# Negotiating Autonomy, Control, and Privacy in Always-On Home IoT Technology-Mediated Care Relationships with Older Adults

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Always-on home IoT technologies, such as smart speakers, sensors, and cameras, are increasingly marketed toward older adults aging in place and their support networks for use in care contexts. At the same time, their integration into care relationships surfaces tensions around autonomy, consent, and relational power that existing systems are not well-equipped to address. Through individual and paired interviews with 22 participants (adults aged 65+ and their support network members), we examine how smart home adoption, use, and management become sites of ongoing negotiations. We find that older adults differentiate what they are willing to share based on the recipient, data modality, and degree of retained control, across both platform and family data sharing. They accept awareness mechanisms while desiring authority over automated actions. We show that older adults' preferences are frequently bypassed through structural power asymmetries rooted in device acquisition and management pathways, often rationalized by family members' protective intent. Older adults prefer to actively negotiate boundaries and resist forms of surveillance that undermine their autonomy. From these findings, we emphasize the need for smart home systems that support ongoing, multi-sided negotiations and derive three design criteria for creating care environments that preserve older adults' agency and dignity.

CCS Concepts: • **Human-centered computing → Empirical studies in HCI**; *Human computer interaction (HCI).*

Additional Key Words and Phrases: Older Adults, Aging in Place, Smart Home, Privacy, Family Dynamics

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## 1 Introduction

The population of adults who are 65 and above is one of the fastest-growing demographics. Aging in place, referring to older adults living independently as they age, became a popular concept in the 1980s and 1990s in response to an aging population and rising health care costs [29, 79]. Aging in place was viewed as a means to delay or avoid the transition to institutionalized care [67, 73]. Over time, this concept has evolved beyond cost efficiency to encompass well-being, autonomy, and quality of life, highlighting the importance of familiar settings, social connections, and everyday routines in later life [61]. More recently, researchers have positioned digital monitoring and connectivity as ways to bridge gaps in caregiving resources and strengthen older adults' ability to live independently at home, entangling aging in place with technological infrastructures [3, 39, 48].

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Smart home devices, such as smart cameras, smart speakers, and other home Internet of Things (IoT) devices, have become important tools for support, care, and communication among older adults and their friends and family members. The companies behind these technologies claim that they enhance independence, facilitate communication, and provide assistance for both older adults and their family and care networks [15, 36]. The appeal of these devices rests on the promise of independence and support, but their adoption introduces new tradeoffs. Throughout this paper, we understand care and support as a relational practice involving ongoing negotiations between older adults and their social networks around independence, well-being, and connection. Technology-mediated care in this context refers to the situated ways that smart home devices become embedded in these relationships. This can shape how families coordinate support, maintain awareness, and navigate responsibilities. These technologies persistently collect data, raising questions about privacy, autonomy, and control. The introduction of smart home technologies and AI-based features necessitates a re-evaluation of privacy as a complex negotiation of boundaries within support networks. Considerations include the tension between an older adult's desire for autonomy and their support network's need for peace of mind, as well as how using these technologies could prompt older adults to confront stigmatized social roles associated with frailty [8, 63, 83]. The acceptance of smart technologies by older adults is therefore not an individual event, but rather one which involves households and networks. These devices and services can affect the person-environment fit of older adults' living environments [69, 84]. This can include how technologies align with shifting rhythms of daily life, patterns of cohabitation, and the division of responsibility for maintenance, troubleshooting, and decision-making.

Against this backdrop, we investigate how older adults who use these devices negotiate and manage always-on home IoT technologies with their support and care networks, with an emphasis on the inherent power dynamics and negotiations surrounding data sharing practices. In this study, we define always-on home IoT technology as smart home devices that continuously collect and monitor data or respond to inputs without requiring manual activation. This can include devices such as smart cameras, smart speakers, and other devices that could monitor or control devices in a home setting. To investigate these dynamics, we conducted an interview study examining the nuanced ways in which older adults and those around them use these technologies, as well as how they are employed across connected households. Our study was guided by three research questions:

(1) How do older adults and their support networks maintain autonomy while balancing the surveillance and safety affordances of always-on home IoT technologies?
(2) How do power dynamics shape the ways in which older adults and their support networks navigate decisions around technology-mediated care and support?
(3) How is support coordinated and configured across distributed care networks through the shared adoption and management of always-on home IoT technologies?

Our findings reveal diverse concerns and rationales shaping these decisions: how older adults maintain autonomy while balancing surveillance and safety, navigate power dynamics in technology-mediated care relationships, and coordinate support across their networks. Participants demonstrated sophisticated, contextually situated privacy preferences, drawing distinct boundaries between familial and corporate data collection and expressing varied preferences across different data modalities. We also identify subtle forms of resistance and adaptation through which older adults negotiate compromises when their preferences are not fully supported. From these findings, we argue that the adoption and control of always-on home IoT technologies in care relationships unfolds as an ongoing, relational process. Structural power asymmetries shape whose preferences are heard and whose assumptions are encoded into device adoption and use, yet existing system architectures and familial practices frequently bypass older adults' agency. We discuss implications for privacy, autonomy, and evolving social dynamics within older adults' networks of care, and derive design criteria for systems that treat rule-making as a shared, ongoing, and intra-relational practice, in which all parties can participate, revise, and exit arrangements over time.

## 2 Related Work

Aging in place is described in gerontology and social policy as the process of enabling older adults to remain in their homes and communities with supports that adapt according to their needs and preferences [86]. It has evolved substantially from a more cost-effective alternative to traditional institutionalized care to a comprehensive approach to living independently as one ages, emphasizing the well-being, autonomy, and quality of life of older adults. Past research has highlighted the relational and infrastructural nature of successfully aging in place [45, 89], emphasizing the importance of familiar settings, such as one's own home, as well as maintaining a familial and social support network that supports older adults' independence. Within the UbiComp community, research indicates that older adult participants are strongly motivated by social benefits, using voice assistants for conversation, entertainment, and to feel less lonely, beyond purely utilitarian tasks [65]. Technology-mediated tools can support patient-provider communication in home-based care for older adults [88]. However, the integration of smart home technologies into aging in place strategies raises complex questions about how privacy negotiations, power dynamics, and care relationships are reconfigured when intimate domestic spaces become mediated by always-on home IoT devices.

### 2.1 Shifting Paradigms in Aging-Centered HCI

Within the evolving landscape of aging and technology, home IoT devices represent a particularly complex domain where questions of autonomy, surveillance, and care relationships intersect. Human–Computer Interaction (HCI) has long treated the home as a site of intergenerational awareness and care. Earlier research has been described as being dominated by a deficit-based view of older adults as a burden or the target of compassion while regarding this population as a monolith [41–43], with a focus on functional declines and technology usability, resulting in works that centered more solutionist ways of engaging with age-related issues through technology [66, 80]. A critical shift in the 2010s led to a more holistic and participatory approach in HCI research in this area [43]. Researchers questioned the way older adults' contributions to their social networks were ignored while they were positioned only as recipients of care and compassion [68]. Studies also drew attention to pervasive myths associated with older adults in technology design, such as the notions that older adults are socially isolated and lonely, are a burden on society, and are unable to use technology [23]. Recent studies have placed greater emphasis on the role of stigma and interpersonal dynamics in driving technology adoption and use. Caldeira et al. examined the slow adoption of aging in place technologies and found that design characteristics, such as the visibility or "assistive" nature of a technology, can reinforce the stigma associated with aging [13]. They advocate for system design that actively engages with the dynamics of aging and resists reinforcing harmful stereotypes. Likewise, Mynatt et al. argue that distributed, technology-mediated home-based care should accommodate caregivers and care recipients at varying cognitive and functional stages while upholding older adults' autonomy, privacy, and safety [58]. Emerging research increasingly situates the use of technology within the broader social and care networks of older adults. Homaeian et al. focus on informal caregiving by adult children, highlighting the challenges faced by those in these roles and identifying areas for technological interventions and support that promote interpersonal communication and establish expectations and boundaries [34]. Research has also examined participatory approaches to designing technologies that engage older adults and those in their support and care networks to promote independence [20]. When empowered as co-designers, older adults designed interfaces emphasizing social engagement triggers, cognitive support, and customizable displays—features supporting independence—while explicitly rejecting "Big Brother" approaches that signaled surveillance [28]. However, these co-design studies typically examine older adults' preferences in isolation from the care networks and household dynamics that shape actual technology deployment. Questions remain about whether older adults' stated preferences for customization and control are honored when devices are introduced, configured, and managed by family members within intergenerational care relationships.

## 2.2 Privacy Challenges with Technology-Mediated Caregiving

Older adults experience a fundamental tension between the preservation of privacy and the benefits of safety when adopting monitoring technologies. Berridge and Wetle's dyadic study revealed differences in comfort with remote monitoring between adult children and older adults, with adult children preferring surveillance technologies more while underestimating both their mothers' comprehension abilities and the importance of engaging them in decision-making [6]. Nissenbaum's theory of contextual integrity, widely adopted in HCI research, provides a foundational framework for understanding how privacy operates within family care relationships [59]. Contextual integrity emphasizes that privacy violations occur when information flows inappropriately across contextual boundaries rather than when information sharing occurs at all. It is particularly relevant for technologies used to support aging in place, where information may appropriately flow between family members for safety purposes while remaining inappropriate for corporate data collection or broader surveillance. These technologies can reveal information that even family caregivers feel is inappropriate to access, creating boundary violations within otherwise legitimate care relationships.

Research examining privacy in care contexts reveals that older adults distinguish between different types of data-sharing relationships. Older adults demonstrate a sophisticated understanding of information hierarchies and express comfort with family awareness of their well-being status while maintaining strong preferences for retaining decision-making authority over environmental decisions and personal autonomy [5]. This distinction between awareness and operational control has emerged as fundamental to privacy acceptance. Grigorovich and Kontos argue against framing smart home device monitoring only as a tradeoff between privacy and protection, overlooking vital questions of consent and the power dynamics in decision-making [30]. Older adults' resistance to familial surveillance stems from concerns about autonomy and intimacy within domestic spaces, rather than from a blanket rejection of monitoring technologies. In a study of video-based monitoring systems with privacy-preserving filters, Mujirishvili et al. found that older adults articulate complex boundary-setting practices around visual surveillance [56]. This study demonstrated that participants construct nuanced distinctions between different types of monitoring, with some expressing greater comfort with location detection than with video capture that reveals personal activities.

## 2.3 Understanding Familial Tensions with Always-On Home IoT Devices

Tech caregiving has also emerged as a setting where familial power dynamics can affect older adults' sense of autonomy and their control over their own environment. Research on technology-mediated care relationships reveals how smart home systems can either reinforce or redistribute power within family networks. Past research with the general population about their smart home data sharing preferences has shown that data sharing is acceptable in certain situations, such as when the owner has given consent, when the situation is an emergency, and when the data flows to immediate family [4]. However, when these devices are used by older adults and their support networks, power asymmetries can undermine the autonomy of older adults while positioning family members as gatekeepers for technological access and control. Murthy et al. revealed how "self-appointed family technology managers straddle the line between stewardship and paternalism in their efforts to protect older adults from perceived digital threats" [57]. Similarly, Geeng and Roesner documented the emergence of "smart home drivers" who assume primary responsibility for device configuration and management while other household members become "passive users" who adapt to systems without meaningful input into their operation [26]. Family members often act as initiators who suggest technologies, search for options, and provide ongoing support [49]. This power asymmetry raises particular concerns when technology is used to support aging in place, where older adults may become subject to monitoring and control decisions made unilaterally by family members. Past research in ICT (information and communication technologies) supports the idea that risk perceptions and threat models for surveillance vary between older adults and people around them and should not be presumed by

others managing technology [72, 95]. Older adults also possess a sophisticated understanding of privacy risks and demonstrate clear preferences for consultation in technology-related decisions [25, 27, 77, 82]. Ghorayeb et al. found that older adults did not want one-size-fits-all systems and pushed back against unnecessary or unwanted features, while negotiating acceptable conditions of surveillance where they could see a clear benefit [28]. Power dynamics in technology-mediated care relationships require deeper investigation, particularly regarding how asymmetric technical knowledge affects decision-making autonomy and family relationship dynamics [9, 46]. In particular, care technologies can create new forms of interdependence between older adults, family members, and technical systems. Correa and Domènech showed that successful implementations depend on the recognition of care as a collaborative social process rather than a unidirectional service delivery model [18].

### 2.4 Toward Collaborative Approaches to IoT Use for Aging in Place

Despite growing recognition of the complex privacy hierarchies and power dynamics that shape the adoption of aging in place technologies, much prior research has focused either on older adults' individual technology use and acceptance patterns [38, 70, 71, 77] or on the needs and challenges experienced by family caregivers in isolation [47, 87, 92]. Although these studies have been foundational in identifying opportunities and barriers associated with smart home technology for older adults, they often overlook the relational negotiations that occur when always-on, data-collecting devices mediate care across households and generations. In particular, earlier work has tended to emphasize usability or privacy tradeoffs as primarily individual decisions [22, 76], rather than complex ongoing processes that involve multiple stakeholders, shifting household roles, and evolving boundaries of autonomy. As a result, there remains limited empirical understanding of how older adults and their care networks actively negotiate monitoring, data sharing, and decision authority in everyday contexts, especially when technical knowledge and privacy preferences vary across generations.

There is a need to better understand how older adults navigate competing privacy preferences within care networks, especially when family members have different perceptions of risk and privacy attitudes. To address these gaps, our study investigates not just individual attitudes or preferences, but focuses specifically on the situated, relational negotiations that unfold as older adults and their families adopt, configure, and live with persistent always-on home IoT technologies. By foregrounding these dynamics—including who has a say in setup and ongoing management, how privacy boundaries are navigated, and what happens when devices break or are updated—we contribute an empirically rich account of agency, autonomy, and power in technology-mediated care. Through this approach, our work builds on and critically extends prior HCI and gerontology literature by revealing how agency and privacy are collectively constructed and maintained within real-world intergenerational support networks.

## 3 Methods

To understand the complex interplay of individual preferences and collective decision-making around always-on home IoT technologies, we structured our investigation as a two-stage interview study. First, Stage 1 surfaces participants' individual experiences and privately held tensions. Stage 2 then examines how these accounts travel, converge, or conflict in joint contexts where shared practices and negotiations are enacted. This process is central to our focus on household- and network-level decision-making and power dynamics in always-on contexts.

In Stage 1, we conducted interviews focused on the individual experiences and perspectives of older adults and their family members regarding the use of always-on home IoT devices. Interviews were approximately 45 minutes long and began with a "device tour" during which participants described the devices they owned and how they used them. Prior to the interview, participants were asked to provide photos of their smart home devices. We used these visual artifacts to ground questions regarding the physical placement and domestic integration of specific technologies. Focusing on one to two devices most relevant to our research questions, we

asked participants about device installation, household access configurations (e.g., who has control over settings, who can access devices from outside the home), and typical usage scenarios. We then explored participants' mental models of device functionality, particularly around data capture and always-on operation. Questions probed multi-user dynamics and social tensions, asking participants to describe agreements or disagreements about device use and to share specific stories of both conflicts and positive experiences. We also examined participants' awareness of data collection, storage, and sharing practices, including who reviews device data and any concerns about family member access. To support our discussion, we used storyboards (Figures 1–3) depicting scenarios involving always-on home IoT devices and services to help participants envision and discuss technology-mediated care situations they might not have directly experienced, particularly around emerging features like always-on video connections and family monitoring dashboards. This approach has been effectively used in past HCI research to ground interview discussions [17, 24]. The storyboard scenarios were based on the features advertised in the Amazon Alexa Together service (remote assist, activity feed and alerts, circle of support, and fall detection response) [2] and always-on video calls on Facebook Portal [1].

Each storyboard scenario was introduced with a verbal description of the depicted feature to ensure participants had a shared understanding of the technology before responding. We presented storyboards to all participants in the same sequence: customized alerts, remote assist, followed by always-on video calling. For each scenario, we probed participants' initial reactions, imagined use and potential partners, willingness to adopt, concerns, and how they might relate to their own current living situations. This structured approach was intended to help participants envision and evaluate technology-mediated care situations they may not have directly experienced, grounding speculation with concrete examples using these functionalities and devices. Where participants expressed difficulty engaging with a scenario or found the depicted features unfamiliar, the interviewer provided additional context using the verbal description and visual materials before proceeding.

Fig. 1. "Customized Alerts (Amazon Echo)". This storyboard probes the customized alerts feature in Amazon Alexa. The scenario depicts a feature where family members receive notifications of an absence of interactions with the device as a reminder to keep in touch.

Fig. 2. "Remote Assist (Amazon Echo)". This storyboard probes Amazon Alexa's remote assistance and fall detection feature. The scenarios include a family member controlling an older adult's smart home device, a collaborative reminder, and an emergency fall detection notification.

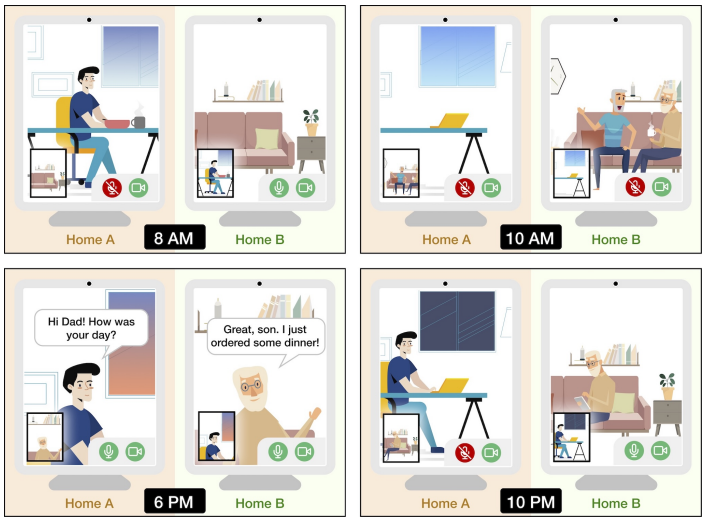


Fig. 3. "Always-on Video Calling (Facebook Portal)". This storyboard depicts a scenario where family members have an always-on video call throughout the day as a way of keeping in touch through a smart speaker with a display.

In Stage 2, we examined shared use and perceptions within care dyads through a two-part interview. The paired interview began with a device tour similar to Stage 1, during which we also asked participants to describe their installation decisions and how they managed device access and control between one another. We asked participants to walk through their shared usage patterns, discuss whether these practices evolved over time,

and recall memorable moments with the devices, allowing us to observe how they negotiated their accounts in real time and to surface possible areas of agreement or tension. Following the paired interview, we conducted individual interviews in which participants first reflected on the joint discussion (e.g., whether it accurately represented their practices, what might have been left out) before exploring more sensitive topics. These individual interviews focused on precautions taken when using devices, disagreements or arguments over device use, data review practices, and concerns about family member access, as well as participants' views on data generated from always-on home IoT devices and what they wished was different when using these technologies with family. This two-part structure allowed us to examine both the collective narratives that emerged in joint discussion, and the individual experiences and concerns that remained private.

## 3.1 Participants

We recruited participants through online platforms, local senior centers, and word-of-mouth referrals. Each prospective participant was emailed a study information sheet explaining informed consent procedures alongside a demographic screening questionnaire to assess eligibility. The study procedure was approved by the university's Institutional Review Board. We collected verbal consent from each participant at the start of each interview. In Stage 1, we recruited two groups: older adults aged 65 and above who lived independently and had experience using always-on home IoT devices, and adults aged 18 and above who had experience using always-on home IoT devices with a friend or family member aged 65 or older. Stage 2 involved paired interviews with participants meeting the same criteria, with the additional requirement that they actively used always-on home IoT devices to communicate or interact with each other. There were no constraints on the relationships between interviewees. The paired participants include adult child–older adult dyads, a spousal dyad, and one former-colleague dyad (Group 3: 3A and 3B). While Group 3's relationship does constitute a form of care dyad within the scope of this study, we chose to focus our findings and discussion primarily on family-based care dyads in this study. Familial relationships constituted the majority of our Stage 2 sample and generated the richest data pertaining to intergenerational power dynamics, technology-mediated surveillance, and asymmetric authority. Accordingly, we excluded 3A's data entirely from our analysis, and 3A does not appear in Table 1. We also excluded Group 3's paired interview from the cross-dyad analysis presented in the findings. However, we retained 3B's individual interview data in the analysis because 3B discussed a separate care relationship with their mother extensively, including their use of always-on home IoT technologies in that familial context. We acknowledge this as a limitation of our study and note that non-familial care relationships may involve meaningfully different dynamics around authority, expectations, and negotiation practices that warrant dedicated investigation in future work. Stage 1 participants received a $40 gift card, while Stage 2 participant groups received an $80 gift card (split between participants). Our participants (Table 1) included older adults aged 65–78 (12 of 15 female) and support network members aged 20–65 (5 of 7 female), with device usage ranging from single smart speakers to comprehensive ecosystems encompassing a variety of always-on home IoT devices.

## 3.2 Data Analysis

All interviews were recorded and transcribed by the research team. We conducted reflexive thematic analysis to identify patterns of meaning across the dataset [11, 12]. The reflexive thematic analysis approach allowed us to examine how participants themselves framed autonomy, control, and privacy in their care relationships without imposing predefined categories, enabling us to theorize how older adults and family members balance competing priorities and navigate power dynamics in technology-mediated care and support. Four additional researchers from our research team engaged in collaborative coding sessions to discuss emerging codes and ensure multiple perspectives informed the analysis. For example, codes related to participants' perceptions of how their data is collected, valued, and protected included "data-implication-unaware," "data-value-exchange," "privacy-apathy,"

Table 1. Participant demographics and devices used across Stage 1 (individual interviews) and Stage 2 (paired interviews). Group 3's data was excluded from analyses. 3B's individual interview data was retained as 3B discussed a separate familial care relationship (see Section 3.1).

| Group | ID | Age | Gender | Relationship to OA | Devices Used |
|---|---|---|---|---|---|
| **Stage 1 – Individual Interviews (N=15)** | | | | | |
| Older Adult (OA) | OA1 | 65 | Female | N/A | Tablet/eReader, Smart speaker, Smartwatch/wearable, Smart TV, Smart thermostat |
| | OA2 | 75 | Female | N/A | Tablet/eReader, Smart speaker |
| | OA3 | 69 | Female | N/A | Tablet/eReader, Smart speaker, Smart thermostat |
| | OA4 | 68 | Male | N/A | Tablet/eReader, Smart speaker, Smart thermostat |
| | OA5 | 68 | Female | N/A | Tablet/eReader, Smart speaker, Smartwatch/wearable |
| | OA6 | 75 | Female | N/A | Tablet/eReader, Smart speaker, Smart TV |
| | OA7 | 65 | Female | N/A | Tablet/eReader, Smartwatch/wearable, Smart TV, Robot vacuum |
| | OA8 | 78 | Male | N/A | Smart speaker, Smart thermostat, Smart TV, Smart lights, Smart electric vehicle |
| | OA9 | 67 | Female | N/A | Tablet/eReader, Smartwatch/wearable, Smart TV, Smart doorbell, Smart security camera, Smart kitchen appliances |
| | OA10 | 71 | Female | N/A | Tablet/eReader, Smart speaker, Smartwatch/wearable, Smart TV, Smart security camera |
| Support Network (SN) | SN1 | 65 | Male | Child | Tablet/eReader, Smart speaker, Smartwatch/wearable, Smart security camera |
| | SN2 | 25 | Female | Child | Tablet/eReader, Smart TV, Smart security camera |
| | SN3 | 20 | Male | Grandchild | Smart speaker, Smart doorbell, Smart security camera |
| | SN4 | 29 | Female | Child | Smart speaker with video (Facebook Portal) |
| | SN5 | 27 | Female | Grandchild | Smart speaker, Smart TV |
| **Stage 2 – Paired Interviews (N=7)** | | | | | |
| Group 1 | 1A | 50 | Female | Child | Smart speaker with video (Facebook Portal) |
| | 1B | 78 | Female | N/A | Smart speaker with video (Facebook Portal) |
| Group 2* | 2A | 65 | Female | Partner | Tablet/eReader, Smart speaker, Smartwatch/wearable, Smart TV, Smart lights |
| | 2B | 73 | Male | Partner | Tablet/eReader, Smart speaker, Smart TV, Smart lights |
| Group 3 | 3B | 65+** | Female | Former Colleague | Tablet/eReader, Smart security camera |
| Group 4* | 4A | 48 | Female | Child | Smart speaker |
| | 4B | 75 | Female | N/A | Smart speaker |

*Denotes participants living in the same household. **Participant declined to report a specific age.

and "privacy-functionality-tradeoff." Through an iterative process of coding, discussion, and reflection, we developed candidate themes that captured patterns related to our research questions about autonomy, privacy, power dynamics, and care negotiations. These themes included privacy tradeoffs for tangible convenience, autonomy concerns centered on monitoring, gift-giving that creates adoption through obligation, and support networks navigating care needs with little focus on autonomy.

The research team met regularly to refine these themes, examining how codes clustered together and considering alternative interpretations. Throughout this process, we practiced reflexivity by discussing our own relationships with technology, our assumptions about aging and family care, and how our positionality shaped our interpretation of tensions and negotiations in the data. We paid particular attention to instances where our interpretations diverged, treating these as opportunities to explore nuanced or conflicting perspectives on support, surveillance, and control. Our analysis was informed by critical theories of digital ageism, which examine how technologies reproduce and amplify power asymmetries in care relationships, alongside feminist epistemological frameworks that foreground situated knowledge [21, 31, 60]. The final themes were developed through continued engagement with the data and these theoretical frameworks, focusing on how older adults and their support networks navigate autonomy, control, and privacy in technology-mediated care relationships.

## 4 Findings

Our findings draw on data from 22 participants across individual and paired interviews (excluding the paired session data from Group 3's non-familial dyad; see Section 3.1). Across these accounts, power, privacy, and autonomy recur as cross-cutting analytical threads: we identify autonomy as the central value older adults seek to preserve, privacy as the boundary they actively negotiate, power as the structural asymmetry that shapes how those boundaries are set, control as how that asymmetry is felt and enacted in everyday use, and negotiation as the ongoing process through which these boundaries are contested and revised. Our findings reveal how always-on home IoT technologies reconfigure power, privacy, and autonomy within older adults' care relationships. We treat these three concepts as lenses that illuminate two interrelated areas of inquiry. Section 4.1 examines how older adults construct hierarchies of trust and data control, distinguishing between familial and corporate data flows, navigating modality-specific concerns, and articulating the conditions under which monitoring is acceptable. This section directly addresses our first research question around how older adults maintain autonomy while navigating the surveillance and safety affordances of these devices. Section 4.2 examines how technology acquisition pathways and household roles concentrate or distribute decision-making authority, shaping who configures devices, who holds ongoing access, and who bears the burden of adaptation. This section addresses our second and third research questions around power dynamics in technology-mediated care decisions and how support is coordinated across distributed care networks.

### 4.1 Everyday Smart Home Practices, Privacy Perceptions, and Data Control in Older Adults' Support Networks

Participants included independent older adults living alone, multi-generational families, and dyads where an adult child provided in-home care. There was considerable heterogeneity in care relationships, ranging from older adults as active caregivers to those receiving intensive daily support. Some older adults provided care for others, including one participant who supported their aging parents while managing their own household, and another grandmother who regularly dog-sat for family, thereby demonstrating continued reciprocal contributions within support and care networks. Older adults with advancing dementia or mobility limitations received varying levels of assistance, from weekly visits by adult children living an hour away to bathing support from nearby family members. For older adults such as OA8, who had more technical expertise, smart home devices became a way to extend control over their physical environment. As an electrical engineer, OA8 custom-configured

their smart home setup to include radiant heating, leak detectors, and smart switches. Many older adults in our study also utilized voice assistants for everyday tasks, including setting timers, playing music, converting units, setting reminders, looking up information, and making calls. One described their Amazon Alexa as "a great companion," emphasizing its usefulness and affective presence in their daily life (OA2). 4B mentioned that "[I'm] watching some documentary [and I would] ask questions about some countries I don't remember. I can say, 'where is Chile?' " For another participant group (1A and 1B), family-only use cases with video devices such as Facebook Portal served as a persistent social channel during and after the pandemic, rather than enabling discrete, session-based calls. The roles that these devices played also shifted over time as users discovered new features or ceased using others. 4A said,

> it started with [4B] asking Alexa, what's the weather? What's the temperature? When's it gonna rain? … and then it progressed to the reminders or the notes and … the alarm … [so we no longer have to set it] for her. (4A)

In some cases, as older adults' needs changed or as new features were adopted, older adult participants also started to engage in configurations and device adoptions of their own accord. SN5 said, "[After my uncle brought home and set up the first unit,] I've seen three speakers floating around their house… Apparently they really like it [because] they bought more."

*4.1.1 Hierarchies of Trust: Navigating Data Flows with Family vs. Corporations.* Older adult participants constructed a privacy hierarchy distinguishing data sharing with technology companies from persistent observation by family members. Contrary to assumptions often embedded in care technology design that older adults are generally accepting of familial monitoring for safety [50, 81], older adults in our study demonstrated reluctance toward familial surveillance, even while many willingly accepted some level of corporate data collection as a necessary compromise for accessing desired IoT functionalities. Older adult participants consistently expressed pragmatic acceptance toward corporate data practices, considering them transactional costs for device and service access. 1B described, "I think I deliberately made the decision that the convenience is worth the tradeoff of what people might do with that data." Likewise, OA4 viewed inferences from data collected by service providers (such as media recommendations) as an "obvious" and expected function of technologies that "are geared toward them gathering information … [about] your interests and providing [services] for you."

However, older adult participants' acceptance of familial monitoring or observation was more situationally conditional. While participants acknowledged the utility of safety and connectivity devices, they expressed reluctance toward both providing family members with access to their own data and accessing data about their family members. For example, OA3 was generally accepting of corporate data collection, viewing ads as "part of the process" of participating in the digital economy. However, their concern about being watched was noticeably higher for social surveillance, where they wanted to compartmentalize familial data sharing to avoid judgment from or conflict with other family members. OA3 did not want their child or grandchildren "to know that [they] are watching a certain … movie or [listening to a certain] podcast" because "they're all in this religious home."

This resistance stemmed not from wholesale rejection of technology-mediated monitoring, but from concerns about preserving privacy in intimate spaces, and the autonomy that boundary protects. When asked about always-on teleconferencing in cross-household settings, OA1 expressed concern that constant data sharing was problematic because "[my daughter] will want to have private conversations with [her husband and her child] and I will want to have [mine]." 2A and 2B expressed similar hesitations about their Echo device's drop-in calls, eventually disabling the feature entirely. They remarked, "Once you give that permission that they can drop in, it's forever, unless you turn it off," emphasizing they would "rather know who's dropping in and… what the situation is at the time." Participants' comfort also hinged on the social choreography of how and when certain features and data streams were turned off. Households cultivated shared rules of thumb, such as muting audio while playing Wordle (1A, 1B) or repositioning cameras to avoid recording a spouse in the evenings (1B).

Older adult participants expressed willingness to allow smart devices to infer their behaviors for convenience or safety while insisting on retaining authority to specify how and when these inferences are acted upon, particularly regarding alerts sent to family members or caregivers. OA7 demonstrated pragmatic acceptance while explaining their perceptions of low risk: "I think that's probably part of our reasoning that we're not too concerned about it because we don't feel we have that much to offer." This acceptance extended to preferences about predictive monitoring, as OA4 described when presented with device-based activity tracking derived from Amazon Alexa usage frequency:

> I think it's great actually. When [Amazon] have that option to see what's going on in your life, in terms of the use of the device being an indicator of your activity … I don't have a problem with that and I don't think it's intrusive. (OA4)

However, acceptance from older adults became complicated when algorithmic predictions triggered automated actions, particularly notifications to family members in our storyboards (Figures 1 and 2). Tension emerged in participants' desire to maintain authority over the threshold and timing of interventions, most evident in attitudes toward fall detection and emergency response systems. OA1 argued that the system needed to "not make mistakes," highlighting a demand for high reliability before they would entrust their social relationships to automated alerts. Even when algorithmic detection might be accurate, participants insisted on human judgment rather than automated action. For example, participants expressed concern about the lack of a verification step and demonstrated a desire to retain agency even in crisis scenarios. OA7 argued against the device contacting emergency services as a first response, asserting, "Alexa should not be calling just because the fall is detected. They should be calling, alerting the person or asking the person,… are you okay?" OA8 indicated a preference for devices where "you press a button and you can get help that way."

*4.1.2 Modality- and Context-Based Privacy Concerns: Balancing Utility, Dignity, and Intrusiveness.* Older adult participants expressed different privacy concerns for audio versus video monitoring. For example, several participants conveyed stronger reservations about recorded speech, viewing audio as potentially searchable text and content that can be logged, resurfaced, or misconstrued. OA3, who is a writer, viewed audio as something similar to text that could be "evidence of everything you said and maybe you wouldn't want to have that." In contrast, OA3 saw video data as a medium that captures visual data with actions and emotions, which they perceived as more open to interpretation.

When asked about the storyboard scenario of always-on video calling (Figure 3), participants such as OA3 and OA4 described a preference for having access to mute buttons that they could turn on depending on the situation. Other participants viewed video as a kind of context-laden, ambient monitoring that would feel more invasive than other types of data. OA2, for instance, differentiated between their acceptance of Amazon Alexa and their rejection of smart cameras based on the perception that video monitoring would create an obligation to present a curated image of themselves and their living space: "[It's] a good thing [that Alexa] can't see the house … I feel really bad if somebody knocks on the door and the table isn't cleaned off and the dishes aren't done." OA6 noted that, despite their acceptance of being monitored remotely, video monitoring would still make them uncomfortable: "I'm totally aware that I act differently if I know I'm on camera."

Even among those skeptical of cameras, concerns frequently centered on who could access or store recordings and for how long, rather than on the act of visual monitoring itself. Our findings align with and complicate prior HCI and aging in place literature on convenience–privacy tradeoffs [62, 64, 74]. For example, participants' pragmatic calculations of whether a potential loss of privacy was worthwhile remained highly situated. 1A was willing to accept a loss of privacy to Facebook ("the data on the portal should not be assumed to be private") in return for the ability to connect with scattered family through the Facebook Portal. Those with firm privacy commitments still accepted always-on family video because of its clear relational value, even while rejecting cloud-based cameras elsewhere and describing Facebook and Amazon as untrustworthy. OA6 mentioned that

use of devices like Alexa and the data collection associated with it did not present a privacy threat in their view, explaining: "I'm cautious where I need to be, but first of all, I don't believe anyone's interested in me unless they wanted to steal something."

## 4.2 Constructing Family Roles and Power Dynamics around Always-On Home IoT Devices

Beyond questions of privacy and data governance, the adoption of always-on home IoT technologies in care contexts raised fundamental questions about autonomy and familial power. Here we understand autonomy as self-governance over one's own domestic space and data, exercised within a web of care relationships. Agency is the capacity to act; autonomy is the self-governance that results from agency. We distinguish control from power. Control is what a person can do to a device or a data stream: adjust a setting, mute a microphone, disable a feature, reposition a camera. Power is the structural asymmetry that decides whose control prevails when preferences conflict. How devices are bought and managed confers power; retained or surrendered control is how participants felt that power in everyday use. Tensions between protective care and preserved independence surfaced in how devices entered older adults' homes and who controlled the devices' configuration, features, and data. We document how technology acquisition pathways shape lasting dependencies, how well-meaning family members sometimes override consent in the name of safety, and how these dynamics challenge older adults' autonomy over their own domestic spaces and care arrangements.

*4.2.1 Technology Acquisition Pathways and Use in Care Relationships.* Older adults in this study encountered smart home and care technologies through three pathways: receiving a gift, acquiring a device with a clear and functional goal, or making an exploratory purchase out of curiosity or interest. These pathways shaped agency, onboarding, and long-term dependence in different ways.

In scenarios where older adult participants received always-on home IoT technologies as gifts, these devices often entered their homes without their explicit request. These gifted technologies shifted the setup, configuration, and troubleshooting power toward the giver. Although participants did not always view these acquisitions negatively, the pattern reflected broader phenomena in which technologies are imposed through well-meaning care relationships [26]. This phenomenon was common with voice-activated smart speakers, such as Alexa devices. OA6 described receiving an Alexa from their husband as a retirement gift five years earlier, admitting they "had never even heard of it before he brought it home." Similarly, SN1's mother was gifted a smart speaker by a family member because "he thought she would like it, that she could… talk to [Alexa] and ask to do things, but… it just doesn't make any sense to her at all." This reflects a pattern where family members introduced technologies based on their own assumptions about utility and ease of use, rather than explicit requests from older adult participants. In some cases, technology was introduced with little to no consultation with the older adult. OA6 recounted how their child was very adamant about the iPad:

> He just brought it and he set it up to everything and said too bad. Here it is. Sit down and we're gonna go through a few things… and that was pretty much [the same way I got my] Alexa. (OA6)

In a separate case, SN1 described the decision-making around installing a smart home camera in their mother's home without notifying her: "her main goal was she wanted to be able to stay in this house, and this is helping us, you know, grant that request." The decision to conceal the camera exemplified how protective intentions can override consent in care relationships. When asked why SN1 chose not to inform their mother about installing a smart home camera in her home, they explained:

> It was something [me and my brothers] thought about. We all agreed though, we thought it would stress her, if we were to tell her that this is a camera that's always watching you. … We just felt that this was a tool that would help us ultimately allow her to remain in the house as long as possible. (SN1)

Furthermore, when devices were acquired deliberately, the setup process could create additional dependencies within individuals' household relationships. OA2 said of their Alexa installation process, "[My son] had to come out and set up everything," exemplifying circumstances where older adults who are primary users remain dependent on the original installer for configuration. Differences in technical expertise within the support network influenced day-to-day decisions, such as which devices were installed, which features were actually utilized, and who took charge when a system failed. Across cases, the individual who acted as the introducer or configurer of these devices often retained enduring control through apps, admin accounts, or tacit know-how, leaving others dependent on them for even minor changes (e.g., adding routines, changing device names, adjusting motion zones). In one family (4A and 4B), a daughter set up multiple Echo Dots, managed settings from their phone, and fielded reminders and messages on behalf of their mother; they described themselves as the only one who could "change the settings or update them," while their mother emphasized the device's accessibility benefits for speech and vision. SN3 and their brother, who lived close by in a separate house, helped set up their grandmother's Nest doorbell, including tuning motion notifications and ongoing calibration. Additionally, maintenance and troubleshooting were also important factors in continued use. When a Portal device in SN4's parents' home stopped working after a software update, its primary user abandoned it because the original installer, SN4's sibling, was unavailable to troubleshoot remotely. In these cases, older adults remained reliant on technically proficient family members, reinforcing power asymmetry in care relationships even when those family members were unavailable or unwilling to help. This can lead to a sense that their privacy and preferences are ignored and they have lost control: "when you have somebody that is technologically incompetent [who] can't control it, [who] can't turn it off, [who] can't do anything with it… that to me doesn't seem right" (3B). In contrast, older adults who retained configuration access, such as OA7, who independently adjusted privacy settings and disabled always-on listening on their smart speaker over time, were able to use these devices on their own terms, shaping the technology around their preferences rather than accommodating those of whoever introduced it.

*4.2.2 Tensions around Decision-Making and Negotiations.* Where Section 4.2.1 showed how power asymmetries become embedded in acquisition and configuration, this section examines negotiation as the ongoing activity through which those asymmetries are contested, offset, or accommodated in daily practice. Some support network participants engaged in collaborative privacy management and device use practices to preserve the preferences and autonomy of their older adult family members. Adult children demonstrated awareness of privacy boundaries and established routines that respected them. As 1B explained, "My youngest sister's family … they tend to turn the Portal on when they want to communicate with it rather than leave it on all the time." They elaborated that their family members acknowledged the need for reciprocal respect and privacy even for close family, noting that "there [are] times he wouldn't want me to drop in on him if I wasn't at home." Such practices reflected negotiated agreements about acceptable use that balanced connection and privacy. However, successful integration of always-on home IoT devices into older adults' homes also required flexibility to renegotiate these arrangements as needs, capabilities, and household compositions changed over time. SN5's account of their grandparents illustrates this type of shift. Initially, their grandmother engaged with an Amazon Alexa for everyday tasks, but several safety incidents reframed the family's relationship with their existing devices entirely: the grandmother flooded the upstairs bathroom and "started screaming" for her husband, who was in the basement and could not hear her. As SN5 described, "if there had been like a microphone in the room and she could have hollered and like other speakers in the house would've gone off, my grandpa could have heard her." Five months later, the family was still negotiating which device to adopt due to uncertainty about device capabilities and what was deemed safe. Their situation illustrates how life stage transitions can render an existing device ecosystem functionally inadequate, forcing families into urgent renegotiation without clear pathways for identifying, evaluating, or deploying appropriate always-on home IoT alternatives. In a separate case, 2A initially described the drop-in feature on the Amazon Echo, where users could call into a friend or family member's device without needing the

other party to pick up, as an interesting feature: "If my husband's not home and I'm bored or something, I can just drop in on [my daughter] and it's like I'm sitting in [their] living room." However, they soon realized that there would be privacy issues associated with using this device: "There's been times we dropped in on her and we heard conversation in their room and they didn't know we were there." Based on these experiences, 2A and 2B successfully negotiated a protocol with their child to suit both sides' preferences, where they would be able to drop in on their child but not vice versa. In households with Portal devices (SN4, 1A, 1B), families developed lightweight etiquette workarounds for video-based monitoring, such as muting while eating, angling cameras away from sensitive areas, or turning devices off around guests, to maintain a comfortable environment without compromising ambient connection.

Perspectives about privacy and surveillance also contrasted between generations. Younger family members often exhibited more misgivings about third-party data implications. SN4, whose parents currently use the Facebook Portal, expressed initial hesitation about its use due to the device being "unclear when it's on and when it's off and how much it does capture." However, these kinds of concerns were superseded by immediate safety imperatives. SN5 rationalized that "the risks of them being watched… versus the risks [to their safety]. Like my grandma falling down the stairs and no one noticing for 30 minutes. That risk is so much bigger than the privacy concerns." This tension between privacy and safety sometimes led to one-sided decisions by family members, as seen when SN1 decided to install a smart home camera to monitor their mother's health and chose not to inform her, believing this would avoid stressing her, while acknowledging the potentially "hypocritical" nature of this privacy violation. OA2 was only able to discourage their adult child, who installed smart cameras in their own houses, from installing indoor smart home cameras in OA2's home by being "stubborn" and adamantly refusing: "When he showed up with the stuff I told him, he needed to go take it back to Best Buy that it wasn't going up in here. … Nope, I'm not going for cameras in every room!" Older adult participants articulated a preference for being consulted on decisions to activate new monitoring functions or to share specific data streams. These negotiations, along with individual acts of resistance such as OA2's refusal, were frequently complicated by divergent perceptions of risk, differing generational attitudes toward privacy, and varied interpretations of independence. Perceptions of device-enabled assistance varied widely based on older adult participants' self-assessed independence and future-oriented thinking. For example, participants often regarded monitoring features as beneficial for anticipated needs. When asked about the storyboard scenario with device activity-based alerts via Alexa Together (Figure 1), OA3 noted, "When you get that old, you think, gee, if I died, you know, I could lay here for a week and no one would know. This would be a nice feature I think." However, older adults perceived the always-on nature of data collection, especially when shared with other family members, as a sign of their diminishing autonomy. In response to the scenario in Figure 3, participants expressed strong reservations about continuous monitoring and video calls. While OA8 could see something like it being useful in limited cases, such as health or weather-related emergencies, they deemed it something they would be reluctant to use on a day-to-day basis: "I don't want to tell the whole world what I'm doing all the time." OA7 deemed it "invasive" and added, "I don't understand anyone who doesn't live together, who would want to actually be watching each other all the time." OA7 further characterized such arrangements as "demeaning," noting that for an adult child of an older person to put those devices in place "kind of deters from their being autonomous… I find it insulting." This resistance was not limited to older adults themselves. Some support network members also articulated a preference for deferring monitoring technologies until a clear threshold of need was reached, framing premature adoption as a threat to the older adult's sense of a normal life. When it came to thinking about whether or not to set up a smart home camera in their mother's house, 3B (who was an older adult themselves) said, "unless there is a red flag that comes up, we would prefer that [my mother] has the most normal life possible."

Older adults consistently expressed preferences for explicit consultation before the activation of actions that controlled their smart home or triggered responses from either the device or support network members. Older adult participants contextualized their resistance to monitoring features as contingent on life stage rather than as

a blanket rejection. OA4 mentioned that "right now my wife and I are [in] … relatively good health and we're pretty independent," but that "as we get older I think these [monitoring technologies] would become much more of an option." Older adults also expressed resistance to unilateral decisions by family members. For instance, in response to a storyboard scenario where family members are notified about unusual home temperatures and given control over the older adult's smart thermostat (Figure 2), one older adult participant emphatically stated, "I don't want to give them access to my thermostats" (OA1). Likewise, when presented with the depiction of remote temperature control by a family member, OA3 asserted, "for [a younger family member] just to be able to manually do it themselves… that just seems a little invasive." Some support network participants also pointed out their concerns, with SN1 saying, "I think it's going a little too far because, the older you get, the hotter you want something to be… having someone younger in control of something like that, [my parents would like that] not so much." These responses highlight a critical distinction between informational access and direct operational intervention, with participants demonstrating greater comfort with passive monitoring than active control. Preferences for being consulted about decision processes were not always honored in practice. In some cases, family members made unilateral technology decisions in the name of care, bypassing consent. SN1 described coordinating care for their mother with their brothers: "There's four brothers, one of us will call in the morning to make sure that she's taken her morning medications. And one of us will call after dinner to make sure she's taken her dinner medications." They then went on to describe how home IoT facilitates this care coordination: "Before I call, I'll always turn on the Nest cam first to see where she is, so it just makes it easier for her to get to the phone. I can time my phone call appropriately." However, this care management involved decisions made without SN1's mother's knowledge: "She has no clue what the device is. It's just a little globe that has a green light on it. And she just thinks it's like part of her cable, TV, hookup."

## 5 Discussion

Our findings reveal that always-on home IoT technology use in a care context between older adults and those in their support networks is fundamentally shaped by sociotechnical negotiations over autonomy, privacy, and power within these relationships, with identity operating as a throughline that shapes how adoption is experienced, resisted, or accepted, particularly when device use signals a shift toward dependency. Across multiple participants, the data use and management challenges we observed included not only conflicting and competing preferences, but also situations in which one party lacked the awareness, recourse, or standing to participate in negotiations. Where prior work often models adoption as a point-in-time acceptance decision [38, 76] or a one-time consent event [16], we find that home IoT use between older adults and those in their support networks is an ongoing, relational process of negotiation. We treat autonomy here not as independence from others—freedom from interference in one's home—but as self-governance exercised within care relationships. Older adults in our study did not seek to exit their support networks; they sought standing within them: a say in what is monitored, by whom, and under what conditions. This decision-making unfolds within existing family power dynamics that can shape whose preferences are prioritized or overridden, as well as how agency is exercised in everyday use. In this section, we discuss the differing perspectives of home IoT use in this context and argue that it depends less on optimizing individual privacy settings and more on supporting collaborative boundary-setting within older adults' support networks.

### 5.1 Designing for Asymmetric Privacy Orientations: Familial vs. Corporate Data Flows

Older adults in our study accepted corporate data collection as a predictable, transactional feature of device use while expressing substantially more conditional resistance to equivalent data access by family members. This pattern contradicts findings in other studies that indicate older adults are more accepting of sharing with family members than with a third party [10, 40]. Rather, our findings indicate that familial data sharing is not inherently

more acceptable than corporate surveillance simply because it occurs within a trusted relationship. When device use is shared between participants, the social register of the recipient and the relational consequences of disclosure become significant factors in shaping older adults' perceptions of trust. This aligns with prior evidence that older adults' acceptance of monitoring is conditional on perceived benefit, relational context, and whether data access threatens independence [19].

This asymmetry is consistent with Nissenbaum's theory of contextual integrity [59], which holds that privacy violations are produced not by data sharing, but by flows that violate the normative expectations of a given context. Corporate data collection, however extensive, fits within an expected transactional frame that participants had already accepted as the cost of device or functionality access. In contrast, we show that familial monitoring activates an alternative frame governed by intimacy, household power, and the ongoing negotiation of trust and autonomy. Technology platforms that blur the line between these two kinds of data sharing leave older adults with less meaningful control over their own data and potentially reinforce familial power asymmetries. While research and regulatory action have shown that smart home platforms' transparency disclosures around corporate data collection are already inadequate, the consent mechanisms governing what behavioral data becomes visible to family or care network contacts have received less design attention and scrutiny [35, 37].

Drawing on the patterns identified above, several directions warrant investigation at the intersection of system design, consent architecture, and care relationships. A central design problem is whether older adults can be supported in formally encoding the informal privacy paradigms they already construct—such as device muting, camera repositioning, and selective feature disabling—into system-level access controls that are configured and reconfigured across life stages and support network changes. Research indicates that users prefer fine-grained, recipient-specific control over smart home data sharing, and that point-of-setup consent is insufficient when any single consent facet is later eroded [16, 32]. A second direction concerns the nature of these negotiations: because the same device could mediate both corporate data collection and family-facing awareness, design interventions that increase older adults' control over family data access may affect the experiences of support network members who rely on those features for safety and coordination. How to support genuine negotiation between these parties remains an open design challenge that future participatory work could address. Additionally, at the policy level, existing consent frameworks focus on the platform-user dyad and largely ignore shared use [32]. Always-on home IoT devices are often deployed as part of care infrastructure where older adults may not have initiated or fully negotiated their adoption. Future regulatory work could examine how to adequately capture the ongoing, relational nature of privacy preferences in intergenerational care settings, or whether stronger protections are warranted specifically for the family-sharing functions of these systems.

## 5.2 Decision-Making Authority Over Automated and Family-Initiated Actions While Using Always-On Home IoT Devices

Past research makes a distinction between awareness and operational control in smart homes [75]. Awareness mechanisms show users the data that is being monitored and collected, while control mechanisms allow the user to change the device behavior and permissible actions. Older adults in our study drew clear distinctions between awareness and control when it comes to using always-on home IoT technology with others in their support networks, and they judged each by different standards of what felt acceptable. In storyboard discussions on active monitoring through always-on home IoT devices, participants drew a line between what family could know about, and what they could act on remotely and without permission. Some participants expressed comfort with family members being aware of their in-home status, while strongly resisting operational interventions (e.g., remote control) without explicit permission. For example, participants argued that while a son's awareness of his father's home temperature constitutes care, the son's ability to remotely adjust that temperature infringes upon the father's status as the decision-maker in his domicile.

The demand for maintaining decision-making authority extends to the interpretation of behavioral data by automated systems. Prior work has emphasized the need to enhance the technical accuracy of automated monitoring services to reduce false alarms that can undermine older adults' and their support networks' trust in smart home systems [52]. Our findings extend this perspective by indicating that, alongside accuracy, older adults place a strong emphasis on preserving their own decision-making authority. Although older adult participants in our study expressed openness to adopting devices and services that performed automated actions on their behalf, such as fall monitoring or activity feed alerts to family members, they viewed these types of functionalities as markers of a later stage of life. As shown in Section 4.2.2, older adults associated adoption of monitoring features with anticipated life stage transitions and associated the use of these features with an admission of dependency on others or physical decline. The association of the adoption of smart home monitoring technologies with changes in life situation is in line with previous research that found adoption of assistive technologies should be viewed as a critical part of broader life adjustment and take into account a person's holistic experience [55]. As a result, older adults may have deferred or resisted adopting these technologies or features not because they dismissed the risks of these events, but because adoption was entangled with a sense of a loss of identity and dignity. Older adults resisted letting algorithmic or AI-based approaches alone determine what constitutes an irregularity.

In our study, participants showed willingness to accept behavioral monitoring and other data collection when they acted as a necessary part of accessing certain features in always-on home IoT devices. At the same time, participants' acceptance of monitoring technologies is often contingent upon their retaining the authority to codify the logic that governs it, ensuring that the system serves their agency. Here we identify a tension where older adult participants value always-on home IoT devices that provide features that supply information and recommendations, while also seeking to preserve agency over response protocols. This is supported by emerging HCI literature on algorithmic decision support in care contexts and extends work on ethical frameworks for smart home technology that emphasize individual and relational autonomy [78, 94]. Our participants' comfort with activity pattern monitoring, combined with their resistance to automated family notifications, demonstrates nuanced expectations for care technology use that prioritize supported decision-making over automated or familial intervention.

Participants had a pragmatic acceptance of monitoring as a bounded, transactional exchange while expressing stronger resistance to automated and support network-based control that directly affects domestic autonomy and personal dignity. We contribute to ongoing conversations in HCI concerning contextual integrity in family care settings [7, 59] and the documented dyadic divergences between older adults and their adult children regarding technology acceptance [6]. Technology designers could position always-on home IoT devices and services as pragmatic intermediaries that buffer direct surveillance within families. Older adults in our study expressed comfort with devices that quietly monitor in the background and escalate only when predefined thresholds or risk conditions are met. This suggests a design direction consistent with the Human-Data Interaction framework proposed by Mortier et al., which organizes data governance around legibility, agency, and negotiability [54]. We extend this framework into the care context by demonstrating that older adults' use and acceptance of these technologies are also contingent on retaining these three capacities. In these arrangements, platforms may be designed to provide family members with reassurance about safety without requiring continuous access to intimate, everyday details of home life, helping both parties maintain a balance between independence, care, and dignity. Designers could also provide fine-grained controls for capture, retention, searchability, and recipient scope, especially where older adults' preferences differ, such as between video and audio modalities. Prior work on tangible privacy mechanisms for smart homes similarly found that users desired sensor-level granular control rather than all-or-nothing device management, particularly distinguishing between audio, video, motion, and general sensing capabilities [85]. Additionally, Zeng and Roesner's design exploration of multi-user smart home access control demonstrates that features such as location-based controls, supervisory access tiers, and activity notifications can be implemented in ways that make household data practices more legible [91]. Our findings

suggest that analogous mechanisms are needed specifically for cross-household care arrangements, where power asymmetries are shaped not only by technical expertise but also by generational dynamics and the relational obligations and vulnerabilities inherent in care.

Rather than support networks and/or automated systems having the ability to perform unilateral actions, always-on home IoT technology should be designed for rule-making, where the platform is treated as a site in which older adults and their support networks can author, negotiate, and revise rules for operating and utilizing functionalities. This framing draws on emerging HCI work on multi-stakeholder rule governance in smart homes that identifies the need for a structured rule creation and introduction process, as well as a designated oversight role to ensure that when different people want different things, those competing preferences are openly surfaced and worked through [33]. Applied to care settings, this kind of architecture would directly address the breakdown illustrated by SN1's covert camera installation, which was in part due to a lack of structured pathways for the older adult's preferences to be expressed, recorded, or respected. A way to participate in collaborative rule-making would close that gap by making the older adult a co-author of their own smart home's rules when access is shared with support networks and automated monitoring systems.

### 5.3 Power, Consent, and Ongoing Negotiations: Supporting Shared Controls in Smart-Home-Mediated Care

Support network power dynamics play a central role in the adoption and everyday use of always-on home IoT devices in the homes of older adults in this study. These power dynamics can shape whose safety concerns, autonomy expectations, and privacy boundaries set the contours of daily routines and exceptions around older adults' always-on home IoT technologies. Far from being a matter of "set and forget," the control and management of always-on home IoT devices is an ongoing, situated process that is continually shaped by material breakdowns, shifting family needs, and evolving meanings attached to care, independence, and privacy. The distinction between monitoring and control practices reveals one of the relative power asymmetries that can appear when using technology in general and using it as a tool to establish and maintain support and care relationships. This dynamic is consistent with Geeng and Roesner's observation that smart home households tend to produce "drivers" who assume outsized decision-making authority over devices that affect all occupants [26]. This concentration of authority requires active negotiations over which functionalities to enable and which to limit. Decisions about alerting thresholds or designated notification recipients should become matters for collective deliberation rather than unilateral implementation from one side of the dyad.

Designing for these dynamics requires accounting for the role of the introducer-configurer—often a younger family member—who acquires, installs, and configures devices. Prior mobile security and privacy perspectives emphasize family members' ability and willingness to help and guide older relatives, often treating such help as an uncomplicated resource [53]. However, research has also shown that disparities in control over what the smart home sees and does can produce a power asymmetry where one user is in the position to monitor or control with few guardrails [90]. When these devices are used between older adults and their social networks in a care setting, the introducer-configurer might knowingly or unknowingly impose their assumptions and preferences on older adults. This is particularly salient in cases where support network members install always-on home IoT devices without consulting older adults. For example, OA2 described how their child introduced smart devices into their home using a directive approach, while SN1 installed smart monitoring cameras in their parent's home without notifying them. While OA2's experience reflects the sometimes-paternalistic introduction of technology into older adults' homes, SN1's case represents a qualitatively distinct and more serious breach. The covert installation of a surveillance device in another person's home without their knowledge or consent means that the older adult has no awareness of the arrangement, no ability to contest it, and no mechanism to exit it. SN1 and their brothers framed this decision as an act of care, reasoning that disclosure "would stress her," illustrating

how protective intent can function as a rationalization for bypassing consent entirely and subordinating the older adult's autonomy to the family's risk calculus. This dynamic is especially concerning given that the older adult's ongoing participation in the arrangement is entirely uninformed. Where a shared governance mechanism exists, preferences can at least be surfaced, weighed, and honored. In its absence, there is no structured pathway for the older adult to exercise any agency over their own surveillance. These cases demonstrate that existing always-on home IoT technology ecosystems offer families the technical capacity to surveil, yet lack the procedural infrastructure to ensure that such surveillance remains consensual and bounded.

Always-on home IoT technologies for use between older adults and their support networks in a care context should be designed to enable and encourage multi-sided governance, allowing all involved parties to articulate preferences, exercise veto power, and revise exceptions over time. The ways families use the devices and services can shift over time, especially when devices enter the home without a clear purpose. Life transitions, changes in health status, shifts in a support network, and new device features or usage patterns all create opportunities for renewed discussion and renegotiation. Our findings point to a need for smart home systems that do not assume a one-time consent or configuration event, but instead actively support ongoing negotiations of awareness, control, and data sharing within support networks. Recent HCI literature demonstrates that shared privacy governance in smart home systems can be operationalized through voting on device configurations and visualizing privacy-utility tradeoffs [93] or through automated intermediaries that offload granular decisions in favor of conversations about high-level personal autonomy models [51]. Similarly, everyday decisions between older adults and their support networks about who can see what, who can change what, and under which conditions should be continually revisited as health, relationships, and technical infrastructures evolve. For older adults, this negotiation entails the additional consideration of power dynamics between them and their support networks.

Based on patterns across our data, we propose three criteria that designers can use to evaluate whether a given system architecture supports the kind of ongoing, multi-sided negotiation our participants consistently sought, rather than fixing governance at the point of device setup.

(1) Transparency of presence and data scope: Whether everyone in the care relationship can identify the monitoring devices present in their home and the data they collect.
(2) Consensual adoption and installation: Whether device adoption and installation are done with both the family member's and older adult's acknowledgment and input.
(3) Ongoing re-negotiability: Whether everyone in the care relationship has the ability to negotiate ongoing changes to privacy preferences and monitoring configurations.

These criteria are grounded in what participants demonstrably sought and, in some cases, enacted. Group 2, for example, jointly decided with their child to disable the drop-in feature on their Echo after recognizing that it granted access neither partner had intended to allow going forward. This instance approximates what all three criteria look like in practice: all parties were aware of the device's capability, the decision to change the configuration was made collectively, and the mechanism to do so was accessible. The design challenge is to build systems that produce equivalent outcomes across the full range of use cases and care relationships. In framing these criteria, we center the older adult's awareness and agency as non-negotiable starting conditions, and accordingly do not offer recommendations oriented toward increasing the ease or scope of surveillance beyond what participants themselves expressed a need or desire for. Future systems should provide ways to accommodate ongoing changes in context and preferences, enabling families to articulate, review, and reconfigure arrangements over time without relying solely on the initial installer. Building on work on dynamic consent [14, 44], whereby devices, boundaries, and routines are open to flexible, ongoing revision, designers could explore interaction patterns that periodically prompt stakeholders to reconfirm or adjust agreements, log changes in ways that are legible to older adults, and make it easy to de-escalate or scale back monitoring once acute needs have passed.

### 5.4 Limitations and Future Work

Our investigation offers a detailed snapshot of older adult participants' self-reported accounts and practices with IoT care technologies. Nevertheless, questions still remain about how such perspectives may evolve over time. Because we recruited through senior centers and snowball referrals, the older adults we spoke with largely lived independently and used commercial devices in everyday, non-institutional ways. We heard less about more involved care arrangements, such as residential or assisted living facilities. While this focus suited our attention to aging in place and routine care communication, it may bias the sample toward participants who have a baseline level of access, connectivity, or interest in technology. Overall, we highlight emergent avenues around the complexities of technology-mediated aging in place. Building on these insights, we offer directions for future work to engage a broader range of stakeholders, including professional caregivers, technology designers, healthcare providers, and policymakers. These inclusions can surface institutional, technical, and regulatory barriers or enablers that shape everyday negotiations. Subsequent studies could also consider comparative investigations across diverse demographic and cultural contexts, recognizing that the negotiation of autonomy, privacy, and care is fundamentally shaped by social norms, economic resources, and local policies.

In this study, we demonstrate that speculative design methods, such as storyboarding and scenario-based probes, are important resources for researchers and practitioners. These methods help surface how negotiations around autonomy, control, and privacy might evolve as older adults' and their support networks' use of home IoT ecosystems changes over time. Our use of storyboards to depict emerging care technologies and features (e.g., customized alerts, remote assistance, and always-on video connections) enabled participants to engage with technology-mediated care situations they may not have encountered directly and to articulate latent boundaries, tensions, and desired governance mechanisms. These speculative vignettes prompted participants to imagine future breakdowns, shifts in household roles, and changing platform capabilities, revealing not only current preferences but also the conditions under which they might accept, resist, or renegotiate monitoring practices with family and platforms. Building on this, we suggest that future work can intentionally deploy speculative storyboards and other techniques to probe alternative platform negotiation roles, explore how power and consent might shift as needs, cognitive status, or household composition change, and co-develop more flexible, revisable arrangements for technology-mediated care. In addition, we propose that alternative research methods, such as longitudinal work, cross-cultural studies, or engagements with families in multi-generational or non-traditional households, may shed light on how cultural values and household structures mediate technology use, adoption, and adaptation. Future research could investigate co-designed tools and protocols that help families script these conversations, as well as examine how different representations of awareness-versus-control boundaries shape people's ability to preserve autonomy in living environments more closely aligned to the lived realities and evolving needs of aging and care.

## 6 Conclusion

As always-on home IoT technologies become embedded in care arrangements between older adults and their support networks, the negotiations shaping their adoption, use, and management reveal fundamental tensions around autonomy, consent, and relational power that existing system architectures and design frameworks are not well-equipped to address. In this study, we examined how older adults and their support networks negotiate autonomy, control, and privacy in the context of always-on home IoT technologies used in care relationships. Drawing on individual and paired interviews with 22 participants, we investigated how older adults prefer to maintain agency, how structural power asymmetries shape technology-mediated care decisions, and how support is coordinated across distributed care networks through the shared adoption and management of these devices. Our findings reveal that older adults are not passive recipients of technology-mediated care, but rather active, sophisticated negotiators of privacy boundaries whose preferences are frequently bypassed by existing

system architectures and family adoption practices. The everyday realities of negotiations extend beyond the binary of independence versus surveillance, demonstrating instead the nuanced tradeoffs and creative strategies employed by older adults and their networks to balance autonomy, safety, and social connection. We highlight the lived complexity of aging in a digitally connected living environment and raise broader questions about how different familial and interpersonal interactions with these technologies might empower older adults to be more independent while maintaining and enhancing the systems of support and care around them.

We argue that the adoption and ongoing use of these devices comprise a set of situated, relational negotiations in which older adults and their support networks collaboratively construct and continually renegotiate boundaries of autonomy, responsibility, and support. Older adults' comfort with data sharing is not uniform across a care relationship but is calibrated to the nature of the data, the identity of the recipient, and the degree of retained control over actions based on that data. We emphasize the importance of architectures that treat rule-making as something that all parties in a care relationship can participate in, revise, and exit, and that make the terms of monitoring legible to the older adult at every stage. This framing extends the Human-Data Interaction principles of legibility, agency, and negotiability [54] into the care context by demonstrating that these capacities must be preserved not only at initial adoption but across the full lifecycle of a care arrangement, as health statuses shift, support networks change, and device capabilities evolve. Based on our findings, we introduce three criteria for designing in this context, grounded in what participants demonstrably sought and, in some cases, enacted. These criteria are oriented toward creating shared home care environments where older adults and their support networks can collaboratively shape care arrangements mediated by these technologies, and provide a basis for evaluating whether a given system supports meaningful, ongoing, and multi-sided negotiations.

We call on HCI researchers and designers to study technology-mediated care as a relational and longitudinal phenomenon in within- and cross-household contexts. The asymmetric orientations, intra-relational power dynamics, and structural bypassing of older adults' preferences documented here cannot be surfaced through studies that examine older adults or their family members in isolation. Future work should extend this approach to a broader range of stakeholders, including professional caregivers, healthcare providers, and platform designers, and to diverse cultural and policy contexts in which the negotiation of autonomy, privacy, and care takes different relational forms. Researchers and designers alike have opportunities to more intentionally facilitate relational autonomy and dignity, ensuring that the systems embedded in the most intimate spaces of older adults' lives are designed to preserve their agency and dignity.

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