dryness, diminished libido) Educating and giving agency to affected sexual partners
A form of self-alienation	Supporting self-relations, self-discovery, and self-expression

One concept leverages contemporary sensor technologies that detect and predict experiences, including sweat, heart rate monitoring, and so forth. Such concepts also help to automate and record physiological phenomena that are often tied to specific menopausal experiences, lowering the burden of data capture and storage and producing a record that could be used to measure, predict, and even alleviate symptoms. Thinking of some of the ways that women did not feel that they had ways to express negative emotions, we thought of a stress ball, which is a foam ball that people can squeeze when they feel stressed. Combining all of these ideas, we proposed the following What-If scenario (Fig. 3): *What if a stress ball can track and relieve users' menopausal symptoms, provide a map of others experiencing those symptoms, as well as have a sharing feature to notify family and friends?* We envisioned a stress ball that can physically be squeezed, but which also senses body sweat and responds by cooling and/or using aromatherapy, and which also connects anonymously to global/regional maps of others with similar experiences and/or social media. The idea is not wholly novel: [38] proposes huggable interactive pillows, but not in the context of women's health.

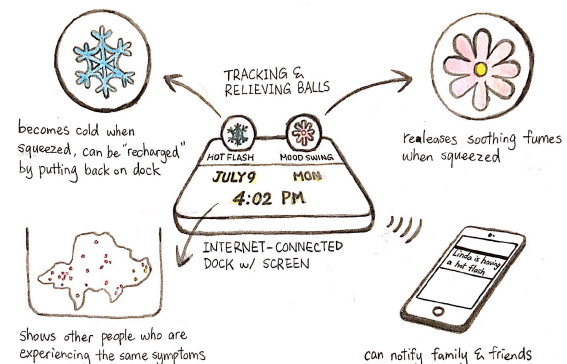


Figure 3: Side A of the Stressball What-If scenario

A second design concept investigated less quantified or "clinically useful" forms of expression. Hate and anger are emotions that are typically frowned upon by society. We asked ourselves, how can anger and frustration be trumpeted, not hidden? We developed the following What-If scenario (Fig. 4): *What if there was a "Rage Against the Menopause" day where during an appoint-ed "rage hour" (randomly decided every year to highlight the un-predictable nature of menopause), women would open their windows and freely scream out?* It's possible to imagine products that could be a part of this ritual: meno-bullhorns and meno-vuvuzelas, for example, which would amplify voices and contribute to the car-nivalesque spectacle.

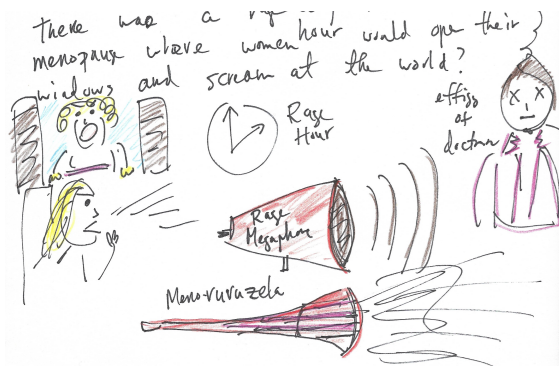


Figure 4: The Rage Hour What-If scenario (detail)

Alleviating negative physiological experiences. It is important to not only consider the ways that much of the negative experience of menopause is socially constructed, but also to take seriously negative experiences people had with menopause. A starting point was to think of technologies to help hide certain kinds of experiences from others, to enhance a woman's privacy. Yet while these do address a problem that many women expressed, they also reinforce the regressive social norm that women should hide such things.

Another concept imagines a sanctuary for women experiencing menopause (Fig. 5). We ask, *What if women starting their menopause journey are whisked away to meno-hotels?* The concept was inspired by month-long postnatal hotels that provide care for new mothers in Korean (산후조리원) and Chinese (坐月子中心) cultures. At the meno-hotel all the needs of women beginning their new journey are met. Women are pampered—massaged, sip on refreshing drinks, sleep in breezy, air-conditioned rooms, eat meno-appropriate food (e.g., ice cream, gazpacho), have their vitals measured by staff knowledgeable about menopause, and participate in activities with other women experiencing menopause. In these hotels, women don light gowns, providing relief from hot flashes and other temperature changes. Older women who have been through menopause may visit guests at the meno-hotel. But the sequestered women cannot go outside, nor can anyone else visit.

This design has the advantage of focusing seriously on alleviating physical discomfort, of celebrating menopause as a life phase, and of creating a luxurious, spa experience. Away from others, women are isolated from social judgment or embarrassment. The problem is that women are isolated from everything else as well: careers, families, sexual partners, and so forth. A scenario like this reveals the tension between women's desires for privacy and the emancipatory goal of challenging the taboos that partly drive such desires. Does the meno-hotel offer need-based pleasures or false pleasures?

Subsequent scenarios moved some of these experiences into a woman's home, as described below.



Figure 5: The Meno-Hotel What-If scenario (detail)

Celebrating, rather than hiding menopause. As feminists, we view menopause as a complex life stage with ups and downs, not as a problem to be solved. We sought to find or imagine design exemplars that addressed this life stage in a less problem-centric way. Our initial design concept recognized that fear of aging, particularly for women, is instilled at a young age. We asked, *What if everyone didn't take it as a given that looking old is bad, looking young is good? Kids could try on wrinkles and gray hair, they way they might try on their mom's heels or lipstick.* This concept was in the form of a "beauty kit" for young children to try on hair extensions and wrinkle liners, much like children might try on their parents' makeup or shoes. In doing this, people might learn to look forward to growing older and for people to be able to recognize older people as attractive.

Although the idea of countering the societal narrative that women should look young and beautiful is appealing, this over-literal solution has a number of problems. Above all, it continues to tie worth to physical appearance. It leaves in place the mappings of age and physical beauty, simply inverting (some) of their values. And it calls attention to visible signs of ageing in any case. It is challenging to support the concept of mature beauty without drawing from the harmful languages and practices of the beauty industry.

Legitimizing and Acknowledging Women's Experience. Women have difficulty finding medical professionals who specialize in menopause, and find that the mental experiences with menopause are often dismissed if there is no scientific evidence of physiological changes. Initially we envisioned a briefcase that women could bring to the doctor. Some of the documents included in the briefcase were family history: age of menopause onset for all female relations as well as length

and flow details for periods from age of first period (including overlay of details such as stress levels, birth control, and medical issues that affected past periods). But we realized that this concept placed the burden entirely on women to convince health care professionals about their lived experiences with menopause.

An iterated concept turned this idea on its head. We instead identified the problem as a lack of expertise. This suggests that those entrenched in medical institutions fail to engage with older women and others engaged with women experiencing menopause. We asked: *What if medical staff who are older women or trained with older doctors proudly wore ribbons to signify that they were ‘menoallies’?* The strength of this scenario is that the burden of proof is on the medical professional, rather than the patient. Obviously, there are many questions about how such a certification might be implemented and what effects it might have in practice. Concerns with this approach are that it still overtly demarcates menopause from other phenomena; it might further normalize a lack of expertise about menopause; and it might appear to diminish expertise in other health domains—or cover medical staff in ribbons for every area of expertise that they have.

Improving Intimacy and Sexual Experience. The influence of menopause on women’s sexual experiences is strong, according to our data. Women talk about physiological symptoms, such as vaginal dryness and diminished libido; issues of self-perception, for example, that she is no longer sexually desirable; and also partner conflicts prompted by changes in the bedroom. Our initial thoughts began with traditional user-centered solutions: if vaginal dryness is lowering enjoyment in sex, then we can imagine a sex toy that applies lubricant and that can be used alone or by couples: *What if a smart vibrator can provide lubricant and automatically adjust its temperature, texture, and size to provide a pleasant sexual experience?* This design concept is rather literal, but it prompted us to look online to see if such a product existed, and in the course of doing so, not only did we not find anything quite like it, but more generally we did not see toys specifically designed for women in this group.

This concept also focuses primarily on the individual woman and helps to correct her symptoms, so it neither acknowledges the agency and responsibility of her partner nor gives him or her opportunities to enact that agency. To address the latter, we developed another What-If scenario: *What if an app can track users’ sex activities and provide guidance for sex, while also recommending new toys based on budget and preferences?* This scenario recognizes the agency and responsibility of the partner, as well as the fact that their sexual habits have changed. It leverages tracking technologies and recommender algorithms to help the couple better

understand sources of pleasure and discomfort and match them with available pleasure objects on the market. The concern we had with this scenario is that it has less to do with the couple learning about each other and more to do with the couple acquiring an ever-growing collection of products.

This led us to frame intimacy less literally about sexual anatomy and instead on notions of attractiveness, body image, and “feeling sexy” to one’s partner. For example, we thought about practices of grooming, and specifically grooming one another such as brushing someone else’s hair, as an intimate practice. As we envisioned specific instances of this behavior, we thought of the classical Chinese practice of a husband painting his wife’s eyebrows, captured in the idiom, *hua-mei zhi-le* “畫眉之樂”, literally “the pleasure of painting eyebrows” and more connotatively suggesting flirtation and true love in marriage.

We developed two concepts intended to encourage forms of intimacy that expand beyond the overtly sexual. Both envision the body as a locus of care. In the first, we ask: *What if there is makeup that can change its color based on skin temperature?* The idea is to prompt awareness of changing body states and (hopefully) care from the male partner. This could also be extended to the ageing woman’s family members and social circles. In the second, we imagine the application of makeup as a couple’s activity (Fig. 6): *What if there are makeup toolkits especially designed for men to do makeup and nail polish for their wives and a smart screen “mirror” to guide the husband and record sweet moments?* Feminists theorists, such as Elizabeth Grosz [19] have argued that makeup is a socio-cultural inscription on the female body. Each of these two scenarios views these inscriptions as performative, not only in the sense of wearing the makeup, but also in the sense of putting it on. The state of being made up reflects a significant body labor, and by calling attention to that labor, the male partner is more aware of it and also, especially in the second scenario, able to participate in it. Both scenarios are vulnerable to the criticism that they perpetuate the expectation that women wear makeup—earlier in life to mark their sexual readiness, and later in life to mask wrinkles and other signs of aging, but the hope is at least scenarios such as these might shift some of makeup’s meanings toward a more wellbeing-oriented direction.

Converging on Four Design Frames

The iterative back-and-forth of ideas—derived from the empirical data and expressed as normative design proposals on the one hand and illustrated What-If scenarios on the other—progressively helped us weed out weaker ideas, focusing instead on ones reflecting our twin commitments to start from women’s experiences of menopause and to reflect our own feminist and emancipatory values. What follows are

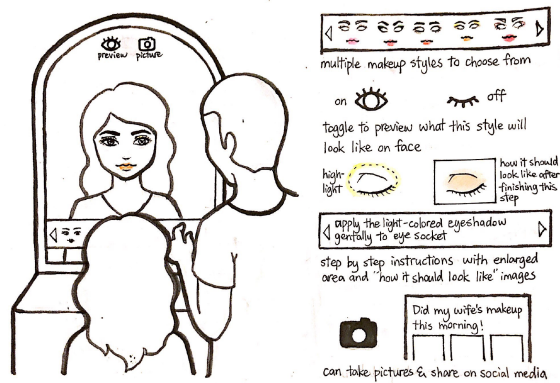


Figure 6: The Makeup Toolkits for Men What-If scenario

four design frames offered as outcomes of this design-based research.

MenoParty. MenoParty is inspired by women who spoke of menopause as a positive experience. Some even used the metaphor of “graduating” perimenopause. We began to think of how we typically commemorate major life transitions, and wondered what a similar ceremony might look like to mark menopause; biologically symbolizing the end of one’s ability to reproduce, and made sense of by women as the beginning of the path towards older adulthood. Our anti-ageist perspective led us to wonder why this important phase did not appear to have a corresponding ceremony – we thought about ways that people regularly mark other important life transitions, such as marriage (e.g. wedding showers, weddings) and puberty (bar and bat mitzvahs, quinceañeras). Our What-If scenarios envision a future where menopause is not isolated from social life, but rather, marked and commemorated as a meaningful time in one’s life (Fig. 7): *What if there were a “Bat Menopause” (a take on a Jewish “Bat Mitzvah”)?* We imagine that rituals will emerge and meaning will be found over time.

We developed two versions of this. One envisioned the MenoParty as a public gathering in a park, visible to the public—perhaps spreading the message that menopause is natural and normal. The other gathering was not explicitly public and looked like it might be taking place in someone’s dining room. Both scenarios envision people gathering across generations, not just women of the age to typically experience menopause. This aligns with other events such as bat mitzvahs are marked by everyone—not just 12-year-old girls, but also fathers, cousins, and family friends. This can only take place in a world where taboo around menopause does not have the same hold it does now.

The issue of a public vs private, and open vs closed, party has implications for the present—and the extent to which MenoParties is a practical design direction for the present or



Figure 7: Outdoor (top) and indoor (bottom) MenoParties

it operates in a more critical or speculative space. The concern with this frame is that it seems to require a sociological change in rituals before plausible designs could be developed. That is, a future where a public menopause party attended by people of all genders and ages may be too distant, so having such an event today could actually further stigmatize women. Current trends like menopause parties, where women seek support and share experiences when transitioning through menopause [12], might better reflect consciousness raising groups of the past which help identify issues and mobilize action [25].

A Menopause Lifestyle Brand. We tried to imagine all of the positive aspects of menopause: many women look forward to a time when they have no periods, for example. People in their forties may be more economically secure. Many have seen their children grow up to depend less on their parents. After working through dozens of scenarios and possible products, with the intention of avoiding negative connotations of menopause, we began to see how diverse positive aspects of menopause could be linked together under the label of *freedom*—freedom from periods, economic anxiety, and day-to-day parenting labors. We also saw that that same era for men is often distinguished with certain lifestyle products—sports cars, golf clubs, expensive whiskeys.

Toward the end of our design process, we began to imagine a lifestyle brand that celebrated menopause: *What if there were a lifestyle brand focusing on products and services aimed at the new freedoms available to women in menopause?* We named it Paused and envisioned the products and services it might offer (Fig. 8). While overall offering a positive framing (“Meno Paused, Party Started”), the brand could accommodate a range of products such as fashion, skin care, accessories, sex toys, and more. As a lifestyle brand, it could also feature a blog or magazine, recipes, tips, and so on, which connecting to lifestyles already common among the demographic: crafts, travel, and so forth. From a design perspective, a lifestyle brand framed around menopause and freedom is actionable: such a brand could be launched right away. Of course, there is the concern that it pursues emancipation through consumerism. More positively, a lifestyle brand could potentially leverage the marketplace as an agent of ideological change, not only by providing a new consumer positioning of menopause and a suite of products marketed within it, but also by proposing a frame that competitive brands could also appropriate.

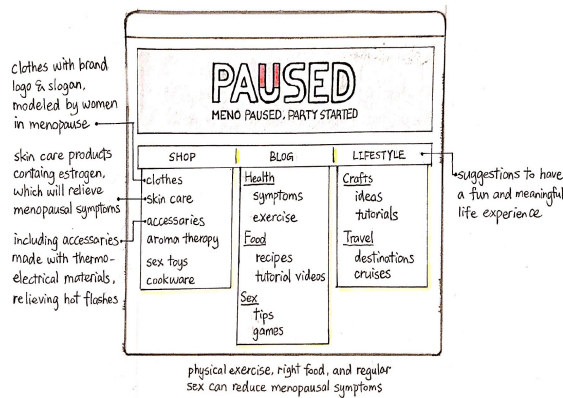


Figure 8: The Paused lifestyle brand What-If scenario (side A)

Menobuddies. Many women express a complex relationship with their own bodies during menopause, as if it is simultaneously their own and alien. For some, this is about her identity: some women have strived towards a certain personality (e.g., independent or stylish) or physical style that is altered or even destroyed by menopause. For others, it is more physical: their body is out of control and has achieved its own agency. We believe that this transformation should be seen in context of the many transformations that occur over all our lives (e.g., puberty, mid-life). This transformation can be strange and even terrifying: women experience anxiety, pain, and isolation because of this other being inhabiting them.

Thus, women find that *an other body* is an apt metaphor for expressing this aspect of the menopause experience.

Taking this metaphor literally, we iterated on the idea of dolls, which resonated with us because of real-life uses. Dolls can represent the physical state of bodies, as in the case of Voodoo dolls. Dolls also represent an “otherness”, an alterity relationship with a being. Stuffed animals are a kind of doll that are common childhood companions. For some, dolls have a strong emotional connection to us, and in Western societies adults can speak of shared experiences with their dolls (e.g., as imaginary friends). Building on our sketches of dolls and even dollhouses, we developed the following what-if scenario: *What if there was a tradition where, upon first experiencing menopause, women received “menobuddies”?* This menobuddy has parallels to the *moderskapsförpackning*, or maternity package, that expectant Swedish women receive from the government. This starter pack celebrates with anticipation the birth of a new child by providing newborn clothing and vital accessories (e.g., diapers, towels, toothbrush). The menobuddy might be part of a package of items women entering menopause receive. The buddy has three functions: 1) capturing stories of menopause; 2) playback of these stories; and 3) a collaborative feature that allows others in the vicinity to experience one’s stories. Its form factor is significant—the doll represents the owner while at the same time having its own body and identity.

The menobuddy can integrate sensors, network connections, LED lighting, recording and playback technologies onto traditional doll affordances: it might capture stories if talked to or by squeezing part of its body. Pulling a string might play back stories from meno-sisters. Menobuddies preserves the stories of women experiencing menopause and highlights that each experience is unique and situated. The menobuddy also conveys that menopause is an experience that cannot be conveyed only by ordinary language—necessitating a representation of its embodied and mental aspects.

Smart (About Menopause) Spaces. We also conceptualized smart workspaces and homes, with the goal of looking beyond generic ageless and genderless users [8]. What makes a room or a city “smart”? Is it possible for a space to be smart about menopause? To make this question more tractable, we applied it to domestic spaces, such as bedrooms. Sexual role-play is a well known practice that often involves props. In our first smart and connected role-play scenario, those props are imagined in a smart home setting that transforms into a theatrical stage according to an erotic script that the couple performs (Fig. 9). To do so, it takes advantages of advances in lighting, projection, and small electronic devices, including ID cards.

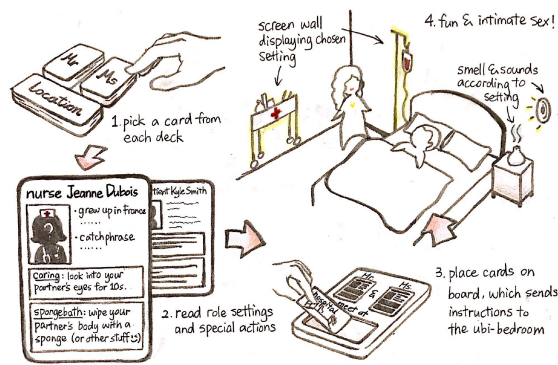


Figure 9: The Erotic Scripts What-If scenario (detail)

Imagining this led us to ask what an erotic space might be if it leverages the capabilities of ubiquitous computing, and if it were smart about menopause. Accordingly, we developed the ubi-bedroom, which combines fantasy, spa, aromas, smart textiles, projection, LED lighting, and 3D audio to produce a luxurious environment that both sets the mood and can accommodate hot flashes—as part of a fantasy (e.g., a blast of heat on a summer beach) or as a problem to be solved, e.g., with a fan simulating a cool ocean breeze (Fig. 10).

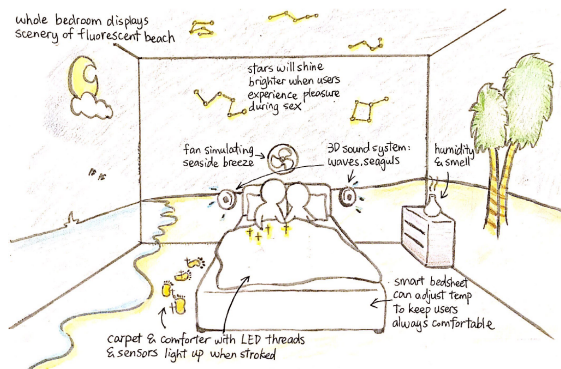


Figure 10: The Ubi-Bedroom What-If scenario (detail)

As we worked through these scenarios, we were able to refine our understanding of the design space. Our concepts tended to move away from individual solutions focusing on anatomy and symptoms towards shared intimate encounters in settings designed to support sexual intimacy, imagination, and play. Our data had shown us that many male partners become frustrated by their partners in menopause, in many cases blaming women. In doing so, the men were positioning themselves as if they had neither agency nor responsibility. Without blaming men, we wanted our designs to provide ways that men and women alike could be responsible together for their sex lives. Such insights can also point beyond design: menopause-related conflict between partners

might not so much require a design as an honest conversation between partners or perhaps a new therapy. We also could see abundant ways that technologies—sensors, tracking, e-textiles, interactive lighting, soft interfaces, machine learning—could support this. Here is an opportunity for HCI to help bring a wellness perspective into the next generation of sexual technologies, rather than deferring such innovation to the sex industry.

5 DISCUSSION

We have introduced a design process, grounded in prior work of an empirical study of women's experiences with menopause. We then developed a normative collection of design propositions, which in turn guided the iterative development of over 80 What-If scenarios, eventually leading to 29 finished What-If scenarios, which finally led us to four design frames for menopause: the menopause party, the lifestyle brand, the MenoBuddy doll, and the smart (about menopause) bedroom. We are aware that none of our design concepts in its present form likely to impact women's health outcomes or emancipate anyone. The goal of this research, rather, was to contribute "nascent" [14] menopause design constructs for researchers and practitioners concerned with women's health and designerly epistemologies and methodologies. That means that we hope to have shed light on more promising design approaches, brought into focus promising leads, and revealed constraints and even dead-ends. We also identified a set of core themes: the menopausal body as possessed; the complex relationships between physiological and sociological sources of experience; the agency of partners; and opportunities to reposition menopause as an opportunity to celebrate. We sought to do this work in a critical and reflexive way, frankly confronting the problems in our thinking and designs, in hopes of helping readers to perceive and to imagine in this space for themselves.

For the Discussion, we step back one higher level of abstraction. If we don't expect the design outcomes introduced here literally to be taken up and developed into solutions, then what are they for? For us, they have contributed to ongoing reflections on the role of HCI in designing for women experiencing menopause, with (we believe) likely implications for similar issues: designing for experiences affected by our age and gender, including menstruation, infertility, erectile dysfunction, incontinence and more. Our understandings of each are shaped by health and medical discourses as well as sociocultural discourses, including taboos, stereotypes, and so on.

We have seen throughout this research that *design frames reify tensions in women's health*. By bringing these tensions to the forefront, we hope to create understandings that will help researchers and practitioners successfully navigate them. Two issues in particular came up time and again throughout

the design research process: the difference between designing for now and designing for some anticipated future, and the difference between designing to address needs related to (biological) sex versus needs related to (sociocultural) gender.

Designing for Health: Now vs. the Future

Two of our What-If scenarios seem situated in different moments in time. Paused, the lifestyle brand, could be pursued immediately, and in some ways it already exists in the form of brands that target women over 40, such as Haralee sleepwear, maker of “cool garments for hot women.” Part of Pause’s appeal to us was that it made sense in today’s marketplace. As such, it offered the potential to put menopause in the public consciousness and to normalize it. Yet it might also be seen as in line with neoliberal changes to the health care system that emphasize a free market rather than a “right to health” [32, 37]. These changes prevent access for people who cannot afford them [37]. Paused might reposition menopause in ways that de-medicalize it, which seems appealing, but then would that also mean that certain products would not be reimbursable by insurance? Using the consumer marketplace to serve health needs and also for consciousness raising seems morally complicated in the present.

At the other temporal extreme is the MenoParty, a concept based on an uncertain future when menopause is celebrated in similar ways to childbirth, puberty, and weddings. But, in today’s world, having a menopause party might make the honoree indeed feel ashamed, because many experience menopause and ageing as though they are shameful and negative. The MenoParty was attractive to us because unlike many other approaches, it does not place responsibility on individual women to understand menopause, and it replaces taboo and shame with acknowledgement and celebration. But we worried that we couldn’t really begin to design for MenoParty until society itself changed.

Now, if we consider these designs less literally, their temporal and other dependencies shift. Paused’s entanglements in consumerism can be recast as how the design achievements of lifestyle brands can inform health system design. Paused prompts questions about whether health systems might attend better to user experiences, that is, to situate themselves in lifestyles that are meaningful. [5] quotes a sex toy designer who collaborated with medical device designers in hopes of combining her own fine art abilities with those of advanced medical ergonomics. Paused prompts us to ask how might newly unfolding experiences of freedom associated with menopause shape health product design? How might the design methodologies for health systems better commit to user experience, understood as situated in sociopolitical dynamics and structures?

Likewise, the MenoParty taken literally seems to be something like a speculative design. Yet it also raises questions

that are interesting in the present. What rituals and ritual-like experiences are already extant in today’s society that might be relevant to menopause? For example, birthday rituals are already common at all ages, and ritual celebrations for menarche and similar experiences already exist. How might HCI researchers and practitioners contribute to the development of rituals for menopause wellbeing? How can HCI do its part to normalize and celebrate menopause, possibly drawing from extant traditions?

Design and the Gender-Sex System

A major focal point of feminism is the gender-sex system. *Sex* refers to the biological distinction between female and male, while *gender* refers to the socially constructed and reproduced ways by which we perform our sex. Further, as political philosopher Seyla Benhabib writes, “the historically known gender-sex systems have contributed to the oppression and exploitation of women” [9, p.152]. This distinction seems particularly relevant in a domain where gendered bodies are central. That is, it should be possible to characterize menopause both as a manifestation of biological sex and as a manifestation of socially constructed gender. The menopause experience frequently reported in our data [30] of inhabiting a body that is not her own, or inhabiting a body that is possessed by some alien force, can be analyzed according to this distinction. Certain physiological sensations—of being hot, of sweating, of emotional imbalance—can all be tied to biological sex during a certain developmental era of life. But other aspects of how they are felt and understood are clearly socially constructed: feelings of shame and embarrassment, or metaphors of possession and monstrosity straight out of horror fiction.

The MenoBuddies concept is a literalization of the hybrid body metaphor, a physical artifact that is intimately connected to yet distinct from the body. HCI’s interest in embodied interaction has at times theorized hybridized bodies, but these are typically cyborg bodies (e.g., [10, 22]) explained against a backdrop of highly sophisticated theory, such as cyberfeminism and cognitive psychology. Yet women in menopause simply refer to their own felt experiences, rather than academic theories, when they characterize their bodies as possessed or not entirely their own. What design methodologies, which design patterns would improve the felt experiences of women (or anyone) inhabiting a hybrid body? MenoBuddy provides one image of how design might take this up, but the construct is nascent.

The Smart (About Menopause) Spaces concept operates on a similar idea. Much of the discourse on smart and connected spaces—and HCI more generally—treats the user as ageless and genderless [8, 24, 27]. To be smart about menopause,

then, means to be smart about sex-menopause and gender-menopause. Sex-menopause would include symptoms and experiences that are linked to women’s biological bodies, while gender-menopause would include experiences linked to the sociocultural meanings and consequences of menopause. Obviously, they can be at odds. A design that senses a hot flash (e.g., via sensors) and lowers the temperature of a room addresses symptoms of sex-menopause, but in doing so it calls attention to the hot flash and, by blowing cool air, might even be seen as inconveniencing others, aggravating negative experiences of gender-menopause. Our What-If scenario draws from cinema and spas to create a spatial language that addresses itself to both biological and sociocultural aspects of menopause. Temporary flashes of heat are shared by both inhabitants and given a narrative explanation (“you are on a beach” or “you are in a sauna”). Men, too, are invited to take some agency and responsibility for shared experiences of intimacy. The construct is nascent, but it has led us toward a clarified sense of” [39], that is, design problem frames.

We have presented our research seeking to develop nascent design theory in the domain of women’s menopause experience by iteratively developing and critiquing dozens of What-If scenarios. We argued that such work was necessary, due to the nebulous nature of relevant current HCI research, and that design methods are well positioned to contribute. Eventually, we converged on four scenarios and discussed their immediate and broader implications. Throughout the project, we found it challenging to imagine interventions in the women’s health space that were acceptably responsive to the knowledge and values represented in health HCI, women’s studies, and design research. While more research and design is needed, we believe that we have helped to map some of the terrain of women’s menopause experiences as a concern for HCI and we hope to support and encourage future work.

6 CONCLUSION

We have presented our research seeking to develop nascent design theory in the domain of women’s menopause experience by iteratively developing and critiquing dozens of What-If scenarios. We argued that such work was necessary, due to the nebulous nature of relevant current HCI research, and that design methods are well positioned to contribute. Eventually, we converged on four scenarios and discussed their immediate and broader implications. Throughout the project, we found it challenging to imagine interventions in the women’s health space that were acceptably responsive to the knowledge and values represented in health HCI, women’s studies, and design research. While more research and design is needed, we believe that we have helped to map some of the terrain of women’s menopause experiences as

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