Expanding Care Conceptualizations: An Integrative Literature Review of Care in HCI

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Abstract

Care research in HCI is evolving to encompass a broader spectrum, where care is not only given to and performed by a human caregiver and human care-receiver, but also extends to non-humans like technologies and more-than-humans, including post-human entities. This expansion reflects a growing recognition of the complex, interconnected networks through which care is enacted and experienced across varying scales. To explore the expanding conceptualization of care in HCI, we conducted a literature review of 93 papers, examining both practical and ethico-political focuses across different scales of care. We identified six categories of care conceptualizations: service, repair, intimate, burden, infrastructure, and ethic. We define care in the HCI space, propose a novel tool to support care research, and suggest conceptual spaces for future exploration with a focus on critical care theorists.

CCS Concepts

• **Human-centered computing → Human computer interaction (HCI)**.

Keywords

care, ethics, feminist, ethico-political, ecosystemic, literature review

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1 Introduction

As environmental and social systems face compounding crises, and the HCI community grapples with the implications of sustainability, recognizing responsibilities of care-taking for our world has become increasingly urgent. Theories of care emphasize relationality, interdependence, and ethical responsibilities. Care offers frameworks to sustainable computing that address not only environmental concerns but also the systemic social inequities embedded in technological development [85, 100]. This paper contributes to ongoing conversations in HCI and sustainable computing about how to respond to ecological degradation, systemic inequity, and technological harm, by raising the question: how is the human-computer interaction (HCI) community thinking about the role of care in shaping the future?

Recent scholarship in HCI has drawn attention to care both as an action (e.g. [20, 95]) and as a theory (e.g. [31, 54]), positioning care as a subject of study and as an ethic for the discipline as a whole to adopt. Calls for increased study of care in HCI [54, 95] acknowledge the fact that the doing of care has been under-explored, in part because it has often been delegated to women and therefore under-valued [49]. With the rise of works in feminist HCI [3, 15, 106], issues in HCI generally associated with women and gender have gained more attention. Furthermore, care work's role as reproductive labour, encompassing tasks such as childcare, household management, and emotional support that sustain and maintain life [35], has become a focus of study.

Beyond interpersonal care, care work is increasingly recognized as essential for the maintenance and survival of our world(s) [136], and as an alternative to a culture of disruption and innovation [59, 80]. Under this broader understanding of care, the sustaining and maintaining work of care determines what comes to be, and what is left to wither. This shift has sparked new conceptual understandings of care in HCI research, expanding care beyond interactions between individuals to include relationships between humans, non-humans, and post-human entities that shape our worlds [100]. As ethical concerns in HCI grow [25] and scholarship as activism gains momentum [69], care is gaining attention as a means to orient HCI work towards more intentionally and morally grounded ends, to "offer HCI an ethical stance from which to take leadership for an alternative, more inclusive future" [31].

In this paper, we examine how care is conceptualized in HCI, articulating its various manifestations in technological systems. Care offers a critical lens for re-imagining sustainability—not just as environmental responsibility but as the maintenance, repair, and ethical care-taking of sociotechnical systems. Care theories emphasize relationality and underscore the importance of sustaining networks over time. To examine how HCI is broadening its engagement with care—moving beyond exchanges between individuals to an interconnected and moral force—we conducted an integrative literature review of 93 full-length research papers from the ACM Digital Library. Rather than aiming for exhaustiveness or systematic coverage, we intentionally sought works that reflect the evolving conceptualizations of care within HCI. Our focus was thus on understanding the varied ways care is theorized and enacted across different contexts, and how future work could better emphasize responsibility and relationality by using a care lens.

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Our literature review identified six distinct conceptualizations of care: service, repair, intimate, burden, infrastructure, and ethic, and demonstrated how care research in HCI encompasses both practical and ethico-political dimensions across various scales. We propose care as a valuable framework that enables researchers to think more relationally about technological interactions and take responsibility for what is maintained or destroyed through care practices. By adopting care as a "responsibilizing frame," we argue that HCI can make meaningful contributions to the future of sustainable computing that better account for the relational and systemic scales of care exchanges while critically examining the ethico-political implications of care's interconnected nature. To facilitate this work, we introduce a diagrammatic tool and advocate for integrating diverse care models, addressing calls for greater citational justice in the field [67].

2 Background

Feminist theories of care have significantly shaped care research [47, 105, 137], including in the HCI space [79], by broadening the conceptualization of care and challenging traditional perceptions of its scope and value. Gilligan's [47] foundational work framed care not just as a practice but as a moral framework rooted in relational thinking, expanding its understanding beyond domestic and private spaces. Care is often stereotypically associated with childcare, healthcare, homecare, and eldercare [49]. Therefore, care has traditionally been viewed as a private activity primarily performed by women [135]. This perception reinforces the undervaluing of care, both as "women's work" and because it is tied to *re*productivity rather than economic productivity [35].

In contrast, care scholars argue that care transcends these traditional boundaries, extending into *ethico-political* dimensions: the systemic forces and political structures which result in care being unequally distributed along lines of gender, race, class, and migration status [135]. Building on the feminist critique of constructed realities shaped by complex interactions [12] and lived experiences [53], feminist care theories highlight care as an active force that shapes the worlds we inhabit. These theories address the ethico-political dimensions of reproductive labour which place the responsibility of care largely on women, particularly racialized women [48]. This perspective underscores care's entanglement with power structures and its potential to inform broader political and economic change, advocating for its recognition as essential to both public and private life.

To express an ethico-political perspective on care, a new definition was required. Care theorists Tronto and Fisher [40] expanded the conceptualization of care beyond domestic spaces, demonstrating how care shapes the emergence of worlds by influencing which entities are sustained and upheld. They offer a broad definition of care that includes "everything we do to maintain, continue, and repair our 'world' so that we can live in it as well as possible. That world includes our bodies, ourselves, and our environment" [40]. Significantly, they still consider care to primarily be a human activity, and primarily expand what actions can be considered care while placing contingencies around how it should be performed and defining different stages of care. Tronto [135] outlines these stages of care as:

(1) Caring about: Recognizing that there is a need for care,
(2) Taking care of: Recognizing that actions can be taken to provide care for those who need it,
(3) Caregiving: Performing the direct fulfillment of those needs, and
(4) Care receiving: Responding to the care received in an appropriate manner. This is done by the person who is receiving in the care exchange.

This framework helps distinguish between emotions or intentions of caring and the actual provision of care, while also empowering and responsibilizing the care-receiver as an active participant in the care exchange.

A rise in care-focused HCI papers followed the publication of Puig de la Bellacasa's *Matters of Care in Technoscience* in 2011 [100, 101]. Building on Latour's Matters of Concern [68], Puig de la Bellacasa broadens the concept of care to include human, non-human, and more-than-human entities as active participants in an ecosystemic care network [100]. In this framing, technologies are not simply tools but active agents that both influence and are influenced by their interactions with humans and the environment. This reflects Suchman's [125] focus on the emergent nature of these interactions, which blur the boundaries between human and machine. Therefore, human-machine configurations can either foster or marginalize different "worlds," influencing all aspects of reality. Matters of care thus have ethico-political implications [100], as they can determine what gets cared for, maintained, and brought to be.

Early work engaging with theories of care in HCI particularly focused on the domain of computing ethics. Adams and Ofori-Amanfo [2] discuss the need to engage with feminist ethics through the lens of care, and encourage engagement with oppressive systems of gender and race [1]. As HCI's engagement with care grows, the field is shifting toward recognizing care for more than just individual humans, acknowledging that care can be extended to and enacted by non-human entities, and is implicated in social systems. This shift, when coupled with Tronto and Fisher's definitions of care [40] and Puig de la Bellacasa's [100] expansive theory of caregiving and receiving, opens up a vast array of possibilities for what can be understood as care within HCI and recognition of its broader significance. Technologies under an expansive theory of care can redefine and support various forms of care while also being shaped by and contributing to the ethico-political forces that influence care practices [31].

Beyond the selection of papers which highlighted ethics of care, care research in HCI initially focused on healthcare technologies for professionals (ex. [13, 41, 140]). Healthcare research primarily examined the role of technologies in facilitating [81, 84] or simulating [38, 75, 141] healthcare scenarios. While healthcare is a crucial domain of care research, its public visibility sets it apart from privatized, feminized forms of care like childcare, highlighting its exceptional status within broader care practices, and does not fully address the lack of research on care.

In HCI, the concept of care as a public, as well as private, activity has broadened with the professionalization of roles beyond healthcare, encompassing paid work such as childcare and cleaning. Technologies now play a significant role in this shifting care economy, from gig platforms [71] and social media forums [95]

to the datafication of care [58, 104, 108, 128]. Research in HCI is increasingly examining technologies that intersect with diverse forms of care work, reflecting the wider professionalization of care [95, 98]. Many of these roles, however, are predominantly filled by women of colour, particularly immigrant women [49] whose labour is devalued both politically and monetarily [44].

The expanding view of care in HCI has brought a diverse range of research topics under its umbrella, along with multiple conceptualizations of care. As an action, care has evolved into new forms and relationships with technology. As a theoretical concept, it holds the potential to engage with ethically entangled subjects that shape our worlds.

3 Methods

We conducted an integrative literature review [115] to examine how ***care*** has been conceptualized by the HCI community. Rather than be exhaustive, our goal was to explore diverse conceptualizations of care in relation to technology, including but also beyond commonly studied domains such as healthcare, childcare, and eldercare. Through an iterative search process, we identified and analyzed 93 papers from major HCI publication venues that engaged substantively with care.

3.1 Search Strategy

To identify relevant scholarship, we conducted multiple rounds of iterative searches in the ACM digital library, refining our search terms based on insights from relevant papers. We continued this process until we reached saturation, i.e. additional searches and analysis no longer yielded new conceptualizations of care. Our search focused on the years 2014-2024, reflecting our interest in recent shifts in care research within HCI towards more networked (as opposed to between two individuals) understandings of care [7, 72]. We focused on full-length papers published in ACM CHI, ACM CSCW, ACM DIS, and PDC, as these are established venues for scholarship related to care and technology. We chose not to include extended abstracts, such as works-in-progress, workshop proposals, etc., to ensure that each paper in our corpus had comparable depth and structure, and substantial theoretical or empirical engagement with care.

Prior to data collection, the research team collaboratively developed a set of 15 search terms to capture different forms of care, including relational and community-oriented forms of care. Search terms included "community," "grassroots," and "collaborative," along with terms such as "infrastructure" and "relation" to account for technologies and other non-human entities in care practices. Each term was concatenated with "care" and "technology" and searched in the ACM digital library across the four identified venues. From the search results, we conducted a preliminary review of 30 papers, selecting papers that the research team identified were relevant to the review based on the centrality of care to either the paper's theoretical framework or empirical focus. Each member of the research team documented a brief summary and analytical memo for each paper, reflecting on its conceptualization of care. Based on an analysis of recurring keywords appearing in the paper in this initial set, we refined our search terms, and conducted another search. After multiple rounds of iteratively refining search terms based on emerging themes and team discussions, we analyzed subsets of papers resulting from each iteration. We continued this process until we reached thematic saturation, defined as the point at which no new conceptualizations of care emerged from the data. The final corpus consisted of 93 papers across 8 search terms: Peer, Community, Infrastructure, Network, Community, Support, Relation, and Collective.

Initial Search Terms	Maintenance/Maintaining, Grassroots, Infrastructure, Labour/Labor, Community, Collaborat*, Collective, Cooperat*, Commons, Relation, Emotion, Affective*, Support*, Moral*, Intimate* AND care AND technology
Final Search Terms	Peer, Community, Infrastructure, Network, Communit*, Support*, Relation, Collective AND care AND technology

Table 1: Initial Search terms and Final Search terms. Note that * in search is a wildcard symbol which searches for words that start with the same letters. For example, cooperat* could refer to cooperation, cooperatives, cooperative, etc.

3.2 Thematic Analysis

To document and structure our search and analysis process, we maintained analytic memos of our reflections, insights, and questions about the papers. These memos were discussed after each round of analysis to inform subsequent search steps. We applied iterative coding and reflexive thematic analysis [22] to identify recurring patterns in conceptualizations of care.

In each iteration of the analysis, research team members independently open coded the corpus, focusing on: a) who the recipient of care was, b) the role of technology in care, c) the nature of the relationship between caregiver and care receiver (e.g. paid vs. unpaid), d) the mode of care delivery (e.g. online, offline, hybrid), and e) the theoretical perspectives on care. Not all papers covered all of these dimensions, but each engaged substantively with at least one. Codes were developed inductively and refined iteratively. Citational information was also documented for each paper, including title, authors, venue, publication date, and abstract.

After we reached saturation, we performed a deep read of all the 93 papers in the final corpus. We analyzed the papers to elucidate the conceptualizations of care used in the work by extracting care theorists (e.g. Tronto [135], Puig de la Bellacasa [100], Mol [85], Gilligan [47], Collins [27], and Murphy [89]) cited in each paper and the care theories discussed (e.g. "Ethic of Care", "Matters of Care"). We also recorded any definitions of care used, and if no explicit definition was provided, looked into what the language around care was.

Through this process of iterative coding and reflexive discussions, we synthesized conceptual patterns across the corpus, and

collaboratively constructed six distinct conceptualizations of care: care as intimate, care as repair, care as service, care as burden, care as infrastructure, and care as ethic. Each of these conceptualizations will be elaborated in our findings along with highlighting their implications for care research in HCI.

3.3 Reflections and Limitations

Our review is neither systematic nor exhaustive. Following Snyder [115], we conducted an integrative literature review to develop "preliminary conceptualizations" [115] that can help capture some of the variations in care research we observe within the domain of HCI. Thus, rather than summarizing existing trends, we used the review to critically analyze papers that engage with care to capture meaningful variations across different studies. We acknowledge that our review is inherently selective and interpretive: there might be other conceptualizations of care that were not captured within our corpus or generated by our analysis. Further, as we prioritized depth over breadth, our analysis is what can be referred to as a "constructed interpretation" [132] of care literature related to HCI. Future work could expand upon our review by either expanding the corpus or using alternative methodologies to analyze it. We provide the final corpus of our review in the Appendix along with the corresponding search terms and conceptualizations.

4 Findings

In this section, we articulate the six conceptualizations of care identified in our integrative literature review. We then examine the scale of care represented in the corpus (ranging from individual to systemic) and whether the paper discussed care as a practice, an ethico-political concept, or both. Rather than referencing every paper that aligns with each conceptualization, we present selected examples to illustrate key patterns.

In exploring care-related papers, we uncovered a diverse range of topics. The corpus showcased both the expanding boundaries of care in HCI and increasing interest in care as a theoretical lens. In terms of domains, healthcare featured prominently, particularly in research on mental health care (e.g. [19, 39, 63, 88, 114]), elder and dementia care (e.g.[87, 109, 149, 150]), and the coordination of healthcare across different stakeholders (e.g.[98, 126, 148]). Care in response to disasters was also commonly studied (e.g.[36, 116, 144]), as well as care for communities (e.g.[57, 107, 130]). Care as reproductive labour, such as childcare and homemaking (e.g.[7, 54, 131]), and for reproductive health (e.g.[6, 9, 52, 60, 93]) were further highlighted. The roles of technologies varied across these categories, with some technologies being tools to support or provide care (e.g.[139]), some being recipients of care themselves (e.g.[37, 82, 93]), and some coming into conflict with care (e.g.[58, 107, 120, 127]). These variations suggest that care is not a singular or stable concept in HCI but is instead contingent on socio-technical, material, and relational contexts. In the following section, we expand upon the patterns and highlight tensions and gaps in the corpus.

4.1 Conceptualizing Care

Through our analysis, we constructed six conceptualizations of care that reflect the diversity of care exchanges studied in the field of HCI. Each conceptualization of care was shaped by the citational genealogy, the theoretical framework employed, the recipients of care (e.g. people, environment, community, technology), and disciplinary focus of the paper. The six conceptualizations, while analytically distinct, are not mutually exclusive and in some cases overlap or complement each other. These conceptualizations of care are: care as a service, care as a burden, care as intimate, care as repair, care as infrastructure, and care as an ethic.

4.1.1 Care as a Service. Care as a service refers to a structured and professionalized set of activities aimed at supporting the well-being, health, and quality of life for individuals. It typically involves paid care work that addresses physical, emotional, and social needs. In the corpus, care as a service often showed up as healthcare (e.g.[32, 58, 147]), home caregiving (e.g.[97]), house cleaning (e.g.[95]), long-term care (e.g.[128, 138]), or education (e.g.[76]). The papers examined how professionals used technologies in their care work and/or how technologies could be introduced into these professions.

Some papers focused on an individual professional performing care for an individual human or non-human entity (e.g. [50, 71]), while others discussed the networked nature of professional care work (e.g. [32, 94]). For example, Suh et al. [126] proposes "Collective Care Management" as a "team-based care approach" between a variety of healthcare workers. Particularly in healthcare, there was a tension between centring an individual who is receiving care and the "multiple, siloed healthcare service providers they depend upon" [50]. Furthermore, although care as a service positions a professional as the caregiver, it also involves "non-professional auxiliary care-givers" [70] such as patients and family members, who take on structural roles defined by specific expectations and responsibilities (e.g. [51, 55]). The domain of healthcare also shows an example of the inherent tensions between individual care relations and larger systems of care. In healthcare, a key challenge was the need to address both the personal, individualized aspects of care and the larger, fragmented healthcare system. This challenge showed a need to integrate individual care with an understanding of how these individual care interactions fit into and are influenced by the broader healthcare structures (e.g.[6, 43, 50, 63, 146]).

Most care professionals in these papers were care-givers who interacted repeatedly with care-receivers, in contrast to service providers such as doctors who only sporadically see a patient. For example, Poon et al. [98] focused on "healthcare professionals that provide long-term, chronic, post-acute, and assistive care services." Therefore the expertise around knowing the needs of the care-receiver was often more central to the care work than the professional expertise required by the caregiver's field, emphasizing relational aspects of care work.

Importantly, some studies recognized unpaid care work as a service, due to the knowledge needed to perform care work, regardless of monetary compensation (e.g. parenting, home care work)[73]. Glick et al. [50] rejects the term "informal" to describe these unpaid carers, arguing that it implied a non-professional or a casual role. Given the devaluation of unpaid care work [54], this explicit acknowledgement of the skill required to perform care work challenged the harms of under-recognizing the effort and expertise that goes into care.

In most papers that conceptualized care as a service, care-receivers were humans; however professionals did need to perform care work on the digital tools and systems they used, at times at the expense of care provided to human care-receivers. Some studies explicitly explored the care work required to sustain digital components of a care-as-service system. Ismail et al. [58] and Sun et al. [128] explore the challenges of negotiating between the datafication of healthcare work and the needs of patients.

4.1.2 Care as a Burden. Care as a burden recognizes the physical, emotional, and financial demands that caregiving can place on individuals. This perspective acknowledges that care can lead to significant stress, exhaustion, and other negative impacts on caregivers, as "care work is often dirty, dangerous, and burdensome" [127]. This conceptualization was particularly prevalent where care work was performed by a family member without adequate support, presenting care as a responsibility or an obligation that people did not have the choice not to fulfill (e.g. [51]). The recipient of care was generally an individual and was primarily focused on eldercare (e.g.[16, 138]) and care for a person with a disability or chronic illness (e.g.[19]). Notably, many care workers in these papers were marginalized in some way, adding additional layers of complexity and burden to their caregiving roles.

Due to declining social support for care work, family members are increasingly shouldering the responsibility of providing long-term care. Yet, portraying care in these situations as a burden risks perpetuating harmful historical narratives that label individuals with disabilities as burdens. Some papers which conceptualize care as a burden balance examining the positions of care-receivers with that or care-givers. For instance, Guan et al. [51] discuss the role of technologies in relation with a care giver and care-receiver with dementia in leveraging "community caregiving approaches" and empower agency for people with dementia amidst the global COVID-19 pandemic. Papers which conceptualize care as a burden, but also include the impacts of care in relation to the care-receiver are therefore able to acknowledge the onus of care placed on care-givers without adequate scaffolding for care work, as well as the agency and needs of the care-receiver.

4.1.3 Care as Intimate. Care as intimate refers to care for bodily health often not openly discussed in public (i.e., non-intimate) settings. In the corpus, care oriented towards reproductive health was often referred to as "intimate care," which "often involves parts of the body that are hidden or involved in sexual functioning" [6] and is associated "with intimate settings, experiences, and placements of technologies close to intimate parts of the human body" [119]. Despite the use of gender-neutral language in conceptualizations of intimate care, these papers dealt exclusively with cisgender women's health issues, seldom noting the needs of transgender men or nonbinary people—other than noting that the language excludes them—and never dealt specifically with cisgender men's health issues. By choosing intimacy as a frame for reproductive care, gynecological care, and urinary care, these authors signal how reproductive health matters have been stigmatized and treated as a private issue [61], as well as uniquely separated from other more public or "universal" matters of health.

These papers often focused on an individual being able to have agency in taking care of their own reproductive health, and challenging taboos in reproductive health issues (e.g., [5, 74, 145]). Despite the individual and private association with the term 'intimate,' papers also discussed ways that intimate care could be supported by communities and connected to the broader ecological environment or other systemic care relations (e.g., [9, 24, 119]). For instance, Søndergaard et al. [119] discuss how menstrual care products could be managed in ways that are more environmentally conscious, and how menstrual discharge could be used to care for plants, thereby linking intimate care with ecological concerns.

The discussion of intimate care engaged with both theory and practice, incorporating theories around the situated experience of reproductive health alongside actionable strategies to destigmatize and improve reproductive wellbeing (e.g., [26, 52, 60, 93]). In line with feminist research, there was an imperative for change proposing "a woman-centred program of research to design that improves the conditions of women, within the social endeavour of (self-)care and through re-imagining practices that are paramount throughout the life course and vital to all being in the world" [5]. This approach emphasizes the necessity of transforming how care as intimacy is perceived, practised, and integrated into broader care systems.

4.1.4 Care as Repair. Care as repair refers to understanding care as a way of restoring, maintaining, and improving the well-being of individuals, relations, or systems. This concept emphasizes the role of care in addressing breakdowns—whether in physical objects (e.g., [36]), social structures (e.g., [65, 69]), or communities (e.g., [117])—through practices that address damage, wear, and dysfunction. Care as repair involves identifying issues, addressing immediate needs, and implementing solutions to mitigate damage, promote recovery, and move towards long-term sustainability.

Care as repair is generally enacted by communities of peers to rebuild after an acute crisis. For example, several papers discussed care as a form of repair following natural disasters (e.g., [36, 116]), with social media used to connect community members and provide care to others. Rather than relying on formal channels of aid, care as repair in these contexts "catalyze[s] collective action among members, facilitate[s] community development initiatives, educate[s] members, and [is] a key source of social support" [110]. Papers that focused on care as repair often positioned care as a mediating force, explicitly acknowledging the ways care transcends boundaries between private and public life.

Care was seen as a means to rebuild and re-envision social structures, particularly in moments of systemic breakdown. Disaster in these papers provided opportunities to expose faults in existing systems of support and rethink care as a way of supporting and sustaining communities. These studies also highlight examples of informal repair practices carried out by "untrained, nonprofessional repairers" [37]. Care as repair underscores the importance of grassroots, community-driven efforts in addressing immediate needs and fostering recovery, highlighting how collective, informal support can play a role in restoring and enhancing well-being during times of crises. Through grassroots initiatives and innovative use of digital tools, care as repair offers transformative potential for re-imagining and reconstructing.

4.1.5 Care as Infrastructure. Care as infrastructure involves viewing care practices, relationships, and systems as foundational to the functioning of societies and organizations, similar to physical infrastructure like roads or telecommunications. It also extends to relational and sociotechnical phenomena. Care as infrastructure shows how care can support public goods and services that support a populace. In the corpus, examples of care as infrastructure included supporting schooling [76], internet connectivity [37], health systems (e.g., [9, 142]), and disaster responses (e.g., [117]).

Like other infrastructures, the importance of care becomes particularly visible when it breaks down or is absent [123]. For example, the lack of adequate caregiving resources can lead to significant social and economic disruptions. Wilcox et al. [142] highlight how care infrastructure involves assemblages of informal social ecologies, formalized knowledge sources, and self-reflective media, and showing how the breakdown of these interconnected systems can expose vulnerabilities and highlight the need for "assembling together elements of informal social ecologies, formalized knowledge sources, and self-reflective media" (ibid). Care as infrastructure also responds to needs in spaces which could create harm through otherwise oppressive systems. Boone et al. [20] discuss how data infrastructures mediating between food assistance programs and the Office of Immigration Affairs use a caring data practice to form an infrastructure which attends to social and cultural community contexts through relational values.

Additionally, care as infrastructure works by connecting various elements within a society, creating a network of support that facilitates well-being in ways that are often neglected. For example, Karusala et al. [62] assert that care infrastructures function to support, leverage, and extend care as a resource, reinforcing its essential role in maintaining the neglected fabric of society. Similarly, Baker et al. [10] discuss "matters of data care" in scientific workplaces, emphasizing that caring for data goes beyond technical expertise to include a shared responsibility for the well-being of "science, nature, and life on earth." This demonstrates how care infrastructure not only supports local collective data management but also draws attention to neglected aspects of infrastructure. Reynante et al. [103] discusses care as a sustainable approach to civic engagement, particularly in relation to reproductive work such as childcare, further extending the concept of care as infrastructure as foundational to social well being.

4.1.6 Care as an Ethic. Care as an ethic represents a moral framework rooted in compassion, responsibility, and reciprocity within relationships and interactions. It emphasizes attitudes and behaviours that prioritize the well-being and dignity of others, acknowledging their inherent value. As an ethic, care guides decision-making and actions by emphasizing empathy, attentiveness, and responsiveness to the needs of individuals, communities, and the environment. It also involves recognizing and addressing power imbalances, systemic injustices, and vulnerabilities, while fostering connections, mutual support, and collective responsibility.

Care as an ethic highlights how maintenance or fostering of particular things, systems, and ideals demonstrate responsibility for what worlds come to be. Care, in this sense, serves as a way to discern "what, how, and when things get caring attention and come to matter and what, how, and when things don't" [64]. This ethical approach also involves critical reflection on the power dynamics and systemic structures that influence who and what receives care (e.g., [72, 83, 112]). Introducing care as an ethic calls for a deliberate effort to address inequities and ensure that care practices do not reinforce existing hierarchies or exclusions.

Care as an ethic also emphasizes the interconnectedness and interdependence inherent in human relationships and social structures. Dye et al. [36] frames care as an imperative to "recognize the inevitable interdependency essential to the reliant and vulnerable beings that we are." This perspective aligns with the values of collaboration, cooperation, and interpersonal support emphasized by Toombs et al. [129] and Wolf et al. [143], which are fundamental to fostering a compassionate and responsive society. By acknowledging our mutual dependencies, care as an ethic fosters a sense of shared responsibility and solidarity, encouraging actions that support collective well-being. Unlike care as a burden, this view sees care as an inter-generational and communal responsibility in a way that builds power [92]. Along this line, Musgrave et al. [90] present care as "the ancestral bequeathing of resistance practices known to Black women and femmes from their mothers, grandmothers, and aunties to care for self and community when adversity is encountered," reinforcing how collective, caring practices sustain communities and align with Meng et al.'s [83] advocacy for "democratic caring experiments in the small." Such commitments show how care ethics is engaged in sustaining and enhancing networks of support to create "thick, situated connectivity, and densely woven networks" [116]. This relational perspective in care ethics demands a contextual understanding of circumstances and a compassionate responsive engagement.

While care as an ethic highlights integrated and relational approaches that foster long-term sustainability and equity, it also reveals the complexities and tensions within care practices. These tensions often arise between competing needs of human and non-human care-receivers, as well as between caregiver responsibilities and their burdens.

4.2 Care as Practical and as Ethico-political

In addition to identifying the six conceptualizations of care, we examined whether each paper focused on practical aspects of care, ethico-political aspects of care, or a combination of both. By practical aspects, we refer to the tangible actions, behaviours, and activities involved in caregiving—the "doing" of care—such as physical maintenance and emotional support. By ethico-political we mean the enmeshed moral, ethical, and political forces that shape how care is enacted, recognized, or denied.

We recognize that all care relationships involve multiple interconnected components—social, political, economic, affective, material, and logistical—that influence how and what care is enacted [49, 100, 135]. Papers in the corpus tend to focus on specific aspects of care, which we categorized as either practical or ethico-political depending on the primary emphasis of their analysis.

The practical aspects of care ranged from addressing challenges in elder care (e.g. [55, 150]) to documenting neighbourhood buildings in need of care [83]. These studies examined care as actionable practices that affect change through subjects and on objects, forming the material and social dimensions of a care relationship.

In studies that conceptualized care as a service or care as a burden, where the focus is on interpersonal care between care-givers and care-receivers, care was often not explicitly defined or analyzed conceptually. This is likely because care in these contexts is easily recognizable, requiring less conceptual justification. Therefore, papers addressing individual care practices—such as in healthcare–tended to engage less frequently with ethico-political aspects of care (e.g., [42, 114, 148]).

By contrast, papers examining the ethico-political aspects of care examined the role of care in bringing particular worlds into being. These papers often conceptualized care as an ethic (e.g., [14, 54, 119, 122, 131]), as they were attentive to the ethical responsibilities which come along with entangled impacts of care. These papers used theories of care like Tronto and Fisher's [40] "ethics of care," a framework which reveals how care is shaped by power structures and interrelated forces. Such frameworks position care as both a conceptual lens and an interventionist practice [111], demonstrating how practical aspects of care are influenced by broader systemic contexts.

The ethico-political aspects of care extend beyond material concerns to critically examine the systemic influences and politics of marginalization that shape how care is understood and practised within historical (e.g., [113]), social (e.g., [5]), and ethical (e.g., [45]) systems. For instance, Musgrave et al. [90] highlight how historical trajectories are essential when contextualizing online harassment of Black women, framing it not as a contemporary issue caused by technologies but as a manifestation of longstanding structural inequalities. Similarly, Hui [57] suggests that care is uniquely positioned to address the complex politics of marginalization through "community engagement as ongoing interactions that promote individual and collective well-being. This may involve providing mutual support within a community, being sensitive to diverse backgrounds and experiences, and being flexible and adaptable" (ibid). Helms et al. [54] further explore conceptualizations of care by 'troubling' it through speculative design, creating novel ways of practising care that engage both ethical and political dimensions. Their work examines how gender, disability, and queerness shape care practices, demonstrating the need to understand care beyond its practical aspects to address systemic influences and the intricate politics of marginalization.

Papers focusing on ethico-political aspects often addressed practical aspects whereas the latter was less frequent. As an example, while some studies explored healthcare providers' roles with technology integration [94], focusing on the practical aspects of caring for patients. Others discuss the practical aspects of healthcare and extend that discussion to the ethico-political aspects by critiquing the medical-industrial complex, highlighting the global interconnectedness of technologies, providers, patients, and healthcare systems [109].

Papers which conceptualized care as intimate, repair, or infrastructure often focused on both ethico-political and practical aspects of care. For instance, Søndergaard et al. [119] engage with the practical material needs of menstrual products for managing periods (care as intimate), but also discuss the ethico-political aspects of menstruation and ethical responsibilities to ecosystems (care as an ethic).

Finally, papers that conceptualized care as an ethic necessarily engaged with ethico-political aspects of care, using care theory to address critical issues and advocate for more caring futures. They challenge traditional notions of care by framing it as "a theoretical obligation to an issue" [99] and expand the actors participating in care to include technologies (e.g., [37]), ecosystems (e.g., [18, 64, 122]), and ideas (e.g., [66, 83]). These works call for critical approaches to recognize and address care in domains where it is often overlooked.

4.3 Scale of Care

Our analysis revealed that care operates on multiple scales, ranging from individual to relational to systemic levels. Across these scales, care-givers (those doing the care) and care-receivers (those cared for) included human, non-human, and more-than-human entities, such as individuals, communities (e.g., [17, 86]), data (e.g., [82, 133]), the environment (e.g., [34]), democracies (e.g., [83]), and even the discipline of HCI itself (e.g., [56, 91]). These varying scales highlight the complexity and breadth of care practices, extending beyond the traditional caregiver-care recipient dyad to encompass entire networks and systems.

Papers which examined care on an individual scale included care between two individuals in an asymmetric manner with one individual being the caregiver and other being the care-receiver. These papers often focused on patient-doctor/nurse [88] or person with extended care needs-family member [71, 73] pairings. As noted, these papers were also more likely to focus on the practical aspects of care.

Other papers discussed care at the relational level, which highlight the reciprocal nature of care across two or more entities. In contrast to the individual scale, which implied a hierarchical structure between caregiver and care-receiver, relational care tended to be more horizontal, and often acknowledging the agency of both human and non-human actors in care exchanges. Relational care interactions also extended to communities, focusing on collective well-being, such as social connection [124] or religious groups [110].

Papers which discussed care at a systemic level examined interconnected care exchanges, emphasizing a holistic view of care that encompasses entire structures and networks including environmental care (e.g., [18, 77, 118]) and community resilience, highlighting care's role in maintaining essential service systems (e.g., [30, 62]). Importantly, papers which analyzed care at a systemic level considered not only care for the system, but also the interrelated care exchanges which constitute it. For example, Ashwini et al. [8] explore the social intricacies of inviting robots to support people with autism, while urging for more democratized systems of social robotics that can respond to context-dependent needs and politics.

This more enmeshed conception of care on a systemic level stresses moral agency and moral values such as responsiveness, compassion, contextual understanding, and codependent relationships. These values are essential to shepherding, maintenance, and sustainability, which require thick, situated connectivity and densely woven networks, as noted by Soden et al. [116]. Howard et

al. [56] further proposes that as ethics is "not universal, but situated," care can be "a way of navigating [the] negotiated, contested ethical field."

4.4 Tensions between Technology and Care

Significantly, the role of technologies across the above scales of care was diverse: they served as tools, as care-receivers, or as an integrated participant in care processes. While many papers framed technology as a tool in care exchanges, others suggested that technology should be understood as agential, deeply embedded within care networks. For instance, Dye et al. [37] highlight technologies as primary recipients of care, which in turn supported broader care infrastructures. In other cases, particularly in papers focused on interpersonal or dyadic care, technologies were framed primarily as tools to aid the delivery or execution of care [139].

Many papers in the corpus identified tensions in care, particularly when the needs of different human and non-human care-receivers conflicted, or when caregivers faced challenges balancing their responsibilities and burdens. Technologies were often central to these tensions – at times causing conflicts, at others resolving them, or sometimes serving both roles simultaneously. For example, Brozena et al. [23] highlight how fintech tools for bipolar individuals can minimize harms during manic episodes but also introduce risks of financial abuse. Moreover, technologies themselves demand maintenance, creating new care relations (e.g., [66]).

A recurring tension was the conflict between efficiency-driven design and the relational and nuanced aspects of caregiving. Papers critiqued how design's focus on speed and standardization can marginalize individual needs and reduce care to transactional tasks. For instance, Meng et al. [83] discuss the challenges of "actually embracing plurality and equity of voice [which]... presents a challenge to achieving equality as the condition of equal voice and plurality in caregiving". Others note how healthcare workflows prioritize efficiency at the expense of holistic patient care (e.g., [94]).

In community settings, efficiency often overshadowed relational practices; Rossitto et al. [107] show how nonprofits' streamlined food distribution processes erased valuable volunteer-community interactions, and Toombs et al. [130] highlight tensions between tech-driven priorities and communal practices in hackerspaces.

Datafication and surveillance further disrupted care by introducing new responsibilities for care-givers. In healthcare, requirements for documenting and managing data detracted from patient care (e.g., [87, 147]), with Ismail et al. [58] and Sun et al. [128] noting how datification limits professionals' capacity to attend to patients. Similarly, in education, Lu et al. [76] describe how teachers resist surveillance technologies to better care for their students. These examples illustrate how dominant technological logics often conflict with the relational work of care, making caregiving more challenging.

In contrast, some papers framed technologies as tools to alleviate care burdens. For example, studies explored interventions like collaborative systems to support care exchanges or reduce caregivers' responsibilities (e.g., [21, 134]). However, such technosolutionist approaches risk presenting care as a problem to be solved by technology rather than addressing systemic issues. Rudnik et al. [109] critique how HCI researchers often frame care and dependence as problems requiring technological fixes, neglecting the underlying material and ideological tensions.

Technologies designed to support care often risk reinforcing inequities by prioritizing efficiency or cost-saving measures over relational and context-sensitive approaches. As evidenced by the conflicting impacts of technology on care, it is important for researchers in the HCI field to acknowledge and engage with the ethical and political implications of care, questioning how technology choices contribute to or disrupt systemic inequities. To this end, in our discussion we present a diagrammatic tool to support approaches to research which respond to the enmeshed nature of care, and suggest ways for HCI researchers to engage with critical theories of care.

5 Discussion

As technologies continue to permeate our everyday lives, the role of computing in fostering sustainable futures has become increasingly important. Within this landscape, care emerges as a critical lens through which sustainability can be reimagined—not only as environmental stewardship but also as the maintenance, repair, and ethical responsibility toward the sociotechnical systems that shape our world. Care theories emphasize relationality, highlighting the importance of sustaining networks over time. Through constructing conceptualizations of care in HCI, this paper contributes to sustainability research by articulating the different ways care manifest as we engage with technological systems. Further, we encourage a deeper engagement with the material, ethical, and political dimensions of care, which are integral to goals of sustainability.

As care in HCI comes to signify not only support and maintenance of humans, but also non-humans, ecosystems, and worlds [33], its conceptualizations are similarly diversifying and taking on new meanings, moving beyond primarily solely practical concerns to encompass diverse scales and ethico-political dimensions in relation to technology. The six conceptualizations of care we constructed demonstrate that the field is diverse in its applications of care as a focus of study.

In HCI, designing and studying technologies often reshapes care exchanges, influencing how care is enacted, distributed, and experienced. Because care is often seen as inherently moral and universally good, failing to critically examine the impacts of technology in care risks perpetuating or amplifying harm. As the concept of care continues to expand in HCI, it is important to establish a framework that supports care research in responsibly engaging with the ethical obligations of attending to matters of care. The tensions between technologies and care discussed in 4.4 highlight the harm that can arise from failing to consider the systemic impacts of interacting forces in care exchanges. Without careful consideration, care risks being framed as a moral justification for technological interventions rather than as a critical lens for evaluating how technologies reconfigure relationships. This, in turn, can reinforce harmful dynamics or neglect marginalized needs.

For example, a framework to inform care research could encourage HCI scholars to ask:

- Which care needs are prioritized?
- What/Who is excluded or burdened in these relational systems?

- How can technology foster equitable and sustainable care relationships?

In alignment with theories of care, care should be understood as an ecosystemic process that involves not only individuals but also the broader systems in which they exist. As care theorists [105, 135, 136] have noted, care transcends the boundaries between private and public spheres, and influences broader economic and political forces.

The six conceptualizations of care — service, burden, intimate, repair, infrastructure, and ethic — document the entangled nature of care. Future work should continue to acknowledge this entangled nature of care, and highlight the responsibilities that emerge from this entanglement. Each of these conceptualizations further offer a distinct yet interconnected avenue through which sustainability can be theorized and operationalized in HCI. For example, "care as repair" reorients sustainability to longevity, highlighting community-driven efforts to maintain and regenerate systems. "Care as infrastructure" highlights the relational and material systems of support that lead to resilient sociotechnical systems. These diverse forms of care allow an imagination of sustainable computing not as a discrete technological goal but as an ongoing, systemic practice of maintaining sustaining relations across human, non-human, and more-than-human domains.

To advance the expanding field of care research in HCI, we provide guidance for future studies by encouraging a broader, care theory-based understanding of what should be considered when investigating care in this context. We introduce a diagrammatic tool to aid in care conceptualizations and to encourage broadening the theoretical perspectives of care within the field.

5.1 A Tool for Care Research in HCI

To support future research on care in HCI and to align with the guidance outlined above, we have created a diagrammatic tool designed by the first author that can help researchers engage more deeply with the interrelated components of care, and consequently identify opportunities for change or potential for harm. The tool emerged from the thematic analysis with the goal of visualizing the complexity and interconnectedness of care when seen through an ecosystemic lens. The first author went through multiple visual iterations to adequately represent the entangled nature of care. Initial attempts used Cartesian graphs to spatially map care conceptualizations based on their scale and focus on ethico-political and/or practical aspects. However this spatial model proved inadequate for capturing the diversity of care concepts or the interconnected nature of care revealed through the literature. In response, the designs shifted to a radial format, allowing size and proximity to communicate focus and connection in care networks, respectively. This radial diagram was refined into a flower-like diagram to not only align visually with an ecosystemic metaphor but also accommodate the overlapping nature of care relations that we saw in our analysis.

Rather than being prescriptive, this tool is intended as a reflective aid to help researchers engage more deeply with the relational dimensions of care. It is not designed to guide researchers toward fitting their research within one of the six conceptualizations of care. Instead, it can be used to map out the different forms of care and how they approach scale and focus in care. The tool can also support reflection on the diversity of actors in a care space (i.e., caregivers, care receivers, and other implicated entities), as well as the ways those actors relate to each other. By extension, it also highlights the responsibilities that emerge from care relations due to relationships between actors, reinforcing the ethico-political stakes of care research. This tool will be made available on the streetlab.tech website for use by future research on care in HCI. To demonstrate the tool, we present it in default form, followed by three examples of it in use.

The flower diagram is overlaid atop two concentric circles representing the focus of care of the study, the inner circle is denotes practical, and the outer is ethico-political (Figure 1). The nesting of practical aspects within the ethico-political reflects the analytical stance that ethico-political forces always shape the practical aspects of care [111]. The relative size of the flower petals shows whether the research engages with the ethico-political aspects of care or focuses solely on the practical aspects.

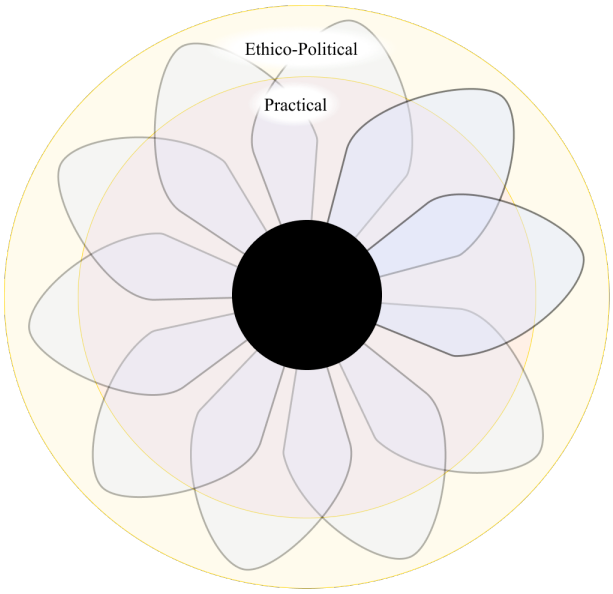

Figure 1: Blank Flower Diagram

At the centre of the flower is a space where the study's main focus can be placed, with petals extending outward from that centre to display the different actors which interrelate in the care exchange. For example, studies taking an individual care scale about elder care might focus on designing to support the caregiver. As pictured in Figure 2, "caregiver" would occupy the centre of the flower, while "elder" would be a petal. The overlap signifies a care relation occurring. In this example, the petals are smaller, and do not touch the outer ethico-political circle, indicating the study focuses primarily on the practical aspects of care without discussing larger ethico-political considerations. If the focus of the study grows to the ethico-political circle, the flower's petals also grow.

The other petals on the flower remain present, signifying that multiple actors are still involved in the care exchange, even if they were not actively discussed. This was often the case in research

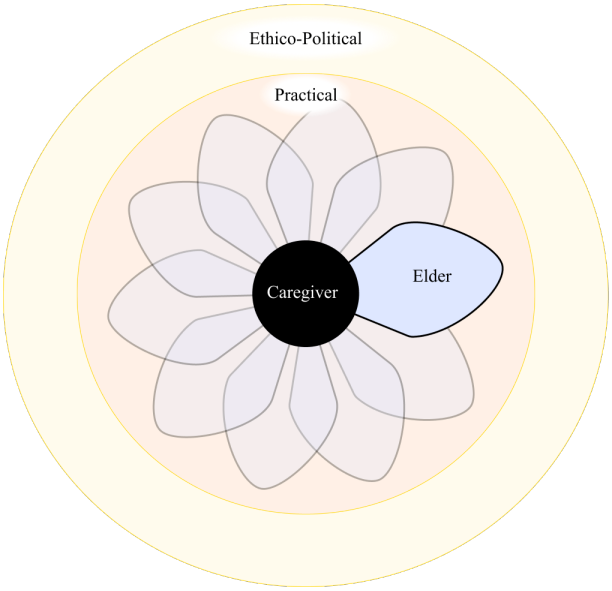

Figure 2: Individual and Practical Care Exchange

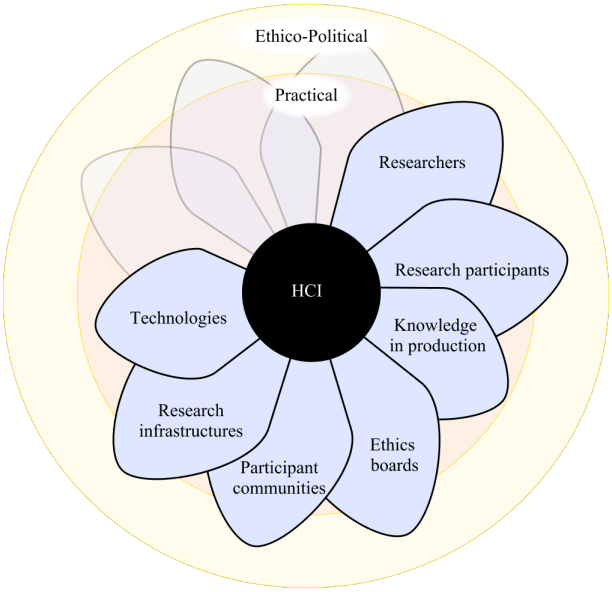

Figure 3: Systemic and Ethico-Political Flower Diagram

that conceptualized care as a service; where the individual interactions between caregivers and recipients (e.g. elder, children, or patients) were the primary focus. While this tool does not prescribe engagement with the ethico-political aspects of the care exchange, nor require the inclusion of other petals, it brings awareness to the fact that other actors and interrelated forces are still present in the care exchange.

In contrast, research examining systemic care often featured a greater number of interacting actors, represented by more petals in the diagrams. As Bellacasa [100], Tronto & Fisher [40], Suchmann [125], and others note, actors in care can include humans, non-humans, and more-than-humans. The types of care actors can thus include physical and non-physical entities. Papers discussing the care ethics of HCI as a discipline highlighted numerous interacting actors and explored the systemic impact of these connections. For example, Howard et al. [56] elaborate on how various elements such as research participant, the role of ethics boards, community members, research infrastructures, the knowledge being produced, participants, and researchers all interact and sustain/maintain each other. They note that "subjects develop complex, psychological, interpersonal, and political relationships to research infrastructures, as they make sense of the instruments that participating in research affords" (ibid). As pictured in Figure 3, researchers rely on research infrastructures to advance their work and careers, while research participants exist in that role due to these same infrastructures and the researchers' need for them. All these entities are mutually sustaining and interdependent, making them agential actors in the care exchange.

It's important to note that the position of each petal on the diagram is not significant. Instead, a filled petal that is touching others indicates that the concepts represented by the petals are interacting. If the petals are touching, all touching petals are interacting through the care exchange, not just those adjacent to each other. For instance, papers that conceptualize care as an ethic often explore multiple actors within the care exchange and delve into the ethico-politics of the systems for which they advocate an ethic of care.

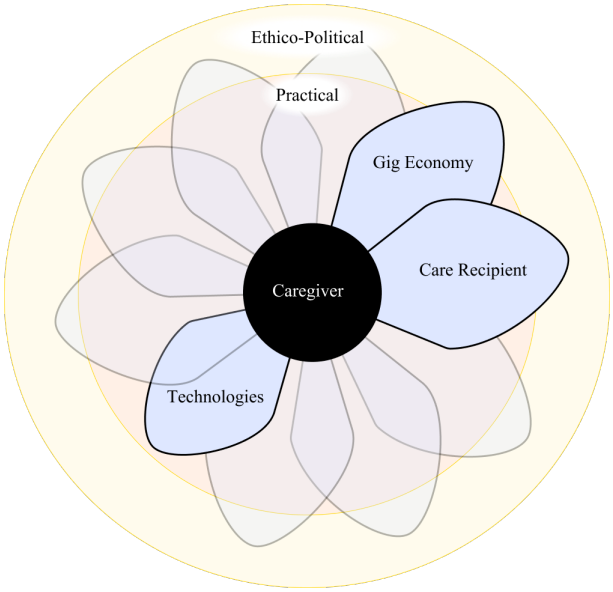

Figure 4: Non-Systemic Flower Diagram

In research where technology is introduced to address a care issue without considering its interaction with other care actors, the lack of discussion of the interaction is reflected in the diagram by the technology petal being separated from the other petals, as demonstrated in Figure 4, with blank petals in between, indicating

a lack of interaction between these elements. Furthermore, the technology petal does not touch the ethico-political sphere, indicating that the ethico-political aspects of care related to the introduction of the technology are not discussed, but they are discussed in relation to the gig economy and the care recipient. In papers that framed care as a burden, the authors often examined how economic structures like the gig economy or social structures such as familial relations affected care recipients and caregivers but did not explore how technologies influenced these dynamics or the care recipient, as the technology was presented solely as a solution for the caregiver.

No single study can comprehensively cover every actor involved in a care network, as well as the many ways that ethico-political forces impact the practical aspects of care, whether for individual actors or the exchange as a whole. Each actor in the care exchange multiplies its relationships, creating a cascading effect of care and making the potential actors in a care network infinite. The focus of any given study determines which components of the care network are examined within this infinite possible selection. Furthermore, in studies considering multiple care actors, each could be analyzed through the lens of ethico-political aspects of care. While addressing the practical aspects of care is valuable and can yield more immediate results, it's essential to recognize that these practical aspects are inherently intertwined with broader ethico-political forces. The diagrammatic tool is designed to emphasize the ethico-political impacts of researching and designing for care, encouraging a thoughtful approach to the wider implications of care practices, and serves as a tool to visualize the relational elements present in every care exchange.

Recognizing the evolving nature of care and its potential to support more ecosystemic approaches to HCI research, we propose using this tool as a reflective exercise to map the responsibilities between different actors, rather than as a prescriptive framework aimed at maximizing complexity. For instance, a researcher may use this tool to map out a multitude of involved actors and ecosystemic implications, but choose to narrow down their focus based on the intentions of their research. Still, they may remain aware of the surrounding system at play. It can also be used to review completed research by mapping its focus and identifying whether further exploration of entangled responsibilities is needed. At any stage in the research process, from planning through writing, the tool can be used as a reflective support about the responsibilities and complexities at play in the ecosystemic care network. In this way, the diagrammatic tool serves as a means of caring for care research itself—helping researchers identify key care relationships, sustain attention to essential connections, and critically assess the scale of their work.

5.2 Caring for Care Research

For HCI as a discipline to continue studying care in a responsible and sustainable way, future research should acknowledge diverse participants within care networks including humans, non-humans, and more-than-humans [54, 64]. We echo calls [10, 31] for the roles of technologies in care to be considered at relational and systemic scales, and in ethico-political aspects. As technologies are introduced to care exchanges, they themselves also require care [100], and have impacts on what else gets care. Particularly in the context of sustainability efforts, neglecting to consider how caring for one thing (for example, a social issue) may come at the expense of another (for example, an environmental issue). Furthermore, by including more-than-humans as actors in the care network, research can examine the emergent responsibilities arising from humans interacting with and through technologies and environments as an ethico-political issue. While future studies and designs may not decide to research these scales and aspects of care, they are still present and warrant consideration.

Previous research has called for a more critical examination of how new technologies impact the systems and communities they are introduced to [29]. Because care is interconnected, providing care for one entity may inadvertently harm another, and not all forms of care lead to socially beneficial outcomes. Murphy [89] highlights how caring for certain interests and ideas can come at the cost of others, and our corpus includes such examples, particularly where caring for technologies interfered with caring relations for people and/or the environment (ex. [34, 107, 127]). This aligns with Tronto and Fisher's [40] definition of care that discusses the maintenance of world(s), invoking a feminist perspective that reality is multifaceted, subjective, and context-dependent [53, 125]. Thus, in expanding the conceptual perspectives on care within HCI, it is crucial to move beyond traditional frameworks that emphasize maintenance and repair. Not all systems should be repaired or maintained if they are based on harmful foundations.

We argue that considering ethico-political aspects and examining care at larger scales can assist researchers being aware of potentially harmful outcomes of care to navigate in a way that reduces oppression and promotes justice as much as possible. For example, technologies meant to match employers with workers may not consider the repercussions of digital visibility for a population which is largely migrant workers [97, 98], and could make their work more risky. A deeper engagement with the politics of migration could surface ways to mitigate these risks.

At the same time, researching the practical aspects of care has significant and often immediate implications for research subjects and communities. While addressing the ethico-political aspects of care can help tackle systemic harms, achieving lasting systemic change requires time and continuous effort. Therefore, offering a practical intervention that directly supports care work is an important research pursuit in its own right. Thus, the key is to not to report on every care actor or explicitly address ethico-political aspects of care, but to remain aware of the broader care network at play and account for consequences of design and research around care.

5.3 Expanding Approaches to Care in HCI

This paper draws primarily on Tronto and Fisher [40, 135] and Puig de la Bellacasa [100] which aligns with the citational genealogy most frequently referenced by the corpus. We acknowledge this as both a limitation of our study and of the field's current landscape. While these widely cited theorists provide a solid base for understanding the moral responsibility embedded in care, they provide less direct guidance in how to practice care in a relational, ethical way.

In addition to the limited theoretical citations present in our corpus, we also acknowledge the remaining focus on healthcare as well as lack of pieces which attend explicitly to more-than-human entities in the care space. This is reflective of the current status of care research in HCI, rather than what it may be in the future. With the expanding conceptualizations of care as well as growing understanding of the ecosystemic nature of care, we hope that future work will expand to focus increasingly on more-than-human actors and care beyond the healthcare space.

Recent work in HCI has discussed the imperative for academics to engage with activism responsibly [69], not just on the issues we study, but also on the discipline of HCI itself. For instance, Chordia et al. [21] highlight the limited intersectionality in HCI's expanding discussions of social justice, noting that normative views frequently shape research design and tools. To address the call for more diverse voices in HCI research, we advocate for integrating more diverse critical approaches to care. Doing so shifts the focus of care research, i.e. which actors are included and whose interests are prioritized. This is also an expression of citational justice, and we encourage engagement with a broader range of care theorists, ensuring their perspectives are better represented in the field [67]. Referring back to the diagrammatic tool discussed earlier, this could result in the inclusion of additional "petals" or a reorientation of which petals are examined through an ethico-political lens, ultimately reshaping the nature of studies on technology in care exchanges.

We suggest four critical authors—Patricia Hill Collins [27, 28], Hil Malatino [78], Leah Lakshmi Piepzna-Samarasinha [96], and Dean Spade [121]—as examples of how diverse perspectives and approaches to care can be integrated into HCI. These scholars are not an exhaustive list of critical care theorists but provide a starting point. While some papers in our corpus have engaged with these scholars [54, 56, 65, 69, 90, 113, 116, 117, 122], their influence is far less prominent compared to works referring to Puig de la Bellacasa [100], Tronto [135, 137], and Fisher [40]. Importantly, beyond theorizing care, they provide practical examples and ways of practising care which could guide efforts to engage in HCI research in more care-ful ways.

Collins' [27] work explores Black feminist practices and "woman centred networks" as crucial sources of support, in which Black women's everyday acts of survival—such as "othermothering" and knowledge-sharing—are radical forms of care that challenge oppressive structures. These networks, often intergenerational, foster collective identity and enable resistance to intersecting oppressions, advocating for social change. Incorporating Collins' perspective on care naturally extends analyses to both the relational and systemic scales. Her focus on a Black feminist understanding of care also deepens the exploration of ethico-political aspects, especially those often overlooked as outside the public sphere, by potentially highlighting impact of technologies on interpersonal and social dynamics, such as the formation and cohesion of community groups. Particularly for papers studying care as infrastructure, this perspective broadens the understanding of how a care infrastructure may manifest as in different communities, provides concrete examples of how care as infrastructure can fail certain communities, but can also be built by those same groups.

Malatino [78] presents trans care as a vital practice of mutual support and resilience within trans communities, often resisting institutional neglect which defies institutionalized and over-medicalized forms of care for marginalized bodies. This perspective can be particularly valuable for papers addressing care as intimate, allowing theorizations of reproductive health and healthcare in HCI beyond taboo and medicalization. He also highlights the importance of sustained, ongoing forms of support that resist burnout and recognize the long-term needs of marginalized communities. This is notably applicable to work which conceptualizes care as a burden, to orient technologies to address the weight of care on care-givers, while not stigmatizing care-receivers. In relation to the diagrammatic tool, this perspective could shift the focus of what is at the center of analysis, shifting from caregiver-patient dynamics at a practical level to more peer-based relational networks at both the practical and ethico-political levels.

Piepzna-Samarasinha [96] critiques the narrative of independence in disability discourses, and advocates for an understanding of interdependent care webs in which individuals care for one another according to need and ability. HCI literature has already engaged with marginalized communities through assets based design, which emphasizes focusing on the abilities and assets that communities have rather than focusing on deficit narratives. These understandings, combined with disability justice theories, could facilitate relational and systemic analyses of care particularly for disabled bodies, and highlighting the role of technologies as ethico-political forces in relation to people with disabilities. Regarding the diagrammatic tool, Piepzna-Samarasinha's concept of 'care webs' [96], in which people form interdependent care relationships based on which each person needs and what each person can give, could inspire visions of what additional petals could be integrated in a more interdependent model of care.

Spade's [121] concept of mutual aid presents cooperative, non-hierarchical care systems which do not rely on formalized institutions to improve care networks, and in fact challenges the idea that institution-based care networks have ever been appropriate for many. For papers that emphasize care as an ethic, this approach raises the question of what ethical responsibility HCI holds, and who or what should care be directed toward. This approach could introduce new systems into analysis, including peer-based and grassroots support infrastructures, while including ethico-political critiques of how care from oppressive institutions impacts marginalized groups. This necessarily expands approaches to care research towards the ethico-political aspects as it critiques extant infrastructures of care and presents relational alternatives.

While not a guarantee that harm through care does not occur, by expanding the range of care scholars and integrating intersectional, radical approaches to care, HCI can adopt more more critical, sustainable approaches to care that emphasize mutual support, relationality, and resistance. This shift not only broadens the theoretical foundations of care in HCI but also encourages a critical re-evaluation of how care practices can both sustain and subvert existing systems.

6 Conclusion

As the pace of technological development accelerates, attending to our responsibilities to our world(s) becomes increasingly vital. The field of HCI is broadening its understanding of care beyond human interactions to include exchanges between humans, non-humans, and more-than-humans, and engage with care as a world-building force. At the same time, care is being framed as a moral imperative, shaping how the discipline envisions its role in the future of technology. To explore the growing research in HCI on care, we conducted an exploratory literature review of 93 papers which use care as the subject of research or as theoretical framing. We present six conceptualizations of care as well as two dimensions: scale of care and focus of care. To support future work in care in HCI, we propose that further studies should aim to consider more relational and systemic scales of care, and the ethico-political aspects of care. We provide a diagrammatic tool to support future research to consider the interrelated actors in care exchanges, and to be more aware of potential harms that care may cause. We conclude by inviting the field to expand the conceptual perspectives taken around care by introducing four critical care theorists as a starting point for HCI to diversify its understanding of care.

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A Full Corpus

Table 2: Overview of Papers and Care Categories

Paper	Venue	Year	Search Terms	Care as Burden	Care as Service	Care as Intimate	Care as Repair	Care as Infrastructure	Care as Ethic
HCI and Intimate Care as an Agenda for Change in Women's Health[6]	CHI	2016	community	FALSE	FALSE	TRUE	FALSE	FALSE	TRUE
Woman-Centered Design through Humanity, Activism, and Inclusion[5]	CHI	2020	community	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE
Networked Empowerment on Facebook Groups for Parents of Children with Special Needs[7]	CHI	2015	community	FALSE	TRUE	FALSE	FALSE	FALSE	FALSE
"It looks useful, works just fine, but will it replace me?" Understanding Special Educators' Perception of Social Robots for Autism Care in India[8]	CHI	2024	community	FALSE	TRUE	FALSE	FALSE	FALSE	FALSE
Embodied Negotiations, Practices and Experiences Interacting with Pregnancy Care Infrastructures in South India[9]	CHI	2022	infrastructure	FALSE	FALSE	TRUE	FALSE	TRUE	FALSE
Data care and its politics: designing for local collective data management as a neglected thing[10]	PDC	2018	infrastructure	FALSE	FALSE	FALSE	FALSE	TRUE	TRUE
Emotion Work in Experience-Centered Design[11]	CHI	2019	community	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE
Wanting To Live Here: Design After Anthropocentric Functionalism[14]	CHI	2021	relation	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE
Mnemosyne - Supporting Reminiscence for Individuals with Dementia in Residential Care Settings[16]	CHI	2024	support	FALSE	TRUE	FALSE	FALSE	FALSE	FALSE
Fragments of the Past: Curating Peer Support with Perpetrators of Domestic Violence[17]	CHI	2021	peer	FALSE	TRUE	FALSE	TRUE	FALSE	FALSE
Alternatives to Agrilogistics: Designing for Ecological Thinking[18]	CSCW	2021	relation	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE
Self Harmony: Rethinking Hackathons to Design and Critique Digital Technologies for Those Affected by Self-Harm[19]	CHI	2017	community	TRUE	TRUE	FALSE	FALSE	FALSE	FALSE
Data Practice for a Politics of Care: Food Assistance as a Site of Careful Data Work[20]	CHI	2023	community	FALSE	FALSE	FALSE	FALSE	TRUE	TRUE
Co-designing Customizable Clinical Dashboards with Multidisciplinary Teams: Bridging the Gap in Chronic Disease Care[21]	CHI	2024	support	FALSE	TRUE	FALSE	FALSE	FALSE	FALSE

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Paper	Venue	Year	Search Terms	Care as Burden	Care as Service	Care as Intimate	Care as Repair	Care as Infrastructure	Care as Ethic
Supportive Fintech for Individuals with Bipolar Disorder: Financial Data Sharing Preferences for Longitudinal Care Management[23]	CHI	2024	community	FALSE	TRUE	FALSE	FALSE	FALSE	FALSE
Microbial Revolt: Redefining biolab tools and practices for more-than-human care ecologies[24]	CHI	2024	relation	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE
Understanding Antenatal Care Needs through Co-Creation with Roma Women to Inform the Design of mHealth Technologies[26]	CHI	2024	community	FALSE	FALSE	TRUE	FALSE	FALSE	FALSE
Infrastructuring Public Service Transformation: Creating Collaborative Spaces between Communities and Institutions through HCI Research[30]	CHI	2019	community	FALSE	FALSE	FALSE	TRUE	TRUE	TRUE
Hospital Employee Experiences Caring for Patients in Smart Patient Rooms[32]	CHI	2024	support	FALSE	TRUE	FALSE	FALSE	FALSE	FALSE
HCI Research on Agriculture: Competing Sociotechnical Imaginaries, Definitions, and Opportunities[34]	CHI	2023	relation	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE
If it Rains, Ask Grandma to Disconnect the Nano: Maintenance & Care in Havana's StreetNet[37]	CSCW	2019	community	FALSE	FALSE	FALSE	TRUE	FALSE	TRUE
Un Grano de Arena: Infrastructural Care, Social Media Platforms, and the Venezuelan Humanitarian Crisis[36]	CSCW	2021	infrastructure	FALSE	FALSE	FALSE	TRUE	FALSE	TRUE
Understanding the Care Ecologies of Veterans with PTSD[39]	CHI	2020	peer	FALSE	TRUE	FALSE	TRUE	FALSE	FALSE
Care and Design: An Ethnography of Mutual Recognition in the Context of Advanced Dementia [42]	CHI	2019	mutual	FALSE	TRUE	FALSE	FALSE	FALSE	FALSE
Harvesting Caregiving Knowledge: Design Considerations for Integrating Volunteer Input in Dementia Care[43]	CHI	2018	peer	TRUE	TRUE	FALSE	FALSE	FALSE	FALSE
Felt Ethics: Cultivating Ethical Sensibility in Design Practice[45]	CHI	2023	relation	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE
Empowering Participation Within Structures of Dependency[46]	PDC	2022	collective	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE
MyCareBudget: Co-creating a Healthcare Digital Commons with and for Disabled Citizens and their Unpaid Carers[50]	CHI	2023	support	FALSE	TRUE	FALSE	FALSE	FALSE	FALSE

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Paper	Venue	Year	Search Terms	Care as Burden	Care as Service	Care as Intimate	Care as Repair	Care as Infrastructure	Care as Ethic
Taking an (Embodied) Cue From Community Health: Designing Dementia Caregiver Support Technology to Advance Health Equity[51]	CHI	2021	community	TRUE	TRUE	FALSE	FALSE	FALSE	FALSE
Investigating Support Seeking from Peers for Pregnancy in Online Health Communities[52]	CSCW	2017	peer	FALSE	FALSE	TRUE	FALSE	FALSE	FALSE
Troubling Care: Four Orientations for Wickedness in Design[54]	DIS	2021	relation	FALSE	TRUE	FALSE	FALSE	FALSE	TRUE
Design Opportunities for Care Transitions in Dementia: Understanding Informal Caregivers' Experiences Through a Practice-Informed Approach[55]	CHI	2024	support	FALSE	TRUE	FALSE	FALSE	FALSE	FALSE
Ways of Knowing When Research Subjects Care[56]	CHI	2019	relation	FALSE	TRUE	FALSE	FALSE	FALSE	TRUE
Community Tech Workers: Scaffolding Digital Engagement Among Underserved Minority Businesses[57]	CSCW	2023	community	FALSE	TRUE	FALSE	FALSE	FALSE	TRUE
Imagining Caring Futures for Frontline Health Work[58]	CHI	2022	emotion	FALSE	TRUE	FALSE	FALSE	FALSE	TRUE
Platforming PCOS Treatment Online: FemTech Logics of Care[60]	CHI	2024	infrastructure	FALSE	FALSE	TRUE	FALSE	FALSE	TRUE
Care as a Resource in Underserved Learning Environments[62]	CSCW	2017	community	FALSE	FALSE	FALSE	FALSE	TRUE	TRUE
Precarious Interventions: Designing for Ecologies of Care[63]	CSCW	2019	community	FALSE	TRUE	FALSE	FALSE	TRUE	TRUE
Feminist Care in the Anthropocene: Packing and Unpacking Tensions in Posthumanist HCI [64]	DIS	2022	relation	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE
It Takes More Than One Hand to Clap: On the Role of 'Care' in Maintaining Design Results.[66]	CHI	2021	community	FALSE	FALSE	FALSE	FALSE	TRUE	TRUE
What is the Topic of the Group, Please? On Migration, Care and the Challenges of Participation in Design[65]	CSCW	2021	community	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE
On Activism and Academia: Reflecting Together and Sharing Experiences Among Critical Friends[69]	CHI	2021	community	FALSE	FALSE	FALSE	TRUE	FALSE	TRUE
Patterns of Patient and Caregiver Mutual Support Connections in an Online Health Community[70]	CSCW	2021	support	FALSE	TRUE	FALSE	FALSE	FALSE	FALSE
"Any bit of help, helps": Understanding how older caregivers use carework platforms for caregiving support[71]	CHI	2023	support	FALSE	TRUE	FALSE	FALSE	FALSE	FALSE
Structuring future social relations: the politics of care in participatory practice[72]	PDC	2014	community	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE

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Paper	Venue	Year	Search Terms	Care as Burden	Care as Service	Care as Intimate	Care as Repair	Care as Infrastructure	Care as Ethic
Connecting Those That Care: Designing for Transitioning, Talking, Belonging and Escaping[73]	CHI	2017	support	TRUE	TRUE	FALSE	FALSE	FALSE	FALSE
Using and Appropriating Technology to Support The Menopause Journey in the UK[74]	CHI	2024	support	FALSE	FALSE	TRUE	FALSE	FALSE	FALSE
Data Work in Education: Enacting and Negotiating Care and Control in Teachers' Use of Data-Driven Classroom Surveillance Technology[76]	CSCW	2021	support	FALSE	TRUE	FALSE	FALSE	FALSE	FALSE
Value-mapping transitions into the Pluriverse: Design notes on Participatory Methods, Traditional Ecological Knowledge and Emergency Community Resilience within the Ring of Fire[77]	PDC	2022	relation	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE
Caring for Intimate Data in Fertility Technologies[82]	CHI	2021	technology	FALSE	FALSE	TRUE	FALSE	FALSE	FALSE
Collaborative Data Work Towards a Caring Democracy[83]	CSCW	2019	community	FALSE	FALSE	FALSE	FALSE	TRUE	TRUE
Care and Connect: Exploring Dementia-Friendliness Through an Online Community Commissioning Platform[86]	CHI	2017	community	FALSE	TRUE	FALSE	FALSE	FALSE	FALSE
"I Don't Want to Become a Number": Examining Different Stakeholder Perspectives on a Video-Based Monitoring System for Senior Care with Inherent Privacy Protection (by Design).[87]	CHI	2024	network	FALSE	TRUE	FALSE	FALSE	TRUE	FALSE
Personal Informatics in Interpersonal Contexts: Towards the Design of Technology that Supports the Social Ecologies of Long-Term Mental Health Management[88]	CHI	2018	network	FALSE	TRUE	FALSE	FALSE	TRUE	FALSE
Experiences of Harm, Healing, and Joy among Black Women and Femmes on Social Media[90]	CHI	2022	network	FALSE	TRUE	FALSE	FALSE	FALSE	TRUE
Weaving Stories: Toward Repertoires for Designing Things[91]	CHI	2022	relation	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE
Matters of Care in Designing a Feminist Coalition[92]	PDC	2020	community	FALSE	TRUE	FALSE	FALSE	FALSE	TRUE
Ambivalences in Digital Contraception: Designing for Mixed Feelings and Oscillating Relations[93]	DIS	2023	relation	FALSE	FALSE	TRUE	FALSE	FALSE	TRUE
Operating at a Distance - How a Teleoperated Surgical Robot Reconfigures Teamwork in the Operating Room[94]	CSCW	2018	support	FALSE	TRUE	FALSE	FALSE	TRUE	FALSE

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Paper	Venue	Year	Search Terms	Care as Burden	Care as Service	Care as Intimate	Care as Repair	Care as Infrastructure	Care as Ethic
Networks of Care in Digital Domestic Labour Economies[95]	CHI	2024	network	FALSE	TRUE	FALSE	FALSE	FALSE	TRUE
Computer-Mediated Sharing Circles for Intersectional Peer Support with Home Care Workers[98]	CSCW	2023	support	FALSE	TRUE	FALSE	FALSE	FALSE	FALSE
Designing for Peer-Led Critical Pedagogies in Computer-Mediated Support Groups for Home Care Workers[97]	CHI	2023	peer	FALSE	TRUE	FALSE	FALSE	FALSE	FALSE
Infrastructuring Food Democracy: The Formation of a Local Food Hub in the Context of Socio-Economic Deprivation[99]	CSCW	2019	infrastructure	FALSE	FALSE	FALSE	FALSE	TRUE	TRUE
Sensing Care Through Design: A Speculative Role-play Approach to "Living with" Sensor-supported Care Networks[102]	DIS	2023	network	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE
Efficiency and Care in Community-led Initiatives[107]	CSCW	2021	community	FALSE	TRUE	FALSE	FALSE	FALSE	TRUE
CareJournal: A Voice-Based Conversational Agent for Supporting Care Communications[109]	CHI	2024	relation	FALSE	TRUE	FALSE	FALSE	FALSE	TRUE
Everyone is Covered: Exploring the Role of Online Interactions in Facilitating Connection and Social Support in Black Churches[110]	CHI	2023	network	FALSE	TRUE	FALSE	FALSE	TRUE	FALSE
Caring and Commoning as Cooperative Work: A Case Study in Europe[111]	CSCW	2021	network	FALSE	TRUE	FALSE	FALSE	FALSE	TRUE
Decolonizing Content Moderation: Does Uniform Global Community Standard Resemble Utopian Equality or Western Power Hegemony?[112]	CHI	2023	relation	FALSE	TRUE	FALSE	FALSE	FALSE	TRUE
Black Feminist Technoscience: Sojourner Truth, Storytelling, and a Framework for Design[113]	DIS	2023	collective	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE
Exploring the digital support needs of caregivers of people with serious mental illness[114]	CHI	2023	support	FALSE	TRUE	FALSE	FALSE	FALSE	FALSE
Mapping Silences, Reconfiguring Loss: Practices of Damage Assessment & Repair in Post-Earthquake Nepal[116]	CSCW	2018	collective	FALSE	FALSE	FALSE	TRUE	FALSE	TRUE
Dilemmas in Mutual Aid: Lessons for Crisis Informatics from an Emergent Community Response to the Pandemic[117]	CSCW	2021	community	FALSE	TRUE	FALSE	TRUE	FALSE	TRUE
Feminist Posthumanist Design of Menstrual Care for More-than-Human Bodies[119]	CHI	2023	relation	FALSE	FALSE	TRUE	FALSE	FALSE	TRUE

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Paper	Venue	Year	Search Terms	Care as Burden	Care as Service	Care as Intimate	Care as Repair	Care as Infrastructure	Care as Ethic
Counting to be Counted: Anganwadi Workers and Digital Infrastructures of Ambivalent Care[120]	CSCW	2022	community	FALSE	TRUE	FALSE	FALSE	TRUE	FALSE
Longing to be the Mountain: A Scoping Review about Nature-Centric, Health-Minded Technologies[122]	CHI	2023	relation	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE
Strategies for Fostering a Genuine Feeling of Connection in Technologically Mediated Systems[124]	CHI	2022	relation	FALSE	TRUE	FALSE	FALSE	FALSE	TRUE
Parallel Journeys of Patients with Cancer and Depression: Challenges and Opportunities for Technology-Enabled Collaborative Care[126]	CSCW	2020	peer	FALSE	TRUE	FALSE	FALSE	FALSE	FALSE
Care Workers' Wellbeing in Data-Driven Healthcare Workplace: Identity, Agency, and Social Justice[127]	CSCW	2023	community	TRUE	TRUE	FALSE	FALSE	FALSE	FALSE
Data Work of Frontline Care Workers: Practices, Problems, and Opportunities in the Context of Data-Driven Long-Term Care[128]	CHI	2023	relation	FALSE	TRUE	FALSE	FALSE	FALSE	FALSE
The Proper Care and Feeding of Hackerspaces: Care Ethics and Cultures of Making[130]	CHI	2015	community	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE
Supporting the Complex Social Lives of New Parents[131]	CHI	2018	support	FALSE	TRUE	FALSE	FALSE	FALSE	TRUE
Careful Data Tinkering[133]	CHI	2022	community	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE
"I know I have this till my Last Breath": Unmasking the Gaps in Chronic Obstructive Pulmonary Disease (COPD) Care in India[134]	CHI	2024	support	FALSE	TRUE	FALSE	FALSE	FALSE	FALSE
An Iterative Participatory Design Approach to Develop Collaborative Augmented Reality Activities for Older Adults in Long-Term Care Facilities[138]	CHI	2024	community	FALSE	TRUE	FALSE	FALSE	FALSE	FALSE
Family Caregiver Experiences of Using a Mobile App for Music-based Training to Support Dementia Care[139]	CHI	2024	relation	FALSE	TRUE	FALSE	FALSE	FALSE	FALSE
Infrastructuring Care: How Trans and Non-Binary People Meet Health and Well-Being Needs through Technology[142]	CHI	2023	network	FALSE	FALSE	FALSE	FALSE	TRUE	FALSE
Social media for earthquake response: Unpacking its limitations with care.[144]	CSCW	2017	community	FALSE	FALSE	FALSE	TRUE	FALSE	TRUE
Troubling Collaboration: Matters of Care for Visualization Design Study[4]	CHI	2023	relation	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE

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Paper	Venue	Year	Search Terms	Care as Burden	Care as Service	Care as Intimate	Care as Repair	Care as Infrastructure	Care as Ethic
Invisibility or Visibility in Intimate Care at the Workplace? Examining the Use of Breast Pumps[145]	CHI	2023	relation	FALSE	FALSE	TRUE	FALSE	FALSE	FALSE
Conflicts of Control: Continuous Blood Glucose Monitoring and Coordinated Caregiving for Teenagers with Type 1 Diabetes[148]	CHI	2023	support	FALSE	TRUE	FALSE	FALSE	FALSE	FALSE
Social Robots in Aged Care: Care Staff Experiences and Perspectives on Robot Benefits and Challenges[149]	CHI	2022	support	FALSE	TRUE	FALSE	FALSE	FALSE	FALSE
I don't know how to help with that - Learning from Limitations of Modern Conversational Agent Systems in Caregiving Networks[150]	CSCW	2023	network	FALSE	TRUE	FALSE	FALSE	FALSE	FALSE