UNIVERSITY OF CALIFORNIA

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# "I'm not ready yet": Intrapersonal and Interpersonal Processes Shaping the Adoption of Personal Emergency Response Systems Among Older Adults

A dissertation submitted in partial satisfaction of the

requirements for the degree of Doctor of Philosophy

in Community Health Sciences

by

Helene Riess

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ABSTRACT OF THE DISSERTATION

"I'm not ready yet": Intrapersonal and Interpersonal Processes Shaping the Adoption of Personal Emergency Response Systems Among Older Adults

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Doctor of Philosophy in Community Health Sciences

University of California, Los Angeles, 2018

Professor Carol S. Aneshensel, Co-Chair

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The goal of this dissertation was to explore older adults' perceptions of and experiences with quality of life technologies and the meanings they ascribe to a specific subset of quality of life technologies: personal emergency response systems (PERS). Specifically, the purpose was to analyze how older adults perceive the need for PERS and how they negotiate the uptake and use of PERS with themselves and with others.

In collaboration with three community-based organizations in western Los Angeles, California, 18 persons (age 71-97 years) were interviewed. The sample was comprised of eight PERS subscribers and ten non-subscribers. The interviews were conducted using a semi-structured interview guide that included questions about perceptions of PERS prior to subscription and experiences with the use of PERS. Data collection and analyses were guided by

constructivist grounded theory methodology. Analytic techniques included initial coding, focused coding, theoretical sampling, and memoing.

The results are presented in a substantive theory that is grounded in the words and narratives of study participants. The theory situates participants' pre-subscription experiences in the context of their efforts to counteract the impacts of aging. It is comprised of three processes: *reclaiming control, protecting personhood,* and *walking the balance beam*. Participants took action to *reclaim control* they had lost over their bodies due to aging-related changes. Interviewees also sought to *protect* their personhood from social forces that encroached on their sense of self. Participants appraised PERS with regards to the extent to which the technology could thwart or support these goals. In many cases, these appraisals stood in opposition to each other and participants' repeatedly used phrases like "I'm not ready yet" to describe this conflict. Thiss internal conflict led participants to *walk the balance beam*, which entailed postponing their decision with regards to PERS while re-evaluating the meanings of PERS. Over time, participants *edged close*r to acquiring a PERS through imagined, vicarious, and actual experiences of emergency situations. Additionally, input from members of their social environment facilitated interviewees' progression towards PERS.

This research is the first to provide crucial insights into the decision-making process specifically prior to PERS subscription. Future research and interventions should conceptualize PERS adoption can be productively conceptualized as behavior change in future research and intervention, which should take into account older adults' level of readiness to adopt a PERS.

The dissertation of Helene Riess is approved.

Deborah C. Glik

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## Curriculum Vitae

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**Education**

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| 2014 –exp. 2018 | PhD candidate, Community Health Sciences<br>*University of California, Los Angeles (UCLA)* |
| 2009 – 2011 | Master of Science, Epidemiology<br>*University of Munich, Germany* |
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- *Best Poster Award 2017*, Acceptability and Adoption of Aging in Place Technologies among Older Adults: A Systematic Review, Annual UCLA Research Conference on Aging
- *Erickson Foundation Excellence in Research on Positive Aging Award 2016*, American Public Health Association
- *Graduate Summer Research Mentorship 2016*, University of California Los Angeles
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**Research Experience**

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| 2015 – 2018 | **Graduate Student Researcher**<br>*UCLA, Department of Community Health Sciences*<br>Conduct multivariate statistical analyses. Manage and clean data. Perform systematic literature review. Support grant-writing efforts. Contribute to manuscripts. |
| 2014 | **Graduate Student Researcher**<br>*UCLA, Institute for Society and Genetics*<br>Performed historical literature review on conceptualization of insulin. |
| 2012 – 2014 | **Research Associate**<br>*Helmholtz Zentrum Munich, Germany*<br>Managed multiple research projects with global partners. Designed and implemented statistical analysis plan for molecular data. Led and facilitated interdepartmental communication and collaboration efforts. Collaborated with statisticians and biologists to develop statistical methods. Mentored peers in statistical methods. |
| 2010 – 2011 | **Research Assistant**<br>*Institute for Tropical Medicine, University of Munich, Germany*<br>Designed and implemented statistical analyses to study geographic conditions of hookworm infection in Tanzania. Used Bayesian statistics to understand spatial distribution of hookworm infection. |

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| 2016 – present | **Graduate Teaching Assistant**<br>*UCLA, Department of Community Health Sciences*<br>- Foundations of Community Health Sciences (Fall 2016, Fall 2017)<br>- Advanced Social Science Research Methods (Winter 2018) |
| 2016 | **Guest Lecture "Qualitative Research Methods"**<br>UCLA, Community Development & Social Justice Scholars Seminar |
| 2015 | **Undergraduate Teaching Assistant**<br>*UCLA, Institute for Society and Genetics*<br>Genetic Concepts for Human Sciences (Winter 2015) |

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| 2016 – present | Chair of Board of Directors<br>*Associated Students UCLA* |
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*Qualitative Data Collection and Analysis:*
Grounded theory methodology, in-depth interviews, initial and focused coding

*Multivariate Statistical Methods:*
Bayesian and frequentist statistical analysis, linear and logistic regression, multi-level regression models, complex survey weights

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**Publications**

1. Adams, R , **Riess, H.**, Massey, P.M., Gipson, J.D., Prelip, M.L., Dieng, T., Glik, D.(2017). Understanding where and why Senegalese adolescents and young adults access health information: A mixed methods study examining contextual and personal influences on health information seeking. Journal of Communication in Healthcare, 10(2), pp. 1-33.
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**Presentations**

- "I'm not ready yet": Intra- and Interpersonal Processes in the Adoption of Personal Emergency Response Systems among Older Adults. Poster presentation at the 2018 Aging in America Conference. March 27, 2018, San Francisco
- Acceptability and Adoption of Aging in Place Technologies among Older Adults: A Systematic Review. Poster presentation at the 2016 American Public Health Association Annual Meeting. Oct 31, 2016.
- Epigenome-wide associations of IL18 serum levels and DNA methylation. Oral presentation at the Third International Workshop of Genetic Epidemiology. March 12, 2013.

# CHAPTER 1

# INTRODUCTION, AIMS, AND RESEARCH QUESTIONS

## Introduction

In 2016, the President's Council of Advisors on Science and Technology published a report providing recommendations on federal actions and initiatives to optimize the value of technology in supporting healthy aging.[1] The report praises advances in technology as a way for older persons to navigate changes related to the aging process. While the report largely focuses on benefits on the individual level, it is published in the context of an aging population that is posing new challenges to medical, social care, and public health systems.[2-4]

With the help of technology-based devices and services such as personal alarm systems, smart homes, and medication dispensers, older adults may be better able to "age in place," that is, to live in their homes and communities for as long as possible, hence reducing healthcare costs while increasing older adults' quality of life. However, older adults have pointed out that these technologies excessively focus on problems of physical and cognitive decline. Participants of numerous studies evaluating factors for the acceptability and adoption of "quality of life" technologies state that these technologies overemphasize disease and disability, and reify ageist stereotypes[2] — a concern frequently ignored by researchers. Therefore, the proposed study engaged a sample of 18 older persons in a conversation about their use of technology, including both current and anticipated use of "quality of life" technology, to shed light on the experiences and meanings these technologies entail for the person in particular social settings and how these meanings shape the adoption of these assistive technologies.

Almost 60% of adults 65 years or older report being willing to use such an “aging in place” technology to be able to stay in their own home.[5] Indeed, 59% of older adults use information and communication technologies, such as cell phones, computers, and the internet, to maintain social relationships.[6] However, adoption rates for devices and services designed specifically for the needs of older adults, so-called quality of life technology, are estimated to be low.[5, 7, 8] For example, less than 20% of older adults use home safety technology, such as small devices that can turn off appliances, turn lights on and off as needed, or regulate the temperature, and less than 10% use a personal emergency response systems.[5] Equally problematic is the fact that in many cases owners of such devices do not use them consistently, thereby diminishing the potential benefits of the technology.[9, 10]

To improve the acceptance and use of these technologies, researchers and technology developers have studied attitudes and beliefs regarding the use of quality of life technologies. The results indicate that older adults generally perceive these technologies as useful and potentially beneficial. At the same time, they are worried about technological devices and services invading their privacy and threatening their independence.[8, 11, 12] Furthermore, older persons are concerned that the use of these technologies not will not only make them feel older, but also that others in their social environment could see the user as old or frail and treat them in a discriminatory manner.[8, 11, 12]

Although this aspect is mentioned frequently, there is a lack of research exploring these specific concerns. Moreover, many studies face methodological issues. Most studies on technology acceptance and adoption elicit responses through technology demonstrations, thus relying on participants to imagine the use. This is problematic as participants tend to imagine the use for a person older and more frail than themselves, deeming the technology irrelevant for

themselves. Also, only a few studies address views and attitudes post-implementation or factors that impact continued and consistent use.

Current research suggests that the adoption of quality of life technologies is a complex process of negotiating needs and anticipated impacts marked by the interaction of technological, personal, and social/societal characteristics and circumstances. The purpose of this study was to advance research on technology adoption by further analyzing the meaning of such technologies for older adults and the intra- and interpersonal processes that lead to acceptance or rejection of aging in place technologies among their intended users.

## Aims and Research Questions

Using a grounded theory approach, I gained insights into processes that impact older adults' adoption of quality of life technologies. Through in-depth interviews with 18 participants, I explored and analyzed the perceptions and experiences of, interactions with, and meanings ascribed to quality of life technology for adults aged 65 and above. In the following, I specify the aims and research questions for this study.

**Aim 1**: *Delineate older adults' experiences with new technology in general.*

I explored the technological context and environment in which older adults live. For this aim, new technology pertained to digital devices and includes recent information and communication technology (e.g. smart phones, the Internet), domestic technologies (e.g. vacuum robots, smart TVs), as well as health-related technologies (activity trackers, medication dispensers, etc.) The goal was to gain insights into older adults' attitudes and beliefs towards technologies and their impact on their lives. I aimed to answer the following research questions:

*RQ 1.1*: What experiences do older adults have with technology?

*RQ 1.2*: What attitudes and beliefs do older adults have about technological innovations in general?

*RQ 1.3*: How do older adults perceive that technology has impacted their lives?

**Aim 2**: *Explore older adults' experiences with quality of life technology.*

The goal was to explore the conversations older adults have with others or with themselves when negotiating the use of quality of life technologies. For Aims 2 and 3, I decided to narrow the broad range of technologies to the specific case of personal emergency response systems (PERS), because pilot work demonstrated that meanings individuals assign vary across technologies. A detailed discussion of PERS is provided in Section IV of Chapter 2. The use of quality of life technologies refers to the general decision to take up or acquire a technology as well as the decision to use or not use technology in a specific situation. Corresponding research questions are:

*RQ 2.1*: What are older adults' experiences with quality of life technologies?

*RQ 2.2*: How do older adults think and feel about their use of quality of life technologies?

*RQ 2.3*: In what ways do older adults explain their use and non-use of quality of life technologies?

*RQ 2.4*: What are perceptions and feelings older adults experience before, during, and after the use of quality of life technology?

**Aim 3**: *Analyze the role of the social environment in the uptake and use of quality of life technology.*

The aim was to explore the role the social environment takes in the individual's decision-making process. Here, the social environment includes, but is not limited to, family members,

friends, peers, caretakers, and healthcare providers. I aimed to answer the following research questions:

*RQ 3.1:* How do older adults perceive the attitudes and beliefs of their social environment towards quality of life technologies?

*RQ 3.2*: How do older adults perceive their social environment as shaping their perceptions and beliefs about quality of life technologies?

*RQ 3.3*: How do older adults perceive their social environment as shaping their use of quality of life technologies?

## Significance and Innovativeness

With this dissertation study, I provide insights into aspects of the technology adoption process that have been largely overlooked in existing research: the experiences older persons have with technology use, the meanings they attach to their experiences, and the role of the social environment and context in shaping these experiences and meanings. The findings of this study add to the scientific literature by providing a systematic and in-depth analysis of the interaction between older adults and PERS. The study identified intrapersonal tensions that may exist when the user negotiates internally to what extent using a technology aligns with their self-concept and sometimes conflicting personal goals like health and independence. In addition, this research was conducted with the premise that technology-based devices are objects with socially established, context-specific definitions and meanings. Technology adoption was conceptualized as a continuous process, in which individuals evaluate and then re-evaluate the technology in physical, psychological, and social dimensions. Thus, the study provides a new conceptual

perspective compared to previous studies and takes research a step further in providing insights into use of quality of life technologies.

The results of this study can be used to inform technology development and design processes, and marketing efforts because it sheds light on intra-individual decision-making processes. Furthermore, individual- and community-based medical and public health interventions could benefit from these insights through an improved understanding of how the use of quality of life technologies among older people is shaped by family members, friends, and the larger community.

## Organization of the Dissertation

This first chapter provided a brief overview of the research topic, specific aims and research questions. Chapter 2 is dedicated to a review of the research literature on the adoption of quality of life technology, including theoretical perspectives and empirical results. The chapter concludes with a discussion of the shortcomings in the current body of research. In Chapter 3, I introduce the research approach applied in this study and outline procedures for recruitment, data collection, and analysis. At the end of Chapter 3, I provide a description the characteristics of the sample used in this dissertation research.

Chapter 4 comprises three sections detailing the insights gained in the study. Section I is dedicated to participants' attitudes towards general technologies. Section II presents the stages of adoption of constructed based on participants' accounts. Section III describes three categories that describe participants' journey through parts of PERS adoption.

In Chapter 5, I discuss the presented results in the context of the current body of knowledge and theoretical models. Finally, I draw implications for research and practice and examine the strengths and limitations of this study.

# CHAPTER 2

# LITERATURE REVIEW

## Overview

This chapter takes a broad view on the literature about older adults' adoption of technology. Section I sets the stage by discussing the importance of studying the relationship between older adults and technology-based devices and services. Section II defines key terms, such as Quality of Life technology and gerontechnology, and give an overview of ways to classify these technologies. The last part of the second section is dedicated to a critical examination of Quality of Life technologies from sociological and gerontological perspectives. Section III presents research approaches to studying technology adoption among older adults and summarizes findings across different disciplines and approaches. Finally, Section IV sheds light on the gaps in previous research.

## SECTION I: Older Adults and Technology

In 2014, Cosmopolitan published an article titled "20 Basic Tech Things Old People Just Don't Understand."[13] With statements like "Nothing freaks old people out like Internet multitasking" or "[Old people don't understand] that laptops don't have touch screens," the article perpetuates the prevalent image of "old people" as technologically illiterate. But are "old people" indeed unable to "get on" with technology?

When technology is defined as electronic and digital products and services, like the Internet, smartphones, or computer, it seems to be true that technology adoption is slower among older persons, typically defined as individuals of age 65 or older, compared to their younger

counterparts.[6, 14] Although still below the national average, older adults' use of information and communication technology has continuously increased in recent years. While 50% of adults aged 65 years or above used the Internet in 2012, the proportion of Internet user in the same age group increased to 59% in 2014.[6] Analyses of data from National Health and Aging Trends Study that includes Medicare beneficiaries shows that 42.7% used the internet and 40% used e-mail or text messaging. [15] Seven out of ten Internet users visit the worldwide web every day or almost every day, and eight out of ten use the internet three to five times per week. Almost half of online older adults use social networking sites. More than three quarters of older adults own a cell phone, but smartphones have not been widely adopted. Portable devices are more likely to be adopted than smartphones, with every fourth older person owning a tablet or e-reader.[6]

However, when defining technology more broadly as machinery or equipment or "a practical application of knowledge," older persons are in almost constant interaction with technology, through biomedical interventions, home modifications and many other devices.[16] Joyce and Loe[16] contend that older people are "cyborgs of contemporary life"(p.171) who blend machine and biology in negotiating everyday understandings of the aging process. According to data from 2011 wave of the National Health and Aging Trends Study, about one fourth of older adults in the US use canes, walkers, and other mobility aids, representing a 50% increase since 2004.[17] Nearly ten percent of the sample reported using more than one mobility device in the previous month.[17] Data from the 2006 wave of the Health and Retirement Survey (HRS) showed that 51.2% had bath or shower modifications and 26.1% had toilet modification.[18]

However, use of home safety and wellness technology is lower than these other devices. A study conducted by AARP [5] found that less one in five persons aged 65 or above use a home

safety technology, such as small devices that can turn off appliances, turn lights on and off as needed, or regulate the temperature. In addition, less than 10% own a personal health and wellness device, as for example electronic pill boxes.

Specifically, 9% of older adults reported using a PERS.[5] Importantly, ownership of a device or subscription to a service is not necessarily predictive of actual use.[10] For example, an estimated 25% of personal alarms subscribers never wear the device to activate the alarm.[7, 19]

The findings on technology use indicate that use patterns differ significantly between types of technology and their functionality. The differences reflect, in part, diversity within the older population in terms of personal preferences and familiarity with technology, health, and physical and cognitive capabilities. All of these factors play an important role in new technology use, partly because they facilitate or impede the use of a specific technology and partly because they determine the need for and usefulness of a technology to the individual. For example, a partially sighted individual may not be able to use a regular cell phone, whereas a healthy and active 70-year-old may not see the need to use a walker. Consequently, there is no simple answer as to why older adults use or do not use certain technological devices or services.

Nevertheless, technology is frequently mentioned as an approach to promoting independence in the public discourse about the implications of population aging.[2] As the population ages, understanding the older segment of the population is becoming increasingly important along with its set of diverse contexts and needs. Over the next 40 years, the proportion of adults age 65 or above is projected to increase from 15% to 24% of the US population.[20] In addition, life expectancy at age 65 is increasing, resulting in more people living into their eighties and nineties.[21] Hand in hand with these trends goes a growth in demand and expenses for health services and formal long-term care.[22] As a result, various sectors, including

healthcare, public health, and policy, are looking for solutions that can effectively reach many older adults in prevention, intervention, and treatment efforts.

Technology is often seen as a potent remedy to the challenges arising in relation to population aging. For example, Data, Technology & Innovation is one of the focus areas of the Public Health Institute.[1] The institute has launched several technology-related programs including the Center for Technology and Aging, which aims to develop, implement, and evaluate technologies that benefit older adults. In healthcare, technology is used to monitor and improve population health, and remote patient monitoring and telehealth programs are available at almost every healthcare institutions.

Technology-based solutions are also increasingly promoted on the policy level. In 2016, the President's Council of Advisors on Science and Technology published a report providing recommendations on federal actions and initiatives to optimize the value of technology in supporting healthy aging.[1] Private industry has also discovered the "silver market" as a business opportunity and has invested billions of dollars in the development of products and services specifically tailored to older adults. The technology market to assist aging adults is particularly promising and is expected to grow from currently $2 billion to more than $30 billion over the next few years.[23]

The next section develops a framework to describe and compare these kinds of technologies that are designed for older adults. It provides an overview of the vast range of available products and services.

[1] http://www.phi.org/focus-areas/?focus_area=technology-innovation

## SECTION II: Quality of Life Technologies

Technology-based products and services are the subject of research in many fields from: (a) basic research and technology development in Mechanical Engineering, Robotics, and Software Engineering; (b) research on user interfaces, involvement, and interaction in Design, Human-Computer Interaction, and Human Factors Engineering; (c) evaluation studies of technology use and their impact in Medicine, Occupational Therapy, and Disability Studies (just to name a few health-related fields); (d) research on the interaction of technology with society at large in Science, Technology, and Innovation studies and Sociology. In the case of technologies for older adults, gerontology and geriatrics offer additional perspectives. As a result, there exists a plethora of sometimes divergent terminologies, concepts, definitions, and classifications of technologies for older adults. In the following, I give a brief overview of existing terms and their definitions, before providing a working definition of quality of life technologies for this dissertation. Finally, a selection of different technologies will illustrate the array of established and emerging technologies.

### *2.1. Definitions*

Gerontechnology , a term coined by Graafmans and Brouwers [24], refers to research and development of "techniques and products, based on the knowledge of the aging process, for the benefit of an optimal living environment and adapted medical care for the elderly."[25] Although the term originally pertained to technology research and development, it is often conveniently used to describe the technologies themselves [2], as will be the case in this dissertation. Using technology-enabled devices and services, gerontechnology has two main goals: (1) to prevent, delay, or compensate for perceptual, cognitive, and physical declines associated with aging; and/or (2) to support or enhance opportunities related to communication, leisure, learning,

service, and artistic expression [26]. Melenhorst and colleagues [27] see the empowerment of older adults as a core mission of gerontechnology. They introduce three underlying concepts: (1) developing technologies specifically for older adults to better integrate this population segment into a changing society; (2) adequately modifying older adults' technological environment so that it enhances their ambitions and aspirations; and (3) giving older adults full control over their technological environment.

Satariano [22] emphasizes the potential of gerontechnologies to enhance opportunities for aging in place — a person's "ability to live in one's own home and community safely, independently, and comfortably, regardless of age, income or ability level." [28] Taking an ecological approach, Satariano sees the role of technology as enhancing functional capacity, marshaling resources, and reducing environmental challenges with the goal to improve the independence of older adults. In the context of aging in place, gerontechnologies are also referred to as aging-in-place technologies since these technologies directly or indirectly impact an older person's ability to live safely and independently. Satariano's definition [22] also specifically includes technology used at the neighborhood or community level, such as voice-activated street signs.

The term assistive technologies is sometimes used interchangeably with gerontechnology.[26] Rather than being an equivalent, however, assistive technologies can instead be considered a subset of gerontechnologies. They include products, services, and devices to maintain, increase, or improve functional capabilities of older persons or people with disabilities.[29] In contrast to the broader focus of gerontechnologies, assistive technologies address users' functionality and are intended to prevent or compensate for physical decline.

Schulz and colleagues [29, 30] introduced the term Quality of Life technologies, hereafter referred to as QoL technologies, and emphasized the importance of evaluating an individual's experienced impact across multiple dimensions of physical health, emotional health, role performance and life satisfaction. Although the definition does not imply a specific age group, the authors focus on the potential of these technologies for older persons and persons with disabilities. QoL technologies are "novel, intelligent technologies," [29] "intelligent, person-aware systems that provide the right kind of assistance at the right time to maximize […] functioning and autonomy." [30] This definition, particularly the words "intelligent" and "person-aware," suggests that QoL technologies are limited to digital, computer-based technologies, for example smart homes (see below). However, the authors do state non-electronic technologies such as wheelchairs as examples for QoL technologies.

The breadth of these definitions makes it hard to get a full understanding of QoL or gerontechnologies because they include a wide range of technologies from "low-tech" mobility devices to more "high-tech" products such as sensors for fall detection. This definition of gerontechnology is particularly problematic since certain technologies that benefit older adults are also used by other age groups. A wheelchair, for example, not only compensates for declines of aging but also supports rehabilitation or mobility of people of all ages with disabilities. Hence, it is unclear whether this definition would include wheelchairs, although Fozard and colleagues [26] mention it as an example. Alternatively, Schulz' definition of QoL technology recognizes the fact that these technologies can benefit multiple groups including older persons and persons with disabilities. Therefore, in this dissertation I follow the definition of QoL technology with a particular focus on more recent technologies that have not reached widespread adoption among older adults yet.

### *2.2. Technology Characteristics*

This section addresses characteristics that distinguish various types of technologies and impact the acceptability and adoption of a given technology. The description relies heavily on those presented by Schulz and colleagues [29, 30], but also includes characteristics suggested by other scholars.[22, 26, 31, 32]

#### *2.2.1. Life Domains*

Because many older adults prefer to stay in their own homes [33], the question arises as to whether the home environment (including the surrounding environment like the neighborhood) provides the necessary resources to meet the demands of everyday life. [22] QoL technologies address older adults' lives in five highly interconnected life domains: housing and daily living; communication and connectedness; personal mobility and transportation; health and self-esteem; and work and recreation. [22, 26, 29-32]

Over the life course, functional and cognitive capacities change, which may make activities that previously did not pose any problems more difficult. For example, many older adults report difficulties with home maintenance, like cleaning, making repairs, or keeping up the house.[34] Furthermore, decreases in the sense of smell can result in the inability to detect smoke, gas leaks, and spoiled food putting the health of older persons at risk of injury and premature death. Likewise, changes in auditory and visual senses can make it harder to move around safely in the home. Home alterations can create a safer living space for older persons through the introduction of technological products and services, such as gas sensors and adaptive lighting.

With increasing age, people commonly place a higher value on emotional satisfaction.[35] As a result, most older adults focus on maintaining rewarding relationships and

spend more time with familiar individuals. At the same time, older adults are often affected by social isolation and loneliness [36], which are associated with higher rates of morbidity and mortality[37, 38], depression [39], and cognitive as well as functional decline.[40-42] In this context, technologies that facilitate connectedness and communication can vastly impact older adult's quality of life.[43-45] Because social participation is also in part determined by physical and cognitive health[46-48], technologies that intervene on the latter can positively impact social participation.

The ability to move around within and outside the home is a key aspect of quality of life. Mobility and transportation (e.g. driving a car) are crucial to being able to engage in physical activity, performing instrumental activities of daily living, and interacting with the community [22, 33]. Prominent examples of technologies that enhance mobility are canes and walkers. Partnerships between care organizations and on-demand transportation services like Uber or Lyft leverage technology to serve older adults' transportation needs.

The aging process has been associated with an increase in morbidity, including diabetes, heart failure, and other conditions. In addition, age-related declines in visual, olfactory, auditory, somatosensory, vestibular, and gustatory senses negatively affect virtually all life domains, decrease physical and cognitive abilities, and put older adults at higher risk of injuries, disability, and mortality.[49-51] In particular, falls present a major challenge to active aging and are a leading cause of injury. Hence, technological interventions that can maintain or improve physical, cognitive, mental, and/or social health will have a profound effect on users' quality of life.

Leisure activities also have a significant impact on older adults' perceived quality of life. Thus, QoL technologies can play an important role in providing opportunities for older adults to

engage in leisure activities, particularly when physical abilities and mobility are limited. In addition, technology can be used for physical and cognitive training through the application of typical elements of game playing (e.g. point scoring, competition with others).[52, 53]

*2.2.2. Functions*

QoL technologies also differ in their functions, which include monitoring or measuring an individual's activity and vitals or their environment; diagnosing or screening to identify problems or needs; and treating or intervening to mitigate problems and issues or prevent their occurrence.[30] The function of the technology is in part determined by the life domain it addresses and the intended impact. For example, many current technologies focus on providing older adults with opportunities to connect with others, which falls under the treatment and intervention domains, whereas technologies to diagnose social isolation or monitor the frequency of communication are scarce. Similarly, health monitors measure and monitor vitals, while diagnoses and treatment are determined by healthcare providers.

*2.2.3. Type of Impact*

QoL technologies achieve benefits for older persons by various types of impacts: enhancement, prevention, compensation, or support for caretakers. The type of impact a technology can achieve is determined by the life domain and is in part limited by technological capabilities in terms of engineering, data analysis, and scientific knowledge. For example, there are various technologies that are able to detect falls and respond immediately, thereby minimizing fall-related injuries. However, technology-based prevention of falls is more complicated and has received less attention in research.[54] QoL technologies can have multiple impacts in multiple domains. For example, technologies that enhance an individual's social connectedness might indirectly impact the individual's health, or vice versa.

*2.2.4. User Involvement and Intelligence*

QoL technologies can also be differentiated in terms of the user involvement. Some technologies require little interaction with the user whereas others need input and direct manipulation. User involvement is closely related to what Schulz and colleagues [29] refer to as the technology's intelligence, that is a technology's capability to detect and adapt to changes of the user's abilities, needs, and environment. Typically, more intelligent technologies need less involvement from the users, and operate autonomously and unobtrusively (for example automatically set of an emergency call in case the person falls).

### *2.3. Examples of QoL Technologies*

This section presents a selection of QoL technologies to illustrate the wide variety of devices and services and highlights the differences in technology characteristics. Non-electronic technologies such as handrails, grab bars, and other home modifications support older adults in safely moving around the house and performing activities of daily living, such as bathing or walking. Similarly, canes and walkers contribute to older adults' mobility. Although these devices are considered "low-tech," they have undergone significant changes and improvements over time. Some even made the jump from low- to high-tech. Wheelchairs, for example, have undergone remarkable development from manual models to more "intelligent" power wheelchairs that detect and adapt to differences in terrain.

Personal alarms or personal emergency response systems (PERS) are devices combined with a corresponding service that allow the user to set off an alarm in emergency cases. The alarm can go to a nominated contact or to a provider organization. Earlier generations of PERS required manual activation of the alarm, whereas recent models are capable of triggering alarms automatically.[19]

To promote communication and connectedness with family members and friends, remote communication systems have been developed specifically for older adults.[55, 56] For example, mobile remote presence systems utilize robotic systems that include screens, cameras, speakers, and a mobile base to enhance the sense of remote presence by allowing the user to control navigation and camera angle. Also, an increasing number of social network and social media websites for older adults (e.g. www.stitch.net or www.olderiswiser.com) provide the opportunity to find like-minded people with similar interests and preferences.

Telehealth describes a variety of technologies and approaches "to deliver virtual medical, health, and education services" in four domains: live video, store-and-forward, remote patient monitoring, and mobile health.[57] Telehealth utilizes telecommunications to keep track of patients' health. For example, remote patient monitoring is increasingly used to monitor vitals, such as blood pressure, weight, blood glucose, and blood oxygen levels of patients with congestive heart failure, diabetes, or chronic obstructive pulmonary disease. Live video communication with a provider may substitute for in-person encounters for diagnostic and treatment services. As the term indicates, telehealth mainly addresses the health domain to prevent disease or maintain health by monitoring, diagnosing, or treating older adults that usually have existing conditions. Currently, these technologies require high user involvement through daily measurements of vitals and are typically provided by healthcare institutions and providers.

Ambient assisted living is an umbrella term for devices and systems that are mostly concerned with recognizing and understanding human activity and behavior within an environment using a variety of sensors and interfaces.[58] An important feature is the continuous collection of data, which are automatically stored (often remotely) and processed. Ambient assisted living can be used in various life domains to provide encouragement and assistance

during common activities; automatically detect adverse events (e.g. falls); monitor health status; and track a person's patterns of movement and activity and generate an alert when a situation is evaluated as dangerous or risky.[59] Ambient assisted living technologies include smart homes, assistive robotics, and mobile and wearable sensors.[60] In smart homes, sensors, such as infrared and pressure sensors, cameras, or microphones, keep track of motion and activity in the home, monitor sleep quality and time, or detect smoke or gas leaks. Assistive robots can support older adults in activities of daily living, such as fetching objects or helping a person get up. Robots that support instrumental activities of daily living help with activities such as housekeeping, medication management, laundry or shopping. Some robots are designed to assist users in tasks such as hobbies, social communication, and new learning. Mobile and wearable sensors — like accelerometers, glucometers, pulse oximeters, thermal sensors, or electrocardiogram monitors — monitor the user's activity, mobility, and health signals. Ambient assistant living technologies impact various life domains such as housing, health, and connectedness, through varying functions (i.e. monitoring and intervening), with passive or active user involvement and a moderate to high context- and person-awareness (i.e. intelligence), with the goal to prevent injuries and enhance independent living.

So far, this section has demonstrated the breadth of the field of quality of life technology. Despite the general euphoria around quality of life technologies in research, engineering, and the market, some researchers have criticized the theoretical underpinnings and practical assumptions, or the lack thereof, in the technology development processes. In the last part of this section, I discuss these perspectives as they shape the critical sense through which I examine research on technology adoption in the next section.

### *2.4. Critical Perspectives on QoL Technologies*

QoL technologies are intended to support older adults and increase or maintain users' quality of life. Despite these good intentions, scholars in various fields have criticized the assumptions and processes that underlie the development of these technologies and could profoundly impact technology uptake and use and users.

Some sociologists and social gerontologists are concerned that emotional, mental, and physical changes that arise with increasing age are classified and understood primarily as medical problems or illnesses. Disabilities, declines, and the aging process in general are seen as aggregated effects of organismic aging [61] rather than the result of "one's social circumstances, opportunities and experiences over prior decades." (p.4)[62] This biomedicalization of aging bodies, minds, and emotions[16] leads to an overemphasis on physical and mental decline. As a result, QoL technologies mostly focus on mitigating physical or cognitive deterioration and fewer resources are invested in technologies for older persons' leisure and empowerment.

Researchers from the fields of Science, Technology & Innovation studies have also criticized prevalent practices in design processes of QoL technologies that conceptualize the older adult as a passive recipient of technology.[2, 63] Peine and Neven [63] found that designers often take a paternalistic stance that disregards older adults' capacity to be in charge of their technological environments.[2] Designers are concerned with user needs, set out to identify those needs, and are the ones that determine the solution to those needs. That is, designers maintain their authority over what needs are addressed and in what way. This stance is based on the assumption that older persons' everyday practices, routines, and needs are pre-existent and that a "good" technology will fit in seamlessly. However, needs can be created through technology[63, 64] and the interaction with technology can also fundamentally change existing practices.[19]

Thus, an older person is not a passive recipient of a technology, but interacts with it and, thereby, shapes its role in their daily life.

Another point of criticism is that QoL technologies potentially materialize ageist stereotypes. Designers, engineers, and researchers develop solutions based on user representations, also referred to as personas.[65, 66] These personas are explicit and implicit images and ideas (i.e. identities) of an imagined end user [67, 68], which are often subject to stereotyping.[66] Personas inform decision-making throughout development [63, 67], and thereby, are "inscripted" into technologies [65, 69], and given material form.[63] Because these scripts become seemingly invisible and "part of the natural order of things" [67], implicit ideas gain normative power and become part of normality.[63]

Thus, when older adults are imagined as "poor, frail, and resistant to change" (p.67)[70], these views are implicitly represented in the design of technology. Peine and Neven [2] found older adults were most often represented: (1) in terms of illness, dependency, and decay; (2) as resistant or reluctant to new technology; or (3) as technologically illiterate or ignorant. Peine and Neven [2] illustrate the consequences of such user representations with a case study of an ambient assisted living telecare system. The system was based on the assumption that for older users "one button is enough to operate [the device] incorrectly" and the designers decided against the implementation of a user interface. While the system was functional, it presupposed users' passive compliance, resulted in decreased privacy, and limited options to resist or creatively use the technology.

Several studies indicate that even when older adults are included in the design process and provide feedback, their feedback is often not taken seriously.[67, 68] Furthermore, Thilo and colleagues [71] point out that older adults are typically involved in the testing of devices, but

little attention is given to older adults' views, needs, preferences or practical aspects of usefulness in daily life.

To sum up, the presented studies show that the development of QoL technology can limit the potential and social standing of older adults. Keeping in mind these critical perspectives, I give an overview of research findings in the next section and address the importance of considering the perspectives of older users in the design of QoL technologies.

## SECTION III: Research on QoL Technology Uptake and Use Among Older Adults

Research on technology uptake and use among older adults can be divided into two areas: (1) studies on attitudes, beliefs, and perceptions towards QoL technologies; and (2) studies that examine processes that constitute adoption of QoL technologies. This distinction is important because the two areas represent different aspects of technology uptake and use. Studies on attitudes, beliefs, and perceptions address relatively static concepts at a particular point in time. The second area instead addresses the dynamic nature of technology uptake and use and includes studies on older adults' experiences with technology use, the ways attitudes are formed, and the impacts of technology use on the individual and their social and physical environments. This chapter presents applied theoretical and conceptual models and findings from both areas. This analysis is based on a systematic review I conducted in 2016 and includes a variety of QoL technologies. It focuses on more recent mostly electronic devices and services, but findings from non-electronic products are also included.

### *3.1. Older Adults' Attitudes, Beliefs, and Perceptions Towards QoL Technologies*

The majority of studies on QoL technologies fall under this category. They focus only on older adults' attitudes, beliefs, and perceptions about these technologies and are concerned with

identifying factors that impact the acceptance or acceptability a certain technology. Notably, most studies do not provide definitions for acceptance and acceptability, terms that are conceptually distinct. Acceptability refers to the question of whether a product or service is "good enough" to satisfy all the needs and requirements of the users. Acceptance, in contrast, is an individual's willingness to use a product or service, or is sometimes referred to the behavioral intention to use it (see the Technology Acceptance Model below.)

*3.1.1. Conceptual Models and Theories*

Various conceptual models and theories about acceptance and acceptability have been used to study older persons' willingness and intent to use QoL technologies. As one of the first models, the Technology Acceptance Model [72] is based on the Theory of Reasoned Action[73] and was originally developed to predict and explain the use of computers in the workplace. Now one of the most widely used models for technology acceptance and use[74], the model includes two major concepts that influence individuals' behavioral intent to use a technology: perceived ease of use and perceived usefulness. Perceived usefulness refers to the extent a person believes that "a particular system would enhance his or her job performance"(p.320)[72]. Perceived ease of use pertains to the extent of the effort needed to use a system or technology. Although the technology acceptance model has been shown to be robust and widely applicable to various settings, populations, and technologies[74], it provides an incomplete picture of technology acceptance in older populations because it examines only the proximal determinants of acceptance.[75] However, age-related adjustments with changes in perception, cognition, movement, and psychosocial and biophysical function need to be taken into account.[75] Nevertheless, perceived usefulness and perceived ease of use have been consistently shown to predict older adults' intent to use QoL technologies.[74, 75]

Recognizing the limitations of the technology acceptance model, Venkatesh and colleagues[74] developed the Unified Theory of Acceptance and Use of Technology Model that includes four core constructs: performance expectancy, effort expectancy, social influence, and facilitation conditions. In addition, the authors describe four moderators that potentially modify the influence of the core constructs on intention to use and actual use behavior: gender, age, experience, and voluntariness of use. Performance expectancy and effort expectancy parallel Davis' concepts of perceived usefulness and perceived ease of use, respectively. Social influences pertain to subjective social norms, that is, an individual's beliefs about how much others value the use of a particular technology. The first three constructs are associated with the intention to use a technology, whereas facilitating conditions influence the actual use of a technology.

Everett Rogers' Theory of the Diffusion of Innovations[64] is an important theory in the research on technology uptake and use. This theory originally did not specifically focus on technological innovations, but products and services more generally. In the public health context, his theory has been widely used to analyze the spread and adoption of health practices, messages, and technologies. Rogers delineates various major concepts, including important characteristics of innovation that impact adoption. These attributes are relative advantage, complexity, compatibility, trialability, and observability.

In addition, Rogers posits that an innovation has to be compatible with existing values, past experiences, and needs of potential adopters. Trialability is important because adoption is more likely when a potential user has the opportunity to try out the innovation before making a final decision. Furthermore, results of using an innovation have to be observable either to adopters themselves or to other people.

Some of these attributes match constructs of the models mentioned above. For example, relative advantage corresponds to performance expectancy in the unified theory of acceptance and use and perceived usefulness in the technology acceptance model. It is the perception of whether an innovation is better than other solutions. Similarly, complexity is similar to the effort expectancy and perceived ease of use constructs.

*3.1.2. Findings*

Although most studies do not apply specific models and theories, their research design and questions are often informed by them.[75] Research on older adults' attitudes, beliefs, and perceptions of QoL technologies has yielded a variety of factors that can be grouped into three categories: technology-based, person-based, and sociocultural factors.

Technology-based factors pertain to perceptions of features and characteristics of a device or service. The cost of a technology or service can be seen in terms of financial expenditure or personal effort. It is a factor mentioned frequently across various types of technologies, including personal alarms [75-77], ambient assisted living technologies [78, 79], and electronic memory aids.[11, 80, 81] The relevance of cost is supported by a quantitative study that found a negative correlation between willingness to pay and willingness to install in-home monitoring technologies.[82]

Practicality is another important factor. [77, 81, 83, 84] Technologies that limit the ability to move or perform daily activities are often seen as impractical, including devices that restrict activities due to limitations in the reach of the device.[78, 79, 83, 84] This issue pertains to technologies that require constant activation or utilize a home base unit, such as fall detectors and environmental sensors, and only work within a certain perimeter of the home. To make technologies more practical, participants in some studies suggest the integration into existing

devices, such as cell phones, or objects of daily use (e.g. clothes.)[77, 78, 85] Older adults also prefer products and services that are easy to use.[56, 77, 78, 85-87] This finding is corroborated by quantitative studies, which found that less complexity was significantly associated with increased willingness to use.[82, 88]

Perceived intrusiveness is a major barrier to technology acceptability and is particularly pertinent to more intelligent technologies with low user involvement.[8, 11, 12, 89] In many studies, cameras and environment-based technologies (e.g. sensor networks) were unacceptable to older adults. [77, 81, 82, 85, 90-93] Constant monitoring is also often perceived as unwanted surveillance.[78, 85, 94] These concerns are more than a matter of preference; they have also been discussed as ethical issues.[95, 96]

Technology has to be reliable and accurate. [77, 83, 85, 87, 93, 97] Especially excessive false alarms are annoying, which often occur in fall detection devices and telehealth systems. [77, 83, 85, 87, 97] Claes and colleagues [82] report that 68.3% of study participants perceived false alarms as burdensome.

Person-based factors include beliefs and attitudes towards technology use as well as expectations about consequences of such use. A frequently mentioned determinant of QoL technology acceptance is the perception of need. [8, 11, 12, 77, 81, 89, 98] However, participants of many studies did not perceive the need to acquire or use a QoL technology and often referred to older, more frail persons than themselves as potential beneficiaries of such devices (see more in the next section).[83-87, 98] Previous experience and familiarity with technology, and self-efficacy also influence technology acceptability and use.[78, 79, 81, 87, 99] Here, past negative experiences with technology use can lead to older adults doubting their ability to use a different technology. Older individuals also consider the consequences a QoL technology could have on

various life domains including their safety, independence and autonomy, privacy, and health and well-being. In many cases, they perceive QoL technologies that provide immediate emergency responses (e.g. fall detectors) would be beneficial to their safety.[8, 12, 76, 79, 81, 91, 94, 100] Although some think that QoL technologies may support their aging in place, many older adults think they would feel more dependent.[76, 77, 81, 86, 87, 91, 99, 101]

The sociocultural context in which technology is to be used refers to influences of the person's social network on technology acceptability and adoption, and perceived consequences for the social environment. The major influences from the social network on the decision to use a technology are advice and opinions of healthcare providers, family (especially children), and peers. [81, 86, 87, 92, 93, 98, 99] The anticipated impact of QoL technology use on social bonds and interactions is also a critical factor. It is important to older adults to maintain social interaction and not replace existing personal contact. [56, 85, 87, 91, 94, 99]

Furthermore, stigmatization and being treated differently is a major barrier for technology uptake and use. Older adults perceive that QoL technologies could be used to label them and treat them in a patronizing, dismissive way. [11, 12, 77, 78, 81, 87] This issue particularly pertains to visible QoL technology as for example personal alarms worn around the neck or remote patient monitoring devices in the home. Claes and colleagues[82] showed that respondents who were concerned with the visibility of monitoring systems to visitors were significantly less likely to agree to its installation than respondents who did not state visibility as a concern.

### *3.2. Adoption of QoL Technologies by Older Adults*

As mentioned previously, a large part of studies addresses acceptance or willingness/intent to use and its antecedents. Fewer studies are concerned with the way older

adults adopt QoL technologies. Rather than seeking for answers to the "why", this kind of research aims to address how older persons come to the decision to use a certain technology and how the use plays out in the lives of the users. The distinction between attitudes and processes is important because the analysis of processes provides insights into how older adults form attitudes such as perceived need and how they negotiate and weigh potentially conflicting attitudes, beliefs, and perceptions to decide whether to use a technological device or service. In that sense, research on adoption processes put the findings of research on attitudes and beliefs in context of everyday life.

*3.2.1. Conceptual Models and Theories*

Although the majority of studies take inductive approaches to understand older adults' adoption behaviors, several studies apply existing models, all of which suggest that potential users go through stages on their way to full acceptance or rejection of a technology. The number of stages, their characteristics, and their conceptual focus vary largely between models.

The innovation-decision process is part of the larger Rogers' Diffusion of Innovations theory.[64] The process focuses on an individual's evaluations of an innovation and depicts a series of choices and actions through which a person decides whether to incorporate an innovation into existing practice. The process consists of five stages. At the Knowledge stage, an individual becomes aware of an innovation and its functionality. Here, Rogers points out that it is unclear whether perceived need precedes awareness of an innovation or whether awareness of an innovation can create the need. In his view, both scenarios are possible.

In the persuasion stage, an individual forms a favorable or unfavorable attitude — "a relatively enduring organization of an individual's belief about an object that predisposes their action" — towards the innovation. At this stage, the individual's type of thinking is mainly

affective, as opposed to cognitive at the first stage. The person decides how they interpret the information they receive and how it fits into existing personal frameworks. Individuals mentally apply the new idea and try to anticipate what happens once the innovation is used. Although attitudes predispose an individual's action, attitudes and actions can be disparate — a discrepancy referred to as the knowledge-attitudes-practice gap.

At the decision stage a person engages in activities to choose to adopt or reject the innovation. Rogers defines adoption "as the decision to make full use of an innovation as the best course of action available" (p.177) [64] Rejection is the decision not to adopt an innovation. To come to a decision, the person might try out the innovation. Rogers clearly states that rejection can happen at any stage of the innovation-decision process, even after a prior decision to adopt (also called discontinuance).

If a person decides to adopt the innovation, the individual puts the innovation to use during the implementation stage. Until this stage the innovation-decision process is a "strictly mental exercise" (p.179)[64] Although the person has sought and received comprehensive information about the use of the innovation, there is still uncertainty about the consequences of the use. In the context of implementation, the concept of re-invention emerges which describes the process of how and to what extent users change or modify an innovation. Finally, the confirmation stage is characterized by the individual seeking reinforcement of their decision. However, the decision may be overturned (i.e. the innovation is discontinued) if the individual's experience with an innovation does not align with their goals and values.

Silverstone and colleagues[102] propose a transactional system that explains the dynamic interaction between technological innovations and the social contexts of their use [102, 103]. The model was originally developed for information and communication technologies but has been

applied to other technologies as well. The household or family, rather than an individual, plays the central role in this model as it creates the boundary between private and public worlds. A household or family can be seen as a social, cultural, and economic unit participating in the public world of production and exchange of commodities and meanings, while aiming to create and sustain its autonomy and identity. To achieve this goal, commodities and objects and their meanings are formed and transformed as they pass the boundary between public and private spheres. Thus, the concept of domestication focuses on the active role of the user in determining the use and producing meaning and identity from artifacts.

Four distinct, yet non-discrete, phases characterize this transactional system. Appropriation, the process of possession or ownership of an artifact, takes place when an object is acquired. Through this transaction objects become significant and can become central to the creation and definition of the household as a collective of its members through distinction from, or association with others. Objectification — the process of determining roles a product will play — is expressed in the usage of artifacts and, importantly, their spatial exhibition. It informs a household's (or an individual's) sense of its collective identity and its place in the world. Incorporation — the process of interacting with a product — focuses on the ways in which technologies are used. To become functional, a technology has to be integrated into the daily activities. The ways in which technologies are used to symbolize and enact the "differentiation and identification, […] the construction and assertion of identity" (p.25)[102] within and between households. Finally, conversion — the process of converting technology to intended feature use or interaction — pertains to the symbolic and material display of the artifact through which a household's (or a household's member) social position and status is defined. At the same time, through this display the household contributes to the public meaning and desirability of the

technology. The process of domestication involves not only practical work but also symbolic work. Users as well as non-users assign symbolic meanings to technologies, which impact individual and group identities and the long-term use of a technology.[104, 105]

Studies that apply the domestication process to understand the uptake or use of QoL technologies are scarce. But other studies that examined the use of more ubiquitous technologies shed light on the importance of understanding the meanings of technologies. For example, a walking group of older adults rejected the use of pedometers because their use would emphasize performance, put pressure on group members to walk greater distances, create undesirable hierarchies, and, as a result, hamper the sociability of the group.[105] Women were particularly opposed to using and displaying pedometers, because they saw themselves as non-competitive. Thus, although group members received, or appropriated a pedometer, when they joined the group, group norms and identities led to the rejection of the technology.

In studying the domestication of robotic vacuum cleaners, Frennert and Östlund [106] found that the domestication process was characterized by a continuous reevaluation and redefinition of expectations. Furthermore, participants formed a meaningful relationship with the device. The vacuum cleaner became meaningful to the users not only because of functionality and convenience, but because the vacuum cleaner supported them in everyday life and saved them time and energy to engage in other activities. Older adults also "converted" their use of the vacuum cleaner by sharing their experiences with friends and family. This was rewarded with attention and positive attitudes which validated and reinforced the use.

*3.2.2. Findings*

Although many studies in this review do not specifically apply any of the theoretical models described above, there is significant overlap in insights. They suggest that technology

adoption is an ongoing and context-specific process in which individuals (re-)evaluate relevant factors in deciding whether to use a device or service.

*Role in daily life*

Generally speaking, older adults see the value of QoL technologies. However, they sometimes push the decision to acquire it to a later point in time when they would actually need it.[90, 98] This insight is also reflected in studies on attitudes and perceptions, where many participants stated that the device or service would be useful to somebody older and more frail than themselves or, in other words, to somebody who were in actual need.

Technology uptake or acquisition is only the first step towards full adoption. A crucial step of the adoption process is incorporating or integrating the technology into daily life. This parallels the implementation phase in Rogers' innovation-decision process[64] and the objectification/incorporation phase in the domestication process.[102] Using a new device or service goes hand in hand with learning to perform new tasks.[84, 90]

For example, in the case of an alarm pendant, the user has to learn not only to use it in an emergency but also to remember to wear it in the first place. Aceros and colleagues[84] report that participants sometimes forgot to wear the alarm pendant, and even when wearing the pendant became routine, they would forget to use it when needed. Thus, learning the task to routinely wear the device interfered with its intended use. Integration of a technology into daily life can also fail when the users experience engaging with the technology as too time-consuming and/or frustrating.[87]

Often, using a QoL technology is only one option of many.[81, 87, 97, 101] These alternatives include relying on oneself, getting help from others, or using another technology.[81] Some are also reluctant to disrupt or discontinue highly valued existing services (e.g. home

health care). Specifically regarding healthcare and social services, older adults may favor relationships with healthcare providers that know them well.[87] Furthermore, older adults may prefer to perform certain tasks themselves rather than relying on technologies[97] or fall back on other, more familiar technologies.[81] Hedman and colleagues[90] state that their participants were also concerned that using a QoL technology is detrimental to the existing ability to perform tasks. But in general, older adults are prepared to take risks and use new technologies in order to achieve the things they value most: maintaining social relationships, independence, and safety. [81, 90, 101]

In some cases, an unintended consequence of QoL technology is the restriction of daily activities as a result of technology use. Technological limitations can interfere with day-to-day activities and create spatial and psychological boundaries. For example, a personal alarm system that utilize a base unit in the home only work within a certain perimeter from the base unit, creating a spatially limited safety zone. Aceros and colleagues[84] report that in some cases these boundaries lead to a clash of "active aging" and "aging in place", where the technology requires the user to be within the "safety zone". However, if the user decides to leave the house to go for a walk as prescribed by the healthcare provider, the system would be ineffective. In another study, these boundaries caused feelings of insecurity when participants moved beyond them.[107]

Changes in users' health and cognitive abilities can impact which technologies older adults use and how they use them. For example, cognitive impairments or dementia may lead to a reduction of the use of certain technologies or incorporate new ones in their daily routines.[90] Here, the standardization of technologies can become problematic as older people are a very heterogeneous group with a vast range of abilities, disabilities, and conditions.[99]

As the domestication process posits, users establish a technology's meaning, function and relevance through the creation of routines and physical space.[63, 102] In other words, users actively adapt objects to fit their circumstances. This also means that users have the capacity to not use technologies in specific contexts or use them in creative ways or reinvent the function of the technology.[64] For example, one of Porter's[97] participants stated that she does not use her PERS when a situation (e.g. a fall) seems solvable without it. Pritchard & Brittain [99] describe participants who lived in extra care residential facilities and only used their alarm pendant when they wanted the TV channel changed or when a neighbor annoyed them. In another study, participants adjusted the technology to stop false alarms by covering the alarm button with a jam lid.[101] These findings illustrate that the interaction between older adults and technology is not deterministic. Older users take an active role in shaping the technology's functionality in their every day practices.[108]

*Impact on self-perceptions*

As described in the previous paragraphs, human beings have the flexibility to make technologies useful to them, sometimes in unintended and surprising ways.[63, 102] But one aspect that is surprisingly often overlooked is the fact that through the interaction between humans and technology, it is not only the technology's function, and sometimes the device itself, that changes, but also the user. [19] In many studies, participants state that a certain technology is more suitable for "older" or "more frail" people than themselves. They perceived that using a certain technology imposed an undesirable identity of being "old", "sick, "disabled", or "dependent" and defined health problems as more serious than they did themselves. These concerns emerged in studies on attitudes and beliefs, but studies that analyzed adoption processes discussed this matter in more depth. It is not only that older adults expect that technologies

would make them feel this way, the use of QoL technologies can actually change the way users perceive themselves, making them feel disabled, frail, or old.[84, 87, 99] Sanders and colleagues[87] interviewed older adults that refused to participate in a telecare program or discontinued the service and found that participants saw themselves as having a strong sense of personal responsibility for maintaining health, self-care, and independence. Participants rejected this program because they saw this intervention as a threat to their sense of self.

*The role of the social environment*

The social environment plays a important role at various stages and phases of the adoption process. In many cases, family members, friends, or healthcare providers raise older adults' awareness of technology-enabled devices and services[8, 12, 81] and often provide crucial support to learning to use a new technology and troubleshooting in case there of problems during the use.[8, 84, 90] In addition, other people that use technologies influence older adults' use of technology.[8, 12]

Members of the closer social environments also actively shape older persons' perception of whether they need a certain technology. In their study on the use of alarm pendants, Aceros and colleagues[84] describe how relatives, friends, and care workers "work on users' self-concepts" (p.105) to establish a fit between the user and the device. This work includes persistent expression concerns about health, safety, and self-care, repeated reminders of the elevated levels of risks that users are exposed to when not using the device, as well as frequent prompts to consistently use the device. As a result, users transform the way they think about themselves and "accept" their vulnerability and the need for alarm pendants.

It is important to note here that the user is also involved in this work and must not be seen merely as a passive recipient of these influences. In fact, it is hard to discern to what extent the

acceptance of the need for technology is due to the influence of others in the environment or whether physical and cognitive declines dictate these transformations in self-concepts. Nevertheless, it is clear that the social environment shapes the users and their interaction with technology "by enacting a particular form of aging."(p.106)[84] Some authors claim that the pressure service providers and family members put forth can be seen as a form of coercion[109] and that older adults use technologies to appease family members' and friends' concerns and unburden family members.[86, 110]

The larger social context also impacts the way in which technologies are used, particularly for technologies that are visible to others. In some studies, participants voice the concern that the use of technologies "colonizes perceptions" [99] and signalizes to others the user's age, thus emphasizing limitations.[97, 99] As a result, older adults worry that others in their environment might treat them differently.[8, 12, 99] Similar to the "identity work" mentioned above, differential treatment can change the way users think about themselves. In addition, the use of technology can reinforce ageist stereotypes [99] or change how other people view the user, thus potentially changing social dynamics and relationships.[109]

This section provided an overview of acceptance and adoption research as distinct approaches to research on technology uptake and use, and highlighted the differences in their assumptions, methods, and findings. The following section critically assesses the current state of the literature and identifies methodological limitations and substantive gaps that need to be addressed to advance scientific knowledge in this field.

## SECTION IV: Limitations and Gaps in Research on Technology Uptake and Use

The previous sections provided a comprehensive exploration of types of QoL technologies, introduced theoretical models of technology uptake and use, and summarized findings of recent studies on technology acceptance and adoption. Despite a broad array of studies, there are questions that remain unanswered. In the following, I identify gaps in the literature. In addition, I discuss how previously applied research approaches and designs limit the type of questions that can be answered. Finally, I provide a detailed description of personal emergency response systems (PERS) and detail why I chose this technology-based service for this dissertation study.

### *4.1. Gaps in Research on Meanings*

As mentioned in the previous section, many research participants indicate that QoL technologies are for individuals older and more frail than themselves. This indicates that older adults do not identify themselves with the intended user of these technologies. [63] Results from previous research indicate that the meanings older adults assign to QoL technologies could have a crucial impact on adoption behaviors and constitute a major barrier to uptake and continued use. Research in other areas shows the importance of self-images in using assistive devices. Larsson Lund and Nygard [111] report that meanings of assistive devices for people with disabilities are manifold and often contradictory. While assistive devices facilitate engagement in activities, they are sometimes experienced as cumbersome to use, thus hampering the ability to engage in those activities. Similarly, the devices provide the opportunity to live independently while at the same time they remind users of their dependence.

These “value dilemmas”[112] are also highly relevant in the uptake and use of digital and non-digital QoL technologies [86, 90, 97, 112] and indicate that older adults base their decisions

about the use of assistive technologies not solely on the device's ability to compensate for physical limitations and impairments. They also take into account how the use matches or impacts their self-concept, which has been suggested as a major barrier to technology adoption.[70] For example, some participants in the Lund and Nygard study [111] used assistive devices as a means to achieve a desired occupational self-image whereas others chose to not use assistive devices because it did not reflect their desired self-image. Similarly, QoL technology research also shows that older adults think about the impact of technology use on their self-concept.[70, 84, 87, 97-99, 101, 112]

Despite these findings, few studies examine how older adults solve value dilemmas and come to a decision about the technology use. To fully understand the reasons why older individuals use or do not use QoL technologies, research needs to go beyond technical and medical perspectives, acknowledge subjective experiences of aging, and explore the meanings QoL technologies have in the lives of their users.

### *4.2. Gaps in Research on the Role of the Social Environment*

Many studies indicate that the social environment plays a role in older adults' technology uptake and use. As described in the previous section, Aceros and colleagues[84] suggest that the role of the social environment goes beyond merely suggesting a technology. Others, such as family members and healthcare providers, actively attempt shape an individual's self-concept to create the perception of need for the technology. The authors' work provides important insights, but it is still unclear how older individuals perceive the "identity work" performed by others and how it shapes an individual's self-concept.

Older adults' views on the coercive nature of others' influence[109] also needs further exploration. In addition, expectations about social consequences may impact the uptake and use

of QoL technologies. Some refuse to use certain technologies, or use them selectively [63, 84], because they reject associated age stereotypes and are afraid that others might treat them differently. Although stigma is a concern that emerges in many studies, it is rarely investigated in depth. As a result, there is paucity of research on the interaction of older adults with their social environment with regard to technology use and how older adults resist or succumb to the influences of their proximal social network, such as peers, friends, and family, as well as society at large, in the form of social norms and role expectations.

### *4.3. Limitations in Research Approaches*

The majority of studies on technology acceptance and adoption involve participants who had not used the technology before. Researchers elicit participants' feedback using video vignettes, pictures or illustrations, verbal descriptions, and or/or prototypes. Thus, participants' perceptions and views are based on hypothetical use and individuals try to anticipate the consequences.[64] However, even when an individual forms favorable attitudes toward a technology, these attitudes do not perfectly predict actual use.[64, 113, 114] In addition, an individual might not be able to accurately predict all consequences of technology use, especially unintended consequences.[64]

Recently, more studies include technology users and sometimes specifically non-users to gather better insights into the reasons why older adults choose to use or not to use certain technologies. Despite this broader perspective, these studies seem to be based on the assumption that technology adoption is a binary state — a person uses a technology or they do not. However, as discussed in the previous section, incorporating devices and services into everyday life is a gradual process accompanied by a continuous stream of decisions.[64, 102, 115] And in some

cases, this learning and integration leads to incomplete adoption.[84] Furthermore, a user can at any point decide to reject the technology, even after having used it.[64]

Consequently, the Technology Acceptance Model and the Unified Theory of Acceptance and Use of Technology have been criticized for ignoring the fact that technology acceptance can fluctuate over time.[12, 75] Interestingly, earlier research on the uptake and use of non-digital assistive devices acknowledged the dynamic nature of technology acceptance.[111, 115, 116] Finally, studies on factors for technology acceptance and acceptability rarely take into account the fact that users have the capacity to use technologies in creative ways, or in Rogers' words "re-invent" the functionality. This aspect is particularly important when studying the impact of QoL technologies on older adults' health outcome because the ways technologies are used determine their effects.

A research approach that conceptualizes technology uptake and use as an ongoing process can provide insights into the development and evolution of perceptions and attitudes and shed light into unconscious thought processes that lead to technology adoption, rejection, or abandonment. For example, various studies have found that perceived need is an important determinant of technology acceptance, yet it is still unclear how older adults come to perceive a need. [117] Understanding this process is crucial, since in many studies participants perceive a technology as acceptable and useful, but for somebody older or more frail than themselves. Knowledge about how need is perceived can inform technology development, technology marketing, and communication efforts with older adults.

### *4.4. Personal Emergency Response Systems*

As described in the literature review section, there is a wide variety of available QoL technologies. For the purposes of this dissertation, I chose to focus on personal emergency

response systems, also called personal alarms, for four reasons: (1) personal alarms provide crucial support to older adults who fall; (2) there is a documented discrepancy between subscribing to a personal alarm service and using it in emergency cases; (3) personal alarms have a unique configuration of characteristics; and (4) personal alarms are among the most widely used QoL technologies.

Falls among older adults pose a serious public health problem[118] and are associated with substantial Medicare expenditures.[119] Every year about one third of individuals aged 65 or above experience at least one fall and 20 to 30% of those who fall suffer moderate to severe injuries.[120] Lying on the floor after a fall for an extended period of time can result in complications including pressure ulcers, dehydration, hypothermia, and death.[121] Personal alarms, typically a combination of a wearable device, a base unit, and a call service, are intended to mitigate the effects of a fall (and other emergencies). With the push of a button, which is located on the wearable component, the user can trigger an alarm that is followed by the notification of a designated responder. Newer models can detect falls automatically without requiring additional action from the user. Although it is one of the most widely adopted QoL technologies [19], several studies report that subscribers underutilize the service. Up to one quarter of subscribers are estimated to never wear the device or wear it inconsistently. [7] In addition, in case of a fall, many individuals choose to not call for help. [7, 19]

These use patterns reveal the unique characteristics of personal alarms. Using a personal alarm requires two separate decisions: to wear the device and to push the button when an incident occurs. In contrast, other technologies are designed to reduce the number of user decisions to improve adherence. For example, wearable automatic fall detectors require the user to decide to carry it around but relieve the user of the responsibility to push a button. Similarly,

wireless sensor networks that monitor activities around the home do not require any user input, which comes with its own caveats and user concerns. In addition, personal alarms require an abstract conceptualization of the benefit of their use. To fully benefit from a personal emergency response system, the individual has to decide to carry it with them in anticipation of an incident that may or may not occur. In addition, the benefit of the device is only realized in case of a negative event, i.e. a fall. That is, the individual is required to negotiate the risks and benefits of personal alarm use and non-use on a daily basis.

Altogether, "optimal" use of personal alarms, that is, realizing the benefit, continuously wearing the wearable device, and using it in emergency cases, entails a complex and ongoing stream of decisions and actions. This property makes this technology the best fitted QoL technology to address the proposed research questions. Given the potential of positive impact of personal alarms on health outcomes and the need to improve their use, I decided to make personal emergency response systems the QoL technology of interest in this study.

## Chapter Summary

The literature review in this chapter revealed significant gaps in understanding older adults' uptake and use of QoL technologies. While various attitudes and beliefs have been found to impact technology use, it is still unclear how they are formed and how they change over time. Furthermore, the role of the user's self-concept and the impact of the social environment have not received enough attention in research on technology adoption among older adults.

Elucidation of these processes is crucial to further understand and bridge the knowledge-attitudes-practice gap. Hence, this research study conceptualized technology uptake and use as an ongoing process. Based on the gaps and limitations presented in this section, the study aimed to provide insights into the development and evolution of perceptions and attitudes, and shed light

on conscious and unconscious thought processes that lead to technology adoption, rejection, or abandonment. In conclusion, I reiterate the specific aims and research questions outlined in the first chapter of this dissertation:

**Aim 1**: *Delineate older adults' experiences with new technology in general.*

*RQ 1.1*: What experiences do older adults have with technology?

*RQ 1.2*: What attitudes and beliefs do older adults have about technological innovations in general?

*RQ 1.3*: How do older adults perceive that technology has impacted their lives?

**Aim 2**: *Explore older adults' experiences with quality of life technology.*

*RQ 2.1*: What are older adults' experiences with quality of life technologies?

*RQ 2.2*: How do older adults think and feel about their use of quality of life technologies?

*RQ 2.3*: In what ways do older adults explain their use and non-use of quality of life technologies?

*RQ 2.4*: What are perceptions and feelings older adults' experience before, during, and after the use of quality of life technology?

**Aim 3**: *Analyze the role of the social environment in the uptake and use of quality of life technology.*

*RQ 3.1:* How do older adults perceive the attitudes and beliefs of their social environment towards quality of life technologies?

*RQ 3.2*: How do older adults perceive their social environment as shaping their perceptions and beliefs about quality of life technologies?

*RQ 3.3*: How do older adults perceive their social environment as shaping their use of quality of life technologies?

In the following chapter, I delve into the research approach, design, and procedures that I used to address these aims and to answer these research questions. I describe the tenets and processes of grounded theory methodology, data collection methods, and the characteristics of individuals that were part of this study.

# CHAPTER 3

# RESEARCH APPROACH, DESIGN, AND METHODS

## Overview

The purpose of this study was to explore and analyze intrapersonal and interpersonal processes in older adults' adoption of personal emergency response systems as a specific example of quality of life technology. The inquiry was of an exploratory nature because little is known about these processes. Therefore, I decided to take a qualitative research approach to address the aims and to answer the research questions of this study. Rather than applying preconceived ideas and variables, as is the case in quantitative studies that test theories, the proposed research questions required an inductive methodology that allows and facilitates the emergence of new and relevant themes that capture older adults' adoption processes for personal alarms.

In Section I, I present the methodology that I applied in this study, its philosophical assumptions and underpinnings, and a discussion of my position as a researcher in this inquiry. In Section II, I describe the research design of the study. I discuss how I recruited participants and enrolled them in the study. In Section III, I delineate the procedures for how I collected and analyzed the data. Section IV addresses criteria to assess the quality and rigor of qualitative research studies. I also describe the steps I took to elevate the trustworthiness of this study. Finally, Section V contains a description of the sample recruited for this study.

## SECTION I: Research Approach and its Philosophical Underpinnings

I chose the methodology of grounded theory for two reasons. First, the application of grounded theory methods allowed me to generate theory-level insights that can be tested and applied in future studies. Second, the procedures of grounded theory focus on eliciting beliefs, meanings, and intentions underlying action.[122] These characteristics would allow me to examine emotional and cognitive aspects and processes in the uptake and use of personal alarms.

My research approach was based on the tenets of social interactionism. I analyzed how older individuals construct meaning around personal alarm systems; how these views shape their actions, i.e. the use or non-use of these services; and how their use is based on both cognition and emotion. In the next section, I describe the principles of symbolic interactionism. I also discuss the role of personal alarms as social objects and the ability of human beings to reflect on and interact with themselves.

### *1.1. Symbolic Interactionism*

Symbolic interactionism is a sociological theory that posits that social interaction constructs and sustains the mind, the self, and social structures. The theory was developed by Blumer [123] based on George Herbert Mead's analysis of social interaction.[124] Blumer bases the theory on three premises. First, humans act towards things based on the meanings that these things have for them. In Blumer's view, these things can be almost anything: physical objects, other human beings, and institutions, guiding ideals (e.g. independence), and activities of others, such as commands and requests. Second, the meanings of the things individuals act towards arise out of social interactions with other individuals. That is, meanings are not intrinsic to things; they are not "a natural part of the objective makeup of the thing."(p.3)[123] Neither do these meanings emanate from an individual's psychological elements, such as sensations, feelings, or

ideas. Rather, meaning is created through a process of social interaction among people. Third, individuals handle and modify these meanings through an interpretive process. Once created, meanings do not simply remain constant. They are "selected, checked, suspended, regrouped, and transformed"(p.5)[123] by the actor. In other words, an individual can change the meanings in a given situation.

Charon [125] further explicates Blumer's premises with the following five ideas. First, social interaction is central to human action. Individual characteristics and social circumstances do not fully determine human action, but rather, humans do what they do based on previous social interaction as well as interactions happening in the present moment. Second, interaction also happens within individuals through an ongoing process of thinking and conversing with themselves. Third, human beings define the situation they are in based on their ongoing thinking and social interaction. Although a situation exists in verifiable, objective terms, an individual's subjective experience also impacts their actions. The fourth point Charon[125] makes is that the present situation has a greater impact on an individual's actions than past experience. Although past experience impacts the way individuals define their situation, they act in the moment also based on present social interaction, present thinking, and present definitions of the situation. Finally, human beings are not passive recipients of and responders to environmental and social influences, but are actively involved in the formation of their action.

This research study was conducted based on the presented premises and ideas and thus focuses on the "social interaction, human thinking, [and] definition of the situation" (p.30) [125] that pertinent to the uptake and use of personal alarms. In the following, I highlight four concepts that are particularly relevant for this study: social objects, self-images, imagined images, and self-concept.

*Social objects*. Symbolic interactionists view physical objects as "social objects." While objects exist in physical form, individuals interpret objects and give them meanings that are created through social interaction with others. Individuals define social objects, use them to achieve goals in a given situation, and change the definitions of these objects when goals change.

In the context of this research, personal alarms are conceptualized as social objects. Personal alarms do not have inherent meanings, but individuals assign meanings to these alarms. These meanings are likely to differ depending on how those affected define a situation. For example, a person who has fallen may see the PERS as unnecessary because they are able to get up without help. The same person may see the alarm as helpful if the fall was the third one in a short period of time.

As Charmaz (p.269)[122] states, people "enact meanings and make them real through interaction." This perspective allowed me to study technology adoption as a process in which meanings and, consequently, actions, e.g. use or non-use, change over time and across contexts.

*Self-images, imagined images, and self-concept*. Charmaz [122] distinguishes between self-images and self-concept. Self-images are "fleeting reflections" (p.267) a person has of themselves in a certain situation. These snapshots change over time across situations. Similarly, through interaction with others, individuals receive a reflection of themself — an imagined image of how the other person sees the individual. The individual evaluates this image and shapes their subsequent action based on this image. In some cases, individuals internalize these imagined images. But individuals can also disagree with and reject these images and act accordingly.[122]

A person's self-concept, on the other hand, consists of relatively stable, organized attributes, values, emotions and evaluations. As opposed to self-image, the self-concept is

enduring and built up over time.[125] It has boundaries, limits, and content.[122] It is when the boundaries of a person's self-concept become permeable that reflected images can impact the individual's self-concept. For example, the self-concept may become permeable when an individual repeatedly and persistently receives information about themself from others.

In this study, I focused on how participants thought about themselves with regards to PERS (self-image.) I also explored how participants thought others saw them (imagined images.) Particularly, I explored how participants processed and acted upon these imagined images, and if and how these images impacted the self-concept.

The tenets of social interactionism form the ontological basis for my study. Next, I provide an introduction to the general principles of grounded theory methodology, which guided data collection and analysis. I also elaborate on the epistemological assumptions of my research approach.

### *1.2. Grounded Theory Methodology*

Grounded theory methodology [126] represents a systematic approach to the examination of temporal sequences or processes, which is a central aim of this inquiry. Grounded theory can result in the development of a substantive theory and, in some cases, more general theories that are directly based on data. Charmaz describes the application of grounded theory methodology as "using inductive data to construct abstract analytic categories through an iterative process." (p.15)[122] This methodology offers the potential to describe an event and to offer explanations for why events and happenings occur.[122]

In this study, I explored how various factors that impact technology adoption relate to each other, how these factors evolve over time, and how they change through older people's interactions with the technology as well as their social environment. These factors include need

for the technology, self-concept, familial and social context and several other factors that have emerged during the course of this study.

I conducted this study from a constructivist stance: my perception of reality was not that of an objective reality. Rather, it is an interpretation that I constructed through my interaction with participants.[127] This interpretation is impacted by my own tacit knowledge, assumptions, and biases.[122] That is, my position as a researcher cannot be assumed to be entirely neutral. Consequently, as much as participants constructed meanings and actions through interpretation, the resulting theory itself is based on my interpretation as a researcher. Hence, the results of this study do not represent the discovery of an objective truth. Rather, they are to be seen as constructed.[122] These premises required me to continuously examine my privileges, preconceptions, and biases and their impact on research direction, data collection, data analyses, and results. Acknowledging my positions within this research study allowed me to be aware of the differences between the reality I lived and that of my participants. In the following I discuss multiple ways in which my views, experiences, and understandings of the world differed from participants' perspectives.

I am significantly younger and grew up in a very different era compared to the participants. This study included participants of age 65 years or older who grew up under different political, economic, and social circumstances than me. These persons also brought with them experiences that I have not had, such as having children, losing a significant other, or grappling with declines in physical and cognitive abilities.

Also, I was raised in Austria by a Russian mother, which means I was endowed with potentially different sets of values and understandings of the world. Thus, I entered interviews as an "outsider" to the experiences of older persons. However, being honest and reflexive (to

myself as well as the participants) allowed me to explore implicit meanings that participants assign to actions, interactions, and objects.[122] The awareness of the differences between me and the interviewee led me to ask participants to make their tacit knowledge explicit rather than taking expressions and their meanings for granted.

Another important position of mine emerged throughout the research process. As participants shared their experiences with their family members, I found myself wondering about my relationship with my mother, who is 65 years old. Compared to some of the participants' children, I am less involved in my mother's daily life, mostly because I live far away from her. The importance of this position of an "uninvolved child" became clear when I shared my insights with other people outside of this project who were more involved in their older parents' lives. I noticed that they tried to justify the behavior of participants' children based on their own experiences. Through these interactions, I realized that I was able to process and interpret participants' stories in a way that reflected their narrative. I was also able to critically examine the power dynamics between participants and their children.

In this section, I discussed the ontological and epistemological assumptions that underly this study. I also elucidated how my background and my experiences influenced my position as a researcher. It is upon this fundament that I designed and conducted this dissertation research. In the next section, I focus on the practical aspects of research design, data collection, and data analysis.

## SECTION II: Research Design and Procedures

After discussing the philosophical principles of my research approach, I turn to the study design through which I translated abstract aims and research questions into actionable procedures. In this section, I discuss the study setting, study sites, sampling methods, and

recruitment and enrollment procedures. I also reflect on the potential risks individuals faced by participating in this study.

### *2.1. Research Setting*

The study methods and implementation was approved by the UCLA Office of the Human Research Protection Program (IRB#17-000885), including the newsletter, flyer, phone recruitment scripts, presentation scripts, screening script, informed consent form, and interview guide (Appendices 1-7).

I conducted the study by interviewing community-dwelling older adults who resided in the Western part of Los Angeles County, California, specifically in the areas of Westchester, Culver City, Marina del Rey, El Segundo, and Santa Monica. I chose this area because of the socioeconomic characteristics. PERS subscriptions represent a nontrivial financial commitment. Therefore, I selected an area that had a higher socioeconomic profile than other parts of Los Angeles, but still contained variation. The median annual household income ranged from roughly $74,000 in Santa Monica to about $95,000 in Marina del Rey.[2] In comparison, the median annual household income for Los Angeles County is about $56,000.

### *2.2. Purposive and Snowball Sampling*

The aim in qualitative research of this type is to investigate a wide range of experiences. Thus, I chose purposive sampling as the sampling method for this study. Purposive sampling is a non-probability sampling method that involves the identification and selection of individuals who are "experts" in the phenomenon of interest.[128] The goal of purposive sampling is not to construct a sample that is representative of the entire population, as is the case with probabilistic sampling. Instead, the goal is to gather a group of participants that cover a broad range of

[2] Median annual household income for the other areas were: $77,000 in Culver City; $84,000 in El Segundo; and $91,000 in Westchester. All income data were obtained from https://statisticalatlas.com/county/California/Los-Angeles-County/Overview.

experiences of a specific phenomenon. How the participants are selected is determined by the researcher, typically through the development of inclusion and exclusion criteria.

As the principal investigator in this study, I determined what characteristics study participants needed to have to adequately address the research aims and questions. Because the research aims are broad, I had to make decisions on how to operationalize the elements of the aims. For example, Aim 2[3] was to "explore older adults' experiences with quality of life technology." This aim has four elements: explore, older adults, experiences, and quality of life technology. The first element "explore" warranted an inductive qualitative research approach, which I discussed in the previous section.

Then, I needed to define the other three elements by answering the following questions: what are the characteristics of an older adult; what experiences are pertinent, i.e. what is the phenomenon of interest; and what constitutes a quality of life technology. In answering the first question, I decided to follow the prevalent definitions of older adults as adults aged 65 and above. For the second question, the research questions under each aim led me to specify the phenomena of interest as: considering acquiring a PERS subscription; having a PERS subscription; or having decided against a PERS subscription. Part of the experience was that participants lived independently in the community. The third question was addressed at the end of Chapter 2: I chose to narrow quality of life technology down to personal emergency response systems. The answers to these questions provided the inclusion criteria for my purposive sampling approach. In addition, I specified exclusion criteria to rule out individuals who I could not communicate with or whose ethical protection I could not assure.[129] Table 3.1 provides an overview of the inclusion and exclusion criteria.

[3] The other two aims had a similar structure. Therefore, I only discuss one aim.

**Table 3.1 Study inclusion and exclusion criteria for purposive sampling**

| Inclusion criteria | Exclusion criteria |
|---|---|
| - Resident in West Los Angeles<br>- Age 65 years or older<br>- Community-dwelling (i.e. not in long-term care facility)<br>- Experience with PERS:<br>Considering a PERS subscription<br>**OR**<br>Having a PERS subscription<br>**OR**<br>Decided against a PERS subscription | - Not willing to give informed consent<br>- Unable to conduct an interview in English<br>- Unable to participate in interview |

In addition, I also used the snowball sampling method. Like purposive sampling, snowball sampling is a non-probabilistic method to select study participants; it relies on previous participants knowing other individuals who could meet the eligibility criteria and, thus, could potentially be recruited for the study.[128] I used this method to be able to reach individuals that I might not have reached with my other recruitment efforts , e.g. Do not participate in organizations for older persons (see 2.3. Recruitment Sites and Procedures.) Therefore, I asked study participants to pass on my contact information to others who they thought might be interested. In the following, I describe where and how I engaged in recruitment activities.

### *2.3. Recruitment Sites and Procedures*

I worked with several organizations to gain access to the community. My recruitment efforts included outreach through an academic-community partnership and two community-based organizations. In the following, I provide a brief description of the organizations and the recruitment methods that were developed in collaboration with these organizations.

*Los Angeles Community Academic Partnership for Research in Aging*

To identify community partners, I first approached the Los Angeles Community Academic Partnership for Research in Aging (L.A. CAPRA.) L.A. CAPRA is a center that facilitates collaboration among the University of California, Los Angeles; Charles Drew University; the City of Los Angeles Department of Aging; and Partners in Care Foundation, an organization that aims to improve community-based care and self-management. The center receives support from the National Institute on Aging and focuses on community-partnered research to create, test, and implement programs to improve the health and quality of life for older adults in the greater Los Angeles area. L.A. CAPRA's community network includes sites in downtown Los Angeles, East Los Angeles, South Los Angeles, Compton, and Long Beach and covers a broad range of socioeconomic strata and racial/ethnic groups. After meeting with the Director and the Director of Community Relations and Outreach I submitted a project description, which was forwarded to L.A. CAPRA community partners. Unfortunately, none of the community partners responded to the outreach or indicated the interest in collaborating on this study. Therefore, I turned to different recruitment venues.

*Westside Pacific Villages*

Westside Pacific Villages (WPV) is a not-for-profit organization that provides its approximately 300 members aged 55 and older with needed services, such as transportation, help around the house, social events, and companionship. It also offers access to vetted and discounted service providers, like plumbers, professional organizers, and other vendors. Many of the services are performed by pre-screened volunteers. WPV's mission is to support residents with their daily activities so that they can maintain an independent and active, yet safe lifestyle in their own homes. WPV currently serves the areas of Westchester, Marina del Rey, Playa Vista,

Ladera Heights, parts of El Segundo, Culver City, Mar Vista, and Venice. Most of these areas are predominantly white. Ladera Heights is an exception, with 80% of the population being African American. The percentages of the Latino population ranged from 3.1% in Ladera Heights to 17.5% in El Segundo.[4] I recruited individuals in four different ways at this site.

*Newsletter.* A recruitment letter was included as part of a newsletter that is sent out to members on a monthly basis by WPV staff. The recruitment letter included an introduction of myself, a brief description of the study, and my contact information (Appendix 1). Interested individuals were able to contact me directly. The newsletter also included an announcement that I would present at "Coffee & Conversations," a monthly social event (see details below). Moreover, it detailed that I would be contacting members via phone. The newsletter was sent out at the beginning of November 2017.

*Phone recruitment.* I attempted to recruit participants directly over the phone using contact information (name and phone number) provided by the WPV office. This direct outreach effort was announced in the aforementioned newsletter in November 2017 (Appendix 1). WPV members had the option to opt out of the phone outreach. To give them time to do so, a reminder about the outreach via phone sent out in early January 2018.

During the recruitment calls, I provided a brief introduction to the study (Appendix 3). Because none of the contacted persons answered the phone, I left a message with the study introduction and my contact information, and attempted another call several days later. Since I was not able to reach any of the WPV members and did not receive any calls back, nobody was screened or recruited via phone.

[4] All data on racial/ethnic groups were obtained from https://statisticalatlas.com/county/California/Los-Angeles-County/Overview

*Social events.* On November 29, 2017, I presented the study in a 5-minute talk at "Coffee & Conversations," a monthly social gathering. For this presentation, I used an IRB-approved script to introduce the study (Appendix 4). On a sign-up sheet, individuals were able to provide their contact information (name, phone number and/or email address). I contacted interested individuals within two days after the event and screened these persons (see 2.4. Participant Screening.)

*Classes and senior center.* The previous executive director of WPV also referred me to the "A Matter of Balance" class in Westchester. The "A Matter of Balance" program is an evidence-based fall-management program for older adults that aims to reduce participants' fear of falling and increase activity levels.[130] On February 21, 2018, I presented the study to the class (Appendix 4) and distributed flyers (Appendix 2). Attendees were also able to provide their contact information on a sign-up sheet for a phone screening interview. Additionally, I was invited to present the study at the Westchester Senior Center on March 13, 2018. Similar to the "A Matter of Balance" class, I presented the study, handed out flyers, and distributed sign-up sheets for attendees. This was my final recruitment event at this site and for this study.

*WISE & Healthy Aging*

WISE & Healthy Aging is a not-for-profit organization that provides programs and services to older adults, including an adult day service center, nutrition programs, and Club 1527, a membership program offering exercise classes, games, and excursions. The organization is headquartered in Santa Monica, California, a city with the following racial/ethnic makeup: 68.1% Whites, 14.2% Latinos, 10% Asians, and 3% African Americans.

The organizational structure of WISE & Healthy Aging is different than that of WPV. As opposed to WPV, the WISE & Healthy Aging building is open to the public, although Club 1527 activities are limited to paying members. Therefore, I adapted my recruitment approaches.

I described the study in a 5-minute oral presentation at the Club 1527 lunch program. As with my presentation at WPV events, I used the language specified in Appendix 4. On a sign-up sheet, interested individuals entered their contact information (name, phone number and/or email address), which prompted follow-up screening interviews over the phone.

The Wise & Healthy Aging facility provides a public space where older adults can meet others, read, play board games and engage in other social activities. I spent about four hours on-site introducing the study. As with the presentation at Club 1527, I had a sign-up sheet to gather the contact information of interested individuals. In addition, I posted flyers (Appendix 2) in publicly accessible areas of the organization.

### *2.4. Participant Screening*

After receiving individuals' contact information, I screened interested individuals to determine their eligibility. I also screened individuals who initiated contact with me as a result of the snowball sampling. I used a screening script (see Appendix 5,) to determine individuals' eligibility. The screening script included a series of questions about their age, living situation, and their ability and willingness to conduct an in-person interview in English. Through this conversation, I was able to determine whether a participant have the ability to engage in a 60 to 90-minute interview. Table 3.1 provides inclusion and exclusion criteria for study participants.

### *2.5. Informed Consent*

Before starting the interview, participants signed an informed consent form to participate in the study (Appendix 6). I gave participants the opportunity to choose whether they wanted to

read the informed consent form by themselves or whether they wanted me to also go through the contents of the document with them. I always made sure that the interviewee was aware of the study goals, benefits and risks, and his or her rights as a participant. The informed consent form also listed my contact information as well as the address and phone number of the UCLA Office of the Human Research Protection Program (Appendix 3.)

### *2.6. Privacy and Confidentiality*

Participants chose an interview location where they felt safe to talk freely and openly. They could also choose to do the interview over the phone. I asked participants for permission to audio-record the interview and kept the audio-recordings on an encrypted hard drive that only I could access, to maintain participants' confidentiality. For the same reason, I removed any identifiable information from interview transcripts, including any proper nouns that could indicate a participant's identity, and replaced them with pseudonyms.

### *2.7. Participant Compensation*

Participants received a $25 Target gift card per interview, for a possible total of $50. However, no participants were interviewed more than once.

### *2.8. Ethical Considerations and Risk Protocols*

Although I expected this study to pose minimal risk to participants, I was aware the interviews could potentially lead to negative or unpleasant emotions or memories because I was asking participants to reflect on their current physical and cognitive condition, self-concept, social interactions, and experiences with technology. Thus, I emphasized to participants at least twice that they had the right to stop the interview at any time and could refuse to answer any question. In addition, I paid close attention to participants' well-being. This was also important as they could experience fatigue from long interviews.

Because this study also addressed the role of members of their social environment, there was a chance that participants would report elder abuse, which includes "physical abuse, neglect, financial abuse, abandonment, isolation, or other treatment with resulting physical harm or pain or mental suffering, or the deprivation by a care custodian of goods or services that are necessary to avoid physical harm or mental suffering," or neglect, defined as the "negligent failure of any person having the care or custody of an elder or a dependent adult to exercise that degree of care which a reasonable person in a like position would exercise, including failure to assist in personal hygiene, or in the provision of food, clothing or shelter failure to provide medical care for physical and mental health needs; failure to protect from health and safety hazards; and failure to prevent malnutrition."[131] In case a participants reported incidents of elder abuse or neglect, or I suspected that a participant may be subject to these conditions, I had accessible the contact information (phone number and or email address) for the local Sheriff's office as well as Los Angeles County Adult Protective Services.

The aim of this section was to give a detailed description of the study design, including participant recruitment, screening, and protection. In the next section, I delve into the grounded theory methods that I employed to answer the study research questions. I describe the type of data I collected, how I collected it, and how I analyzed the data.

## SECTION III: Data Collection and Analysis

Figure 3.1 provides an overview of the grounded theory research process. The process of grounded theory is characterized by a constant back and forth, or "zig zag" (p.86)[132], between data collection and analysis, blurring the distinction between these phases of the inquiry.[122] Data analysis began right after the first interview and throughout used insights from previous

interviews to inform subsequent interviews. I formed theoretical categories and concepts through various phases of initial and focused coding, constant comparison of data and codes, and with the help of memos. I used ATLAS.ti (v.1.6.0), a computer program for qualitative data analysis, to do initial coding and focused coding, and for writing memos — techniques that are addressed later in the section. I turned to Scrivener (v.2.7) for field notes as well as longer and more complex memos. Scrivener is a word processor that provides a management system for documents, notes, and audio-visual data. Furthermore, I extensively visualized my findings on paper to develop them further.

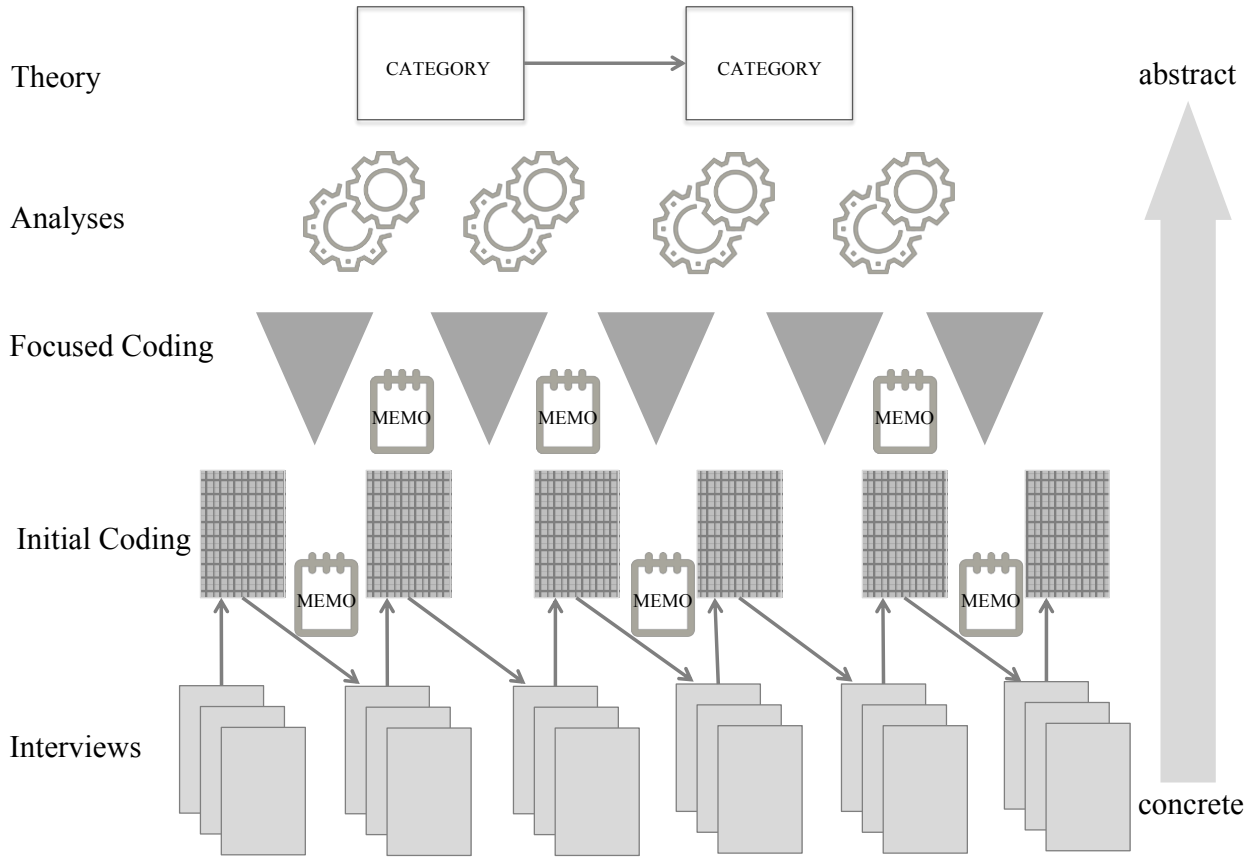



**Figure 3.1 Overview of Grounded Theory Research Process. Source: [133]**

In this section, I describe the methods for data collection and analysis in more detail. I supplement these descriptions with illustrative examples to provide the reader insights into the analytic techniques. In Section III of Chapter 4, I provide an in-depth description of my analytic process and the development of the categories that resulted from it.

### *3.1. In-Depth Interviews*

I collected data through in-depth semi-structured interviews with participants. Interviews allowed a directed exploration of the topic and provided the opportunity to ask clarifying questions to avoid taken-for-granted assumptions.[122, 134] Furthermore, interviews provided insights into participant's thoughts and feelings. To direct the interviews, I used a semi-structured interview guide (Appendix 6.) To ensure accuracy, I audio-recorded interviews.[134] Subsequently, I either transcribed the interviews or submitted them to Rev.com, a verified, encrypted transcription service. After the interviews were transcribed, I listened to the interview again, verifying the transcription, and writing down initial thoughts in memos. The transcripts were the basis for further analysis including initial and focused coding (see sections 3.4 and 3.5).

#### *3.1.1. Semi-Structured Interview Guide*

The semi-structured interview guide (Appendix 7) included a few broad, open-ended prompts, as for example "Tell me about how you decided to get this [PERS]." The guide was designed to take the participant through the adoption process from becoming aware of the device to actually using it. The guide included questions about how the participant became aware of the technology. These questions were asked of participants who already had a device as well as those who did not have one. For those with a PERS, the guide covered a variety of scenarios, asking the participant to reflect on situations in which the device was useful, frustrating, as well as situations in which the participant decided not to use the device.

Prompts, such as "What was going on that day?" or "What went through your mind?" aimed at engaging the participant in telling a story about a specific situation and anything that could be relevant to the situation. While the guide provides an overall framework, I pursued themes that emerged during the interview.[122, 134] Furthermore, I adapted the interview guide as necessary for subsequent interviews (see also Theoretical Sampling below). For example, I added questions about participants' relationships with their family members after noticing that this was salient topic in the first few interviews.

### *3.2. Field Notes*

Field notes are a tool to provide context about a participant and an interview. Before and after interviews, I took field notes that included the date, location, description of the setting, general comments, evaluation and methodological comments, and personal notes about the experience. In some cases, I audio-recorded field notes.

To maintain my participants' confidentiality, I do not provide full examples of field notes and limit examples to methodological notes and personal notes. For example, after my fourth interview, I took notes on areas of improvement in my interviewing style. These notes included prompts to myself, such as "Ask one question at a time," "Avoid hypothetical questions," or "Focus more on the social interactions rather than the technical aspects of using PERS." In some cases, I also wrote down my impressions during recruiting events. The following is an excerpt of my experiences after one of my recruiting presentations.

> […] As I go to check my flyers and sign-up sheets (I thought I had lost a signup sheet with a phone number), another woman approaches me. She asks me where she can get a PERS, which one I'd recommend, and how much they are. I tell her that I'm not a salesperson and cannot recommend any specific device because it really depends on the person. Her father lives alone and needs a device like that. She is taken aback that I don't want to recommend a specific device. I can see a little bit of irritation in her eyes as she says "But you should know this." It makes me wonder: should I know this? Should I be

> prepared for questions like that? I think I should be prepared, but I can't give recommendations - it seems unethical to do that without an assessment of the specific circumstances.

### *3.3. Memos*

Memo writing was an essential part of every step in data analysis. The goal of memoing was to document emerging conceptual thoughts and build theoretical sensitivity.[135] I wrote memos after conducting an interview. I also memoed during and after the initial coding process (see 3.4. Initial Coding) to reflect on emerging interpretations and meanings for every interview. Further on in the research process, during focused coding and beyond, memos became more conceptually abstract, comparing codes with data and other codes and integrating them into broader themes, categories, and concepts. The following is an excerpt from a memo, in which I started to develop an abstract category called *walking the balance beam*.

> WALKING THE BALANCING BEAM
> "Walking the balancing beam" describes the trajectories of a participant's self-concept, self-images, and imagined images in relation to a perceived threat. What the threat is, varies across participants. For some, the threat can be a fall, injury from falling, loss of independence, or death. As self-images and imagined images signify an increased risk of the threat or, in other words, an approximation to the threat, participants struggle do adapt their self-concept to take action and mitigate the risk of the threat becoming real.

I also wrote memos to stay self-reflexive by documenting and questioning my assumptions and potential biases. For example, at some point I noticed feelings of anger towards participants' children when I heard or read participants' experiences with their children who tended to make decisions for them. Knowing this could significantly impact my analytical process, I decided to write a memo acknowledging and confronting these feelings. Doing so helped me distinguish between Lena, the researcher, and Lena, the private person with her sets of values and feelings.

### *3.4. Initial Coding*

Coding refers to the definition of what is happening in the data and interpreting their meaning. In the initial coding phase, I coded the transcribed interviews line by line. Specifically, I assigned very brief descriptions to pertinent data in every line. Examples of initial codes are provided in Figure 3.2, which is a screenshot of the program that I used for the analyses (ATLAS.ti v.1.6.0.)

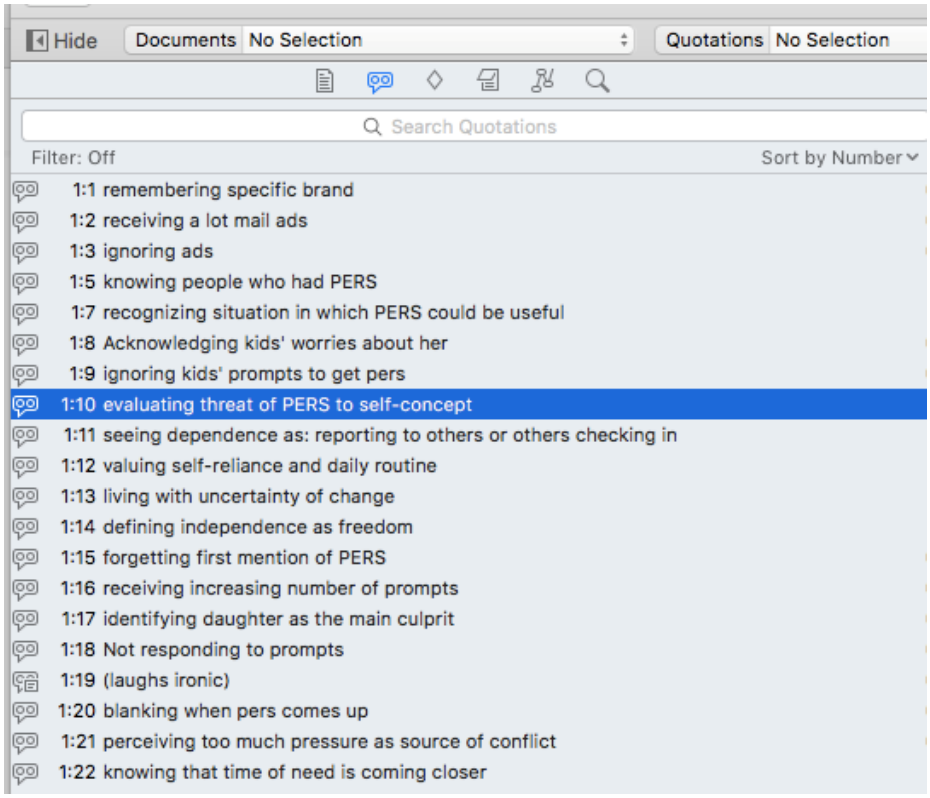



**Figure 3.2 Examples of Initial Codes (Screenshot of Atlas.ti)**

From a symbolic interactionist perspective, human beings are constantly acting towards their environment "according to [their] ongoing definition arising from perspectives that are themselves dynamic." (p.42)[125] Therefore, I used codes that reflected actions rather than topics or themes. An example for such a code is "evaluating threat of PERS to self-concept" (Figure 2.) That is, rather than specifying threat as a theme with regards to PERS, I focused on

describing that the individual actively deals with and evaluates the threat. By studying and analyzing participants' accounts of experiences and interactions and asking questions of the data (see Analytic Strategies), I looked for and found implicit and explicit meanings of participants' actions. Coding for actions also prevented me from making premature conceptual leaps during coding. Initial coding was open without applying pre-existing categories, which allowed new ideas to emerge. Here, reflexivity and self-examination through memoing were crucial to remain open to other interpretations. Initial coding also revealed areas that lack data — insights that were used to explore these areas in subsequent interviews.

### *3.5. Focused Coding, Forming Categories, and Theoretical Sampling*

Focused coding was the process of identifying broader themes and process.[122] It entailed assessing initial codes with the goal to define their meanings. Through constant comparisons [126] (see section 3.6.1) of initial codes with the data, I identified codes with descriptive and analytic power. Furthermore, the comparison of codes with other codes allowed me to group codes, to form tentative categories, and to direct further analyses. Here, memos, which captured conceptual and analytic insights, played a vital role in forming focused codes. Focused codes also led to the reevaluation of the data.[122] I consciously allowed the initial and focused coding processes to be highly dynamic, emergent, and non-linear, where insights at later stages led to a different understanding of data than at earlier stages.

For example, interviews with participants later on in the study revealed new perspectives on older adults' experiences with personal alarms. When that happened, I went back to earlier interviews to see if previous participants shared similar or related views and interpretations in a potentially more tacit manner. For example, when Maria, participant 10, mentioned attitudes towards age as an important factor for feeling ready to get a PERS, I revisited interviews and

found that this theme was also present in previous interviews. Based on focused codes, I formed categories that explicated ideas, events, or processes in the data and provided a more conceptual view than the initial and focused codes.

Throughout the process, I heavily relied on visualization techniques to explore hidden meanings, identify processes, and reconstruct relationships among emotions, beliefs, and behaviors. For example, I drew a "road of life," which represented participants' past experiences, anticipated changes, and where participants situated personal alarms. This drawing helped me to gain a deeper understanding of participants' position in and view of life. Another example is a graph of participants and their children/friends on the way to the personal alarm. Visualizing the relative position of participants to their children or friends helped me clarify the role of the social environment in the adoption of PERS. These and other drawings are provided in Appendix 8. After creating a graphic representation of my insights, I wrote memos to dig deeper into the idea, to verbalize complex concepts, and to establish a direct connection to the data by including pertinent quotes from interviews.

Asking questions of my data was an important technique. As analyses advanced, I compared participants, their actions, their experiences and beliefs, across different situations and at different points in time. Through these comparisons, commonalities and differences between participants emerged, which helped me identify the properties and dimensions of emerging categories. With time, my memos became more abstract and analytical and subsumed more data under the categories I was forming. A detailed description of my analytic insights throughout the progression is provided in Chapter 4, Section III.

These memos also exposed gaps in the data — links that were missing to fully understand and explain the processes present in the data. To fill these gaps, I engaged in theoretical sampling

using two approaches: focused analysis of previous interviews and increased focus on emerging themes in subsequent interviews. When developing the category, I went back to previous interviews to assess how the category applied to previous interviews and to extract additional information that could answer unanswered questions. While I still covered almost all questions from the interview guide, I strategically asked more in-depth and specific questions in areas where additional data was need to fill gaps and to gain a better understanding of processes that had emerged in my data analysis. For example, I noticed that participants kept using phrases such "I'm not ready yet" or "it's not time" to describe their readiness with regards to PERS. In subsequent interviews, I started to probe participants about what they meant with these statements and what it would take to for them to feel "ready."

## *3.6. Analytic Strategies*

### *3.6.1. Constant Comparative Analysis*

From the very beginning of data collection and throughout data analysis, comparisons of segments of data, initial codes, focused, codes, and emergent categories were an essential process to see if the data supported and continued to support previous findings and emerging concepts.[126] These comparisons took place within or between interviews and helped determine conceptual similarities and differences. The goal was theoretical elaboration, saturation, and densification of categories and concepts.[135] For example, I created tables that contained main themes for every non-user and then compared the commonalities and differences between these participants. These comparisons highlighted that all of the participants lived with a certain level of uncertainty. The concept of PERS as a double-edged sword (see Results) also emerged from this approach.

*3.6.2. Asking Questions*

Asking questions of the data is a fundamental analytic technique in grounded theory methodology.[136] In contrast to the questions on the interview guide, these questions were not be asked to the participant, but rather guide the interpretation, analysis, and comparisons of events and experiences within an interview as well as between participants' accounts. That is, I did not always find answers to these questions explicitly in the data (through direct responses by participants), but from scrutinizing participants' accounts and interpreting tacit meanings and actions. In coding the data, the main question was "What's happening here?"[136] In further analyses, the questions became more abstract, yet specific to the proposed research questions.

The following is a list of questions that I kept in mind to guide my analyses. They are grounded in a symbolic interactionist perspective and directly relate to the research questions. The questions pertain to the way participants see themselves in a specific situation (self-image), how they perceive others see them in a specific situation (perceived image), their more general stable view of who they are (self-concept), and how these concepts in relation to each other impact the use or non-use of their personal alarm or fall detector. The questions also address the meanings that participants assign to the use of their device as well as commonalities and differences between participants in their actions and thought processes.

- How do they see themselves?
- How do they perceive that others see themselves? (For example, what do they think a family member is telling them when suggesting the use of a personal alerts?)
- To what extent do self-images and perceived images impact the participant's self-concept?
- Are there any turning points at which the participant experiences a distinct change in self-concept?

- Under what conditions do participants consider using the personal alarm? And under what conditions do they decide not to use it?
- How do meanings that participants assign to the personal alarm change over time and across situations?

*3.6.3. Situational maps*

To deepen my analysis, I created a situational map.[137] Situational maps lay out major human, nonhuman, discursive, and conceptual elements of a situation with the goal to display and make apparent the relationships between these elements. I created the map by quickly writing down all elements that I had seen when participants reflected on PERS. I used the following questions to guide my thinking: "Who and what are in the situation? Who and what matters in this situation? What elements make a difference?"[137] In this case, the "situation" was participants' reflection on and their creation of meaning of personal alarms.[123] The elements of the map represented actors, artifacts, concepts, and topics that had emerged from my previous analyses of interview data. The map is presented in Appendix 9, but here are a few examples of the elements I included:

- Human: peers, friends, children, members of the general public
- Non-human: cane, walker, PERS, assisted living
- Symbolic/conceptual: age, uncertainty, threat, values, security, need, social connection, aging, decisions, loss

I used this map to analyze relations among the different elements by iteratively choosing a focal element and studying how this element was related to others in the map. For example, I chose "uncertainty" as the focal element and analyzed how participants related it to "change", "independence", "security", "PERS", "cane", etc. Next, I picked "aging" and specified the

relationships with “loss”, “change”, “independence”, “children”, and so on. This strategy prompted me to dig deeper in the data and bring forward previously unseen connections. For example, through this analysis, uncertainty emerged as a key concept and became the focus of my subsequent analyses, as discussed later.

### *3.8. Feasibility*

When designing this study, I was concerned that that participants would not be willing to talk about their experiences with QoL technology or might not remember situations. To test the feasibility of the study and the adequacy of the semi-structured interview guide, I conducted a 60-minute pilot interview with a partially sighted participant, whom I call Tracy. She uses a variety of devices, including computers, tablets, and low vision aids, such as media players.

The interview revealed that Tracy was able to reflect on her use of technology. In the following excerpt, the interviewee talks about the time she lost a considerable amount of her vision and the role that technology played in regaining some of her independence:

> It was very, very discouraging. Then my son went to live with his dad and then I moved to a new area and got more treatment and also I worked at the blind agency. So then when I got introduced to technology it was kind of a life saver in some ways. It was really opening up my world again.

Technology also allowed her to engage in important activities that she had to give up after becoming partially sighted:

> I was a newspaper reader from the time I was a little child and my dad read three newspapers a day so I was really brought up to read newspapers, which nobody does anymore. But to be able to look them up online and read them was a real satisfaction for me. It filled a gap I had in my life because I had stopped getting the paper and missed that. It was really enjoyable. It really gave me a lot of pleasure to be able to just sit down and read the newspaper.

The participant also talked about her frustration with technology and her reluctance to ask for help in some situations. In the following excerpt, the participant describes how she

sometimes refuses to seek help because it does not match her self-concept of an independent person.

> Lena: How come you didn't ask for help?
> Tracy: I have no idea. I'm kind of a stubborn, independent person. It's interesting, when I went through school, I would ask for help if I needed help. I didn't need help very often but when I needed help I would ask for it. Part of it was I guess I didn't want to look like I didn't know what I was doing on something that should be very simple. I was afraid to ask. So I never asked because I just figured, "Well, everyone else knows how to do this; I should know how to do this too." That kind of thought, which isn't a very good thought. But that's the way I would do it.

The reluctance to ask for help also came up in relation to her spouse. When I asked Tracy why she does not ask her husband to help her she answers:

> Because I already ask him once or twice and I don't want to ask him a third time and say, "I really wasn't listening to you, will you show me" So that's pretty much why. Because I've asked before.

Overall, this interview gave me confidence that future interviews would yield valuable data to answer the proposed research questions. The pilot participant remembered very specific situations from over 20 years ago (see excerpts 4 and 5). Also, Tracy was open to talking about her frustration in using technology and conflicts with her spouse over the use of technology (data not shown.)

Moreover, this interview led to an important realization, which demonstrates the importance and value of the flexibility of the grounded theory methodology. The devices that the participant in this interview used provided instant relief from her visual problems by enabling her to read the newspaper, book recipes, and keep her own books. In contrast, using a device like a personal alarm requires a more abstract conceptualization of the benefit of use, as it only become useful if and when something bad happens. This led me to the conclusion that the meanings of these devices to the users may be fundamentally different and reinforced my decision to focus on personal alarms.

This section laid out the methods and techniques that I used to collect and analyze the data in order to address the specific aims and research questions. In the next section, I discuss quality criteria of qualitative research studies and describe how I established the trustworthiness of this study.

## SECTION IV: Trustworthiness

In qualitative research, the quality and rigor of a study is demonstrated using the concept of trustworthiness, which can be seen as loosely equivalent to the concepts of reliability and validity in quantitative research.[138] Trustworthiness of this study was established based on four criteria suggested by Lincoln and Guba[138]: credibility, transferability, dependability, and confirmability.

*Credibility*. This concept refers to the adequate representation of the multiple constructions that the researcher studies.[138] To increase the likelihood of producing credible findings, I followed Lincoln and Guba's suggestion of triangulation. While triangulation of different types of sources is not adequate or feasible, I engaged in peer debriefing with my dissertation co-chairs. The goal is to stay "more or less honest"[138] through continuous conversation about methods, findings, and conclusions. I discussed findings in weekly meetings with Dr. Carol S. Aneshensel. Dr. Aneshensel also read some of the interviews to gain a better understanding of the data, gave feedback on my interpretations and conclusions, and provided her perspectives, which were crucial in the development of my category. Furthermore, data were collected until they did not provide new theoretical insights and emergent theoretical categories are saturated.[122] This persistent observation lends credibility to the study.[138]

*Transferability*. In the next section, I provide a detailed description of the sample that was part of this study. I also include a description of participants' backgrounds. Using these descriptions, other researchers can decide whether the theory is transferable to their specific context or population.[138]

*Dependability*. A study is dependable if the researcher can show that inquiry decisions and methodological shifts are appropriate. The aforementioned memos document the formulation and development of categories, and methodological decisions. Information necessary to assess dependability is given by an audit trail, which includes the interview transcripts, initial codes, and focused codes.[138]

*Confirmability*. Similarly, the documentation also provides information to demonstrate confirmability, or the extent to which findings are grounded in the data.[138]

This chapter started out with an elaboration of the epistemological and ontological assumptions that underly this study, followed by a description of implementation strategies. Further, I described the methods for data collection and analysis and established how I addressed the criteria of trustworthiness put forth by Lincoln and Guba. In the next, and last, section of this chapter I provide a description of the sample to set the stage for the presentation of the results in the next chapter.

## SECTION V: Sample Characteristics

In the following, I describe the results of my recruitment efforts and specify the number of individuals I reached, screened, and interviewed. Moreover, I provide demographic characteristics of study participants. Finally, I give the reader more context by giving a more personal introduction of the interviewees.

### *5.1. Recruitment and Demographics*

Recruitment and study enrollment took place between November 2, 2017 and March 13, 2018. As a reminder, recruitment took place through four recruitment channels: Westside Pacific Villages (WPV), WISE & Health Aging, Westchester Senior Center, and a "A Matter of Balance" class. Within each channel, I used different recruitment methods, including newsletters, in-person presentations, direct recruitment via phone, distribution of flyers. In addition, I also accepted participant referrals (see 2.2. Purposive and Sampling in Chapter 3.) I initially thought that phone recruitment of WPV members would be the most successful recruitment tool. However, it became clear that reaching individuals via phone was almost impossible. Participants shared with me that they receive up to 20 phone calls every day from companies trying to sell them something or offering to buy their house, and were concerned about becoming victims of scam activities. As a result, there is mistrust among older adults towards calls from strangers. After several unsuccessful attempts and despite leaving messages, none of the individuals I tried to recruit via phone responded or called me back. Therefore, I refocused my strategy on direct recruitment at events and scheduled additional presentation times at events and in classes.

Table 3.2 details the number of individuals that I contacted, screened, and interviewed for every recruitment channel. In total, I reached roughly 460 individuals. The majority of individuals, about 300, was reached via the WPV newsletter. This number is estimated based on the number of WPV members. In some cases, I estimated the number of individuals reached. In the case of the in-person presentations at WISE & Healthy Aging and Westchester Senior center there were too many attendees to give an exact headcount. With regards to the flyers, I assumed that about half of the 40 flyers that I put on display at the WISE & Healthy Aging facility were read.

**Table 3.2 Number of individuals reached, screened, and included in the sample**

| Channel | Westside Pacific Villages | | | WISE & Healthy Aging | | Westchester Senior Center | Matter of Balance | | ALL |
|---|---|---|---|---|---|---|---|---|---|
| Method | News letter | In-person presentation | Phone | In-person presentation | Flyers | In-person presentation | In-person presentation | Snowball | Total |
| Reached | ~300 | 6 | 6 | ~40 | ~20 | ~40 | 15 | | ~430 |
| Screened | 2 | 4 | 0 | 5 | 1 | 4 | 1 | 4 | 21 |
| Eligible | 2 | 4 | 0 | 3 | 1 | 4 | 1 | 3 | 18 |
| Interviewed | 2 | 4 | 0 | 3 | 1 | 3 | 1 | 3 | 17 |
| Sec. data | | | | | | | | | 1 |
| Total | | | | | | | | | **18** |

Across all recruitment channels and methods, 21 persons indicated their interest in participating in the study. Seventeen individuals shared their contact information on sign-up sheets and four persons were referred from previous participants. Of the 21 individuals that were screened, three persons were not eligible to participate in the study. One woman who was referred to me stated that she was not interested in participating after learning more about the study. A man, who had signed up during on-site recruitment, turned out to be under the age of 65. Another woman did not feel physically able to participate and, thus, was excluded from the study.

Of the eligible persons, I interviewed 17, because one woman was eligible to participate but did not show up to the interview. The interviews took place between November 16, 2017 and March 21, 2018. One interview which I had conducted in early spring of 2017 was included as secondary data. Thirteen interviewees agreed to do the interview in their homes. Four interviews took place in a public setting (two in libraries, one at a restaurant, and one at a senior center), and one participant preferred to do a phone interview.

The demographic characteristics of study participants are presented in Table 3.3. The mean age of participants was 85.5 years, ranging from 71 to 97 years. Sixteen of the 18 interviewees were women. Approximately three quarters of the sample lived alone, whereas the rest shared their home with their children or other family members, such as grandchildren. One participant lived with their spouse and son. The majority of interviewees were widowed or divorced. One participant was still married and another reported never having married.

With regards to education, two out of 18 persons graduated from high school and five individuals did some college without a degree or got an Associate's degree. Seven individuals

**Table 3.3 Demographic characteristics of study participants (n=18)**

| Characteristic | n |
|---|---|
| Total | 18 |
| Age (years/range) | 85.6 (71 - 97) |
| Sex | |
| Female | 16 |
| Male | 2 |
| Living arrangement | |
| alone | 13 |
| child | 2 |
| spouse/partner and child | 1 |
| other family member | 2 |
| Marital status | |
| Never married | 1 |
| Married | 1 |
| Divorced | 3 |
| Widowed | 13 |
| Education (n=16)* | |
| High school | 2 |
| Some college, no degree | 4 |
| technical/vocational training | 2 |
| Associate's degree | 1 |
| Bachelor's degree | 7 |
| PERS subscription | |
| no | 10 |
| yes | 8 |
| Duration of subscription | |
| < 1 year | 2 |
| 1-5 years | 2 |
| 5+ years | 4 |

* Education was not available for the secondary data interviewee; another participant could not be reached

had a Bachelor's degree. Three persons worked as a medical lab technician, nurse, or physical therapist and two reported being a teacher before retirement.

Of the 18 individuals who participated in the study, eight had a subscription to a PERS service at the time of the interview. Half of subscribers had had their PERS for more than five years, whereas the other half had gotten their PERS in the past two years. Ten interviewees were non-subscribers, of whom two had not considered subscribing to a PERS and two had decided against it.

### *5.2. Participant profiles*

In the following, I provide a very brief description of each participant based on information they shared during the interview. Some of the descriptions are more detailed than others because participants varied in the amount of information they shared about themselves. I also assigned each participant a pseudonym to make them more relatable. The goal is to provide context for the reader for the rest of the dissertation and, in particular, for the quotes that I use to illustrate concepts and processes in the next chapter. I deliberately did not include their age as it could potentially identify them in combination with the rest of the provided information. Furthermore, the age does not provide any substantive information about participants or their lives. The first ten profiles are those of non-subscribers, the last eight to subscribers. Within these groups, participants are sorted alphabetically.

#### ***Non-subscribers (NS)***

*Isa*

Isa was the first study participant. She has a son and a daughter, who lives farther away, and a son, who visits his mother on a regular basis. Maintaining a good relationship with her daughter is very important to hear. Isa recently experienced her first fall. Her daughter

brought up the PERS. In reading about personal alarms, she was very surprised about the vast range of options and was worried about having to choose one. Isa lives alone.

*Emily*

Emily describes herself as very curious but also impatient. She also does not like to make decisions. Emily seems to be very social and likes to engage in cultural activities, such as foreign cultural films. She is also a member of a dance group. Emily, who lives alone, has experienced several falls, but none of them happened in the home.

*Jessica*

Jessica describes herself as a loner. Although she meets with friends on a regular basis, she prefers to spend the rest of time alone. Jessica is very cautious because she tends to be "clumsy." Therefore, she has considered getting a PERS At the time of the interview, her grandson lived with her.

*Karen*

Karen is fascinated by computers and says that there is always more to learn about technology. She describes herself as rebellious and very independent. Karen has experienced a couple of falls and has also witnessed others falling. She lives alone in her home.

*Laura*

In her retirement, Laura finally has "the opportunity, the money, and the time at the same time" to lead a very active life. She loves going to concerts and theater plays. Laura lost her husband at an early age and has been independent all her life. Laura was diagnosed with rheumatoid arthritis several years ago, but has the condition well under control. She is on and off collecting information about PERS services.

*Mara*

Mara volunteers five days a week at a not-for-profit organization. She enjoys being physically active and has completed long-distance runs in the past. She lives alone, which is why she had thought about getting a PERS. However, she decided against getting a PERS given her good physical condition.

*Maria & Sandra*

Maria and Sandra have been close friends for decades. They scheduled the interview for the same day at Maria's house, which is why I decided to interview them together. Maria describes Sandra as very loving and caring. Maria loves the show "Grace & Frankie." Neither Maria nor Sandra has experienced a fall. Maria lives with her son. Sandra shares her home with her daughter's family.

*Patricia & Robert*

Patricia and Richard were the only couple that I interviewed. They found each other after their spouses had passed away and spend a lot of time together. They each live in their own home, but visit each other every day. Both of them have experienced several falls. Patricia and Robert stated that they had never thought about getting a PERS. They had seen PERS ads on TV but it never occurred to them that it could apply to them.

***Subscribers (S)***

*Peter*

Peter likes to joke and to laugh. He lives with his son and his wife. Peter has experienced several falls in his home. He has had a PERS for several years but has never worn nor used it.

*Georgia*

Georgia does not go out a lot and likes to watch TV. She goes to church services on a regular basis. She has had a PERS subscription for ten years and used it twice.

*Lilly*

Lilly is passionate about her volunteering, which she has been doing for roughly 20 years. She has two sons who live farther away. She got her PERS a few months ago. In those few months, she already tried out different versions of the device. The day of the interview was the first time Lilly had forgotten to wear the PERS device. Other than that, she reported wearing the device consistently.

*Blue*

Blue loves to go shopping. It used to be one of her biggest hobbies. Recently, she has not been able to do it as much as she would like. She had fallen four times in the past couple of years. She had gotten the PERS about two months before the interview, after her third fall.

*Bonnie*

Bonnie knows how to manage on her own. Having worked as the only woman in a male-dominated industry, she has had to find her way. She places great value on her family and enjoys being around people. She has had her PERS for about two years but reported not having used it at all.

*Violet*

Violet is very independent and loves to play Bridge with her friends. When I came to her home, she had prepared a brochure for me that she had received from her PERS provider. She has had the PERS for more than five years. She had a brain tumor twenty years earlier and has had several falls.

*Rose*

Rose is a passionate volunteer and a very family-oriented person. At the time of the interview, her granddaughter lived with her. She is grateful that she has children that care about her. She has had her PERS for more than five years and has used it once so far.

*Carey*

Carey describes herself as a "people person". She loves being in the water and regularly plays bridge with her friends. She suffered a huge shock when she lost her husband after being happily married for decades. Carey has had her PERS for over 20 years and wears it consistently. She has had two hip replacements and has fallen a couple of times, but has been able to get up herself.

## Chapter Summary

The participant profiles conclude Chapter 3. In this chapter, I discussed the philosophical foundation of the study that informed the study design and methods and demonstrated how I designed and implemented a study in order to address the research aims and questions. Further, I also presented characteristics of the study sample.

Chapter 4 is dedicated to the results of these efforts. Section I describes participants' attitudes towards general technologies. Section II compares participants in terms of their readiness to acquire or use a PERS. Section III presents the core results of my analyses. It discusses how non-subscribers (NS) and subscribers (S) thought about and evaluated PERS.

# CHAPTER 4

# RESULTS

## Overview

In this chapter, I detail the results of the efforts outlined in previous chapters, which included conducting and analyzing interviews with 18 study participants. Chapter 4 is organized in three sections. Section I elucidates participants' attitudes and beliefs about new technologies in general. Section II describes the wide range of study participants and discusses variations of their experiences with regards to their evaluation of, subscription to, and use of PERS. Section III presents the results of the analyses pertaining to the attitudes, beliefs, and behaviors that participants shared about PERS.

## SECTION I: General Attitudes towards Technology

In this section, I describe participants' experiences with digital technologies, such as smart phones, computers, or social media. The results presented here pertain to the research questions of Aim 1. In the following, I provide insights into the views of the women and men in this study with regards to digital technologies and their experiences with the devices that they owned.

Most participants owned some form of digital technology: smartphone (n=6), personal computer with Internet access (n=4), iPads (n=2), electronic book readers (n=3), social media account (n=2), and online banking (n=1). One participant did not own a computer, but frequently used computers available in libraries. Several participants also reported using ride-sharing

smartphone applications like Uber or Lyft on their smartphone (n=3) or the adapted version of GoGoGrandparent (n=2), which does not require a smartphone.

### *1.1. Attitudes and Use of Technology*

Attitudes towards these technologies ranged from indifferent to cautiously positive. While many participants had digital devices, some of them struggled with their use. Several participants described themselves as coming from another era with regards to digital technology, referring to the stark changes that occurred in the past 30 years. For example, Bonnie (S) states:

> I'm not in the right age. I belong in another age where you use the telephone, you wrote thank you notes. You did all these other things. You didn't use the F-word. You know, it's a different world that I come from.

Isa (NS) was another participant who felt that she was not part of the modern world that heavily relies on digital technologies. She reported having retired before or right at the dawn of the computer era. Robert (NS) reported losing his job due to the introduction of computers and the resulting automation of many tasks.

However, not everybody felt like they were from a pre-computer era. Karen (NS) reported having used computers from early on due to her work as an accountant. Until recently, Karen (NS) continued to apply her computer knowledge in her work as a volunteer. Mara (NS), who was the youngest participant in the sample, regularly uses her computer in her work as a volunteer several days a week. Jessica (NS) also reported using "electrical stim[ulation] machines" in her work as a physical therapist.

Staying on top of new technologies was an important theme for four individuals. Laura (NS), Blue (S), and Karen (NS) felt that keeping up with developments in the technology segment was important to stay involved in modern-day life. Laura (NS) states that "the 21st

century is crowding in […] because I don't have the ability to use the computer." During her interview, Laura came back to this topic three times, indicating that she was frustrated about inability to use the computer. She had made several attempts to learn how to use the computer, but found that the classes she attended did not cater to the needs of individuals with no prior knowledge. The lack of appropriate classes posed a significant barrier to Laura:

> And I have tried many classes, but it seems like almost everybody knows how to a little bit, and I don't know at all. And so when I get into the classes, everybody enrolls as rock bottom beginner, but they're not. So consequently, they haven't been very helpful to me.

Although some participants wanted to know about new technologies, many did not enjoy learning about or using technology. In this context, three participants described themselves as technologically inept. Jessica (NS) described herself as "mechanical idiot when it comes to technology," because of the troubles she faces when trying to use her computer, cell phone, and electronic book reader. This frustration led her to eventually abandon her computer. In contrast, Emily (NS) was resistant to acquiring new technology because of her impatience in dealing with new devices and potential problems that may arise. Therefore, she referred to herself as "technology shy."

Other participants expressed their indifference towards new technologies. This indifference stemmed from the fact that these participants were managing their lives without such devices and, therefore, did not see the need for them. Bonnie recounts being able to get important information from her bank by calling several times, instead of using a computer. Similarly, Isa felt that her landline phone was sufficient and was not particularly excited to get the iPad her son had offered her:

> It doesn't really excite me. But I know I'm gonna enjoy it once I get it, because I'll be able to contact the kids. Although I have my phone. I can pick up and call anywhere any time of the day or night. And there's no charge. I have that type. So, I've always felt free that way.

Despite having digital devices, four participants stated that they did not use them consistently. As mentioned before, Jessica stopped using her computer. Violet reported hardly using her electronic book reader, because she likes to pass on books that she deems good. Blue shared that she does not always use her smartphone because she finds it hard to handle.

In most cases, participants learned about or acquired a new device through their children. Children or grandchildren were also in charge of setting up, configuring, and maintaining these devices. Laura and Violet also reported getting a smartphone and an electronic book reader, respectively, from their children. As mentioned above, Isa's son had offered her an iPad. During the interview, she shared that her grandson was setting it up for her. Similarly, Blue reported that her daughter is in charge of maintaining her computer.

### *1.2. Impacts of Technology*

Participants also talked about the impacts technologies had had on their lives and impacts that they were anticipating. Ride-sharing applications was reported to be very impactful technology because they improved participants' mobility. Eleven of the 18 participants had given up driving and in many cases losing the ability to drive was a traumatic event. Lilly (S), for example, remembered the devastation she felt the day her car was taken away by her auto club:

> Here comes this big, very large […] man comes into my garage, and I just started crying, and he just started hugging me, and he took my car. I'll never forget it as long as I live, him taking that car and him

> hugging me while he's feeling sorry for me. It still brings tears. Very, very, very hard to lose your car.

Thus, services like Uber, Lyft, or GoGoGrandparents—among other ride services like Dial-A-Ride[5] that do not require a digital device—gave persons who did not drive any longer the opportunity to be mobile and socialize with others and, thus, were seen as very impactful. Knowing these services were available made it easier for Maria (NS) to give up driving. She says:

> I do have to tell you though that there are so many alternatives out there now. There's that GoGoGrandparent group, and there's the Uber group, etc etc. You're not really locked in the house like you might've been 25 years ago. That I think helped me.

Moreover, Carey (S) and Blue (S) really enjoyed their social media accounts because it allowed them to stay in touch with their families. Carey also reporting playing games on the iPad, which she loved: "I love it. If I lost it or broke it or anything, oh these crazy things, I'd go out and get another one, that's for sure."

On the other hand, some participants anticipated negative consequences from the use of certain technologies and were, therefore, reluctant to use them. Isa (NS) and Violet (S) mentioned that they do not use online banking tools because they had concerns about data security. In addition, Violet was concerned that smartphones were "sociologically […] not good," because these interfere with interpersonal communication. Similarly, Rose was worried about the impact of smartphones on social interactions, particularly for young children:

> So I think that for very young kids, I think they shouldn't be using it all the time. *(laughs)* And even in the mall. Everybody's talking and walking. They don't even know where they're going. They're

[5] https://www.bigbluebus.com/Rider-Info/Senior---Disabled-Transit-Service-Options.aspx

> concentrating on it. So I think that they're wonderful, but I think that they should be used a little more intelligently. Let me put it that way. *(laughs)*

### *Summary*

This section was dedicated to participants' attitudes and experiences with communication technologies, smartphone applications, and personal computers and the analyses showed that attitudes differed between participants and technologies: some individuals were enthusiastic about learning about digital technologies whereas others were indifferent about technological advances. In the next section, I describe how non-subscribers varied in terms of their readiness to acquire a PERS and how subscribers varied in terms of their PERS use.

## SECTION II - Stages in PERS Adoption

The study sample included a wide range of participants with regards to their attitudes and use towards PERS services. In this section, I elucidate variations and similarities between participants' attitudes and use. In comparing the individuals to each other, I identified three dimensions in which an individual's position regarding PERS can be described: subscription status, adoption stages, and adoption attitudes and behaviors.

Figure 4.1 gives an overview of participants' position across the three dimensions. In the first dimension, respondents are divided into two groups according to their subscription status: non-subscribers and subscribers. Non-subscribers did not have a PERS subscription at the time of the interview, whereas subscribers reported being subscribed to a PERS service. The sample was comprised of eight participants who had an active PERS subscription and ten individuals who had not signed up for a PERS at the time of the interview. The analysis showed that

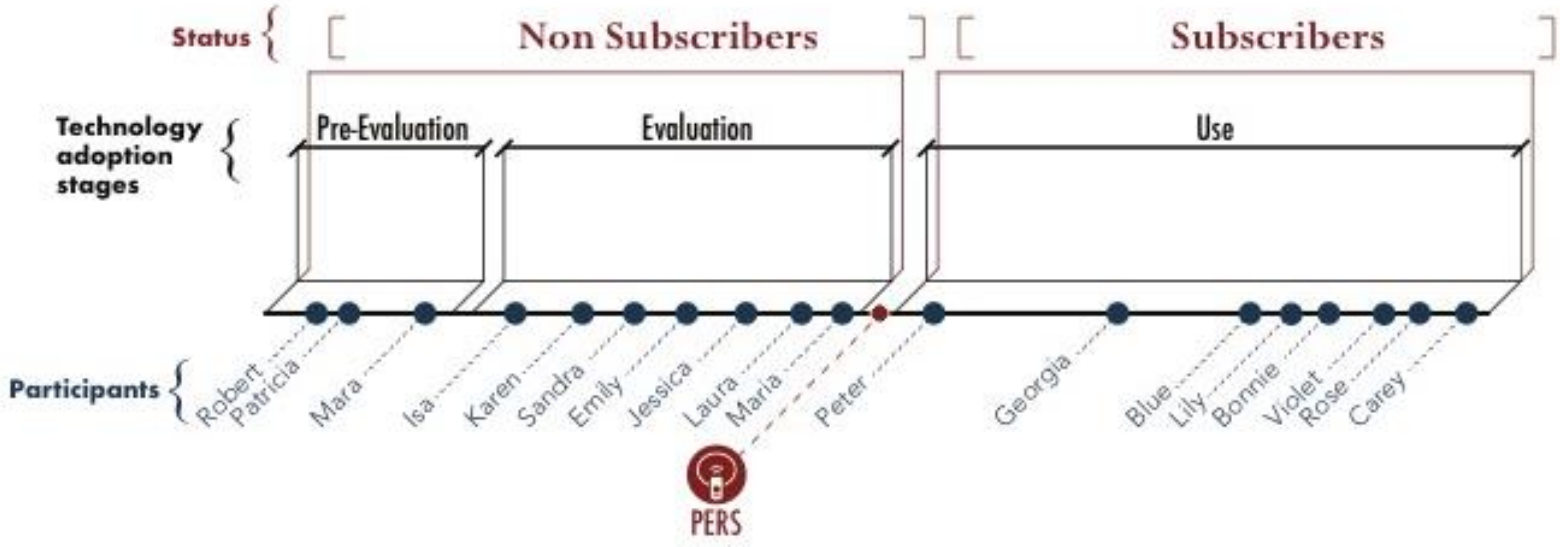



Figure 4.1 PERS Adoption: Subscription Status and Adoption Stages of Study Participants

individuals within each of these two groups were not homogeneous and displayed different thought patterns, attitudes, and behaviors with regards to the PERS service. Therefore, non-subscribers and subscribers are further categorized according to their stage within the adoption process. Among non-subscribers, these stages refer to whether participants were actively thinking and evaluating the acquisition of a PERS. Therefore, the stages are called pre-evaluation and evaluation. Among subscribers, the stages refer to the level of use: inactive and active. In addition, participants within a stage differed from each other. In the group of non-subscribers at the evaluation stage, individuals differed with regards to their readiness to get a PERS subscription. Subscribers differed with regards to the length of time they have had their subscription. In Figure 4.1, readiness at the evaluation stage and duration of PERS subscription are displayed in relative terms. That is, participants' position indicates the readiness or duration relative to other individuals. For example, among non-subscribers, Maria (NS) is readier than Isa (NS). In the subscription group, Carey (S) has had her PERS longer than Rose (S) and the other subscribers. In the following, I describe in more detail the ways in which non-subscribers and subscribers differed within each group.

### *2.1. Non-subscribers*

Within non-subscribers, I classified participants to be either at the pre-evaluation stage or at the evaluation stage. Participants at the pre-evaluation stage had not given substantial thought to getting a PERS, although they were aware that such devices and services existed. Thus, they had no intention to get a PERS at all. Patricia (NS) and Robert (NS) both reported seeing TV advertisements for PERS. Despite having experienced falls in the past, neither Jessica nor Robert had "applied it" (Patricia) to themselves. That is, they never saw themselves as potential users or,

in other words, they had not consciously contemplated getting a PERS. As a result, they had no reason to look for any information about these devices.

Mara (NS) was also at the pre-evaluation stage but differed from Patricia (NS) and Robert (NS) in important aspects. Whereas Patricia and Robert had never thought about getting a PERS, Mara had gone through a conscious deliberation process before coming to that decision. She (NS) had thought about getting a PERS because she lives alone. However, she decided against it because she felt fit enough. Therefore, the way Mara ended up not considering the PERS differed from Patricia and Robert's path.

Individuals at the evaluation stage indicated during the interview that they had thought about PERS subscriptions. But participants at this stage varied with regards to their readiness or their intention to eventually subscribe to a PERS service. All non-subscribers at the evaluation stage used phrases like "I'm not there yet" or "I'm not ready." These statements indicate that while individuals were thinking about PERS, they had not fully developed the intention to acquire such a service and were still undecided whether they wanted to acquire a PERS eventually.

Participants expressed their level of readiness through phrases like the ones mentioned above and through behaviors in which they engaged. Such behaviors included looking for information about PERS services online, asking others, or inquiring about services by calling providers. The more certain and willing a participant was to subscribe to a PERS the closer I positioned them to the PERS in the middle of the graph. By comparing individuals with each other, I was able to establish an order to participants' level of readiness.

In the interview with Maria (NS) and Sandra (NS), I asked them to indicate how close they were to getting a PERS.[6] Holding my hands about one foot apart, I asked them to show me whether they were closer to getting it, i.e. my right hand, or closer to not getting it, i.e. my left hand. Using her own hands, Maria (NS) showed me and explained to me that she was very close to getting it, which is depicted accordingly in the figure. Sandra (NS), on the other hand, indicated that she was closer to the other end of the spectrum, i.e. not subscribing. That is, Maria (NS) was not fully ready to get a PERS subscription but she was more ready than Sandra.

Although I did not ask others the same question, their positions emerged through the perceptions and experiences they shared with me. For example, Isa (NS) shared that she was reluctant to acquire a PERS but that her daughter had initiated the conversation. Isa also was not interested in learning about PERS. She explained the reason she had not read the information materials her daughter had given her: "It didn't interest me."

Karen (NS) said that she was thinking about a PERS, but was reluctant to enter a financial commitment. Sandra faced a similar issue. Therefore, Karen (NS) and Sandra (NS) were at the evaluation stage, but I positioned them closer to the left end of the spectrum. I put Sandra closer to PERS subscription because the financial barrier seemed smaller for her than for Karen.

Finances were not the only obstacle. For example, Emily (NS) was thinking about PERS but lacked access to information. At the same time, she only took limited action to acquire information. However, she was more open, indicated by her curiosity to learn more about PERS services. Therefore, I positioned her as being closer to acquire the PERS than Karen (NS) and Sandra (NS). In contrast to Emily (NS), Laura (NS) is actively trying to learn more about PERS.

[6] I asked this question towards the end of the interview after Maria and Sandra had indicated that the adoption of PERS was a process. Hence, I used this question as a tool to visually represent the discussion we had had up to this point.

She asked me to share any information that I had about these services. She also said that she was talking to PERS users to learn from their experience. With statements such as "I'm just about there" and "I think I will have one of those goofy things hanging off my neck," Maria displayed the greatest level of readiness and intention to get a PERS of anyone in the group of non-subscribers.

### *2.2. Subscribers*

While all subscribers had a PERS subscription, the extent to which they wore and used the device ranged from inactive to fully active. Some participants wore the PERS device more consistently and used it in emergency situations, whereas others did not wear it consistently or had been in situations where they did not activate it even though it was an emergency. Peter reported wearing his PERS only once in a while when his son "puts it on his neck." The rest of the time he "put it on [his] desk and it's still sitting there." Therefore, he was an inactive user. Georgia reported wearing her device but sometimes putting it on the bedpost rather than wearing it around her neck. The other subscribers all reported wearing their PERS consistently, although some of them said they had forgotten to put it on a few times. Most of them reported wearing it all the time, even outside the house where it does not function. This routine helped them to wear the device consistently. Among consistent users, the relative position indicates how long they have had a subscription. Because Carey had been actively and consistently using her PERS for the longest period of time, I put her on the very end of the spectrum.

### *2.3. Changes over time*

Figure 4.1 is a snapshot of where participants were at the time of the interview. For both subscription status groups, participants varied significantly with regards to the time they had been at their specific stage. The position of an individual on the spectrum of stages is not

necessarily representative of the time they had been in the process. That is, some individuals were at a later stage in PERS adoption but had been engaged in the process for a shorter period than somebody who is at an earlier stage. For example, Violet (S) has had her PERS for about eight years. Laura (NS) has been thinking about a PERS — on and off — for roughly 20 years. Although Laura has been thinking about PERS for a longer period of time, Violet can be seen as "further along" because she has been a subscriber for almost eight years whereas Laura is still at the evaluation stage.

The experiences of the men and women in this study indicate that it is a dynamic process, in which participants moved from stage to stage. In the interviews, many participants reported being at previous stages before their current stage. For example, subscribers Georgia, Bonnie, and Blue said that they had seen advertisements for PERS on TV but had not considered themselves a potential customer. In fact, it can be assumed that all participant at some point were in the pre-evaluation stage, for example, when they did not know about PERS services. In addition, all subscribers talked about a period of time in which they deliberated whether to get a PERS. That is, they were at the evaluation stage for some time.

Furthermore, inactive use was not a prerequisite for consistent use. Violet, Rose, and Carey, all subscribers, said they immediately started using their PERS consistently and did not have any problems adjusting to it. Also, consistent use may not be the end goal for everyone. Georgia deliberately chose to hang her PERS device on her bed post. That is, for her this mode is the most consistent one. One stage that most participants[7]—subscribers and non-subscribers alike — went through or are currently going through is the evaluation stage.

[7] It could be argued that Robert and Patricia were in the "Considering" stage for a certain time: during the interview. Through my asking them about their perceptions of the PERS they were engaged in deliberating PERS and how it applies to their situation.

### *Summary*

In this section, I illustrated that the study sample was comprised of a wide spectrum of participants at different stages of PERS adoption. These insights provide the context for the next section, in which I delve into the processes that are characteristic for the evaluation stage. The processes within the evaluation stage emerged as the focus of this dissertation, because 16 out of 18 participants shared experiences at this stage. In the first part of the next section, I describe how I constructed a substantive theory that represents participants' experiences with the evaluation of PERS. In the second part, I discuss this theory: the ways in which participants contemplated PERS and the factors that impacted the way they thought and felt about it.

## SECTION III - Walking the Balance Beam

This study focused on older adults' perceptions about and experiences with personal emergency response systems (PERS). This section is dedicated to the presentation of a conceptual model that I constructed through a detailed analysis of interview data from 18 participants using grounded theory methods. First, I describe and give examples of my analytic process to demonstrate how I used analytic techniques to extract meaning and to construct processes from participants' words. Second, I delve into the conceptual model and its categories and use quotes from participant to illustrate the results.

### *3.1. Constructing Theory from Participants' Words*

Through my conversations with the participants, I understood that considering a PERS was a complex process that involved a deliberation of PERS in multiple dimensions. This section is dedicated to my process of using roughly 500 pages of interview material to construct three categories called *reclaiming control*, *protecting personhood*, and *walking the balance beam*. It is

important to note that this section does not delineate the content of the categories; they are elaborated in subsequent sections. Rather, it provides insights into my analytic process, the decisions I made along the way, and examples of specific instances.

As described in Chapter 3, the grounded theory process is highly iterative and entails initial coding, focused coding, and forming categories. Importantly, I applied these methods in parallel data collection and insights from previous interviews informed subsequent ones. Figure 4.2. provides an overview of how I grouped initial codes into focused codes and how focused codes were then used to create categories. The left column presents examples of initial codes because there were too many initial codes to all be listed. The focused codes in the middle represent a broader theme that subsume similar initial codes. The focused codes provided the basis for the construction of the categories depicted on the right.

I went through the interviews line by line assigning action-oriented codes (i.e. gerunds) to data. In other words, I interpreted what participants were doing, feeling, or thinking, either in the interview or in the situation they were describing. An example for such an interpretive description is *Adjusting to stay independent* which I used to code Carey's (S) statement: "Anyhow, I've learned how to depend on myself and do things the best you can." A code that reflects feeling is *Fearing falls*. I used this code several times as for example for the following statement Lilly (S) made: "I really don't want to fall again."

Other codes were more abstract. For example, Maria (NS) shared a story about a man opening the door for her: "He opens the door for me and has this warm smile, because I look like a little old grandmother. I know that's why! That's funny! That is *really* funny!" Although Maria (NS) does not say it explicitly, the fact that she finds this situation funny indicates that she does not see herself the way she thinks the man saw her in this situation. Therefore, I interpreted this

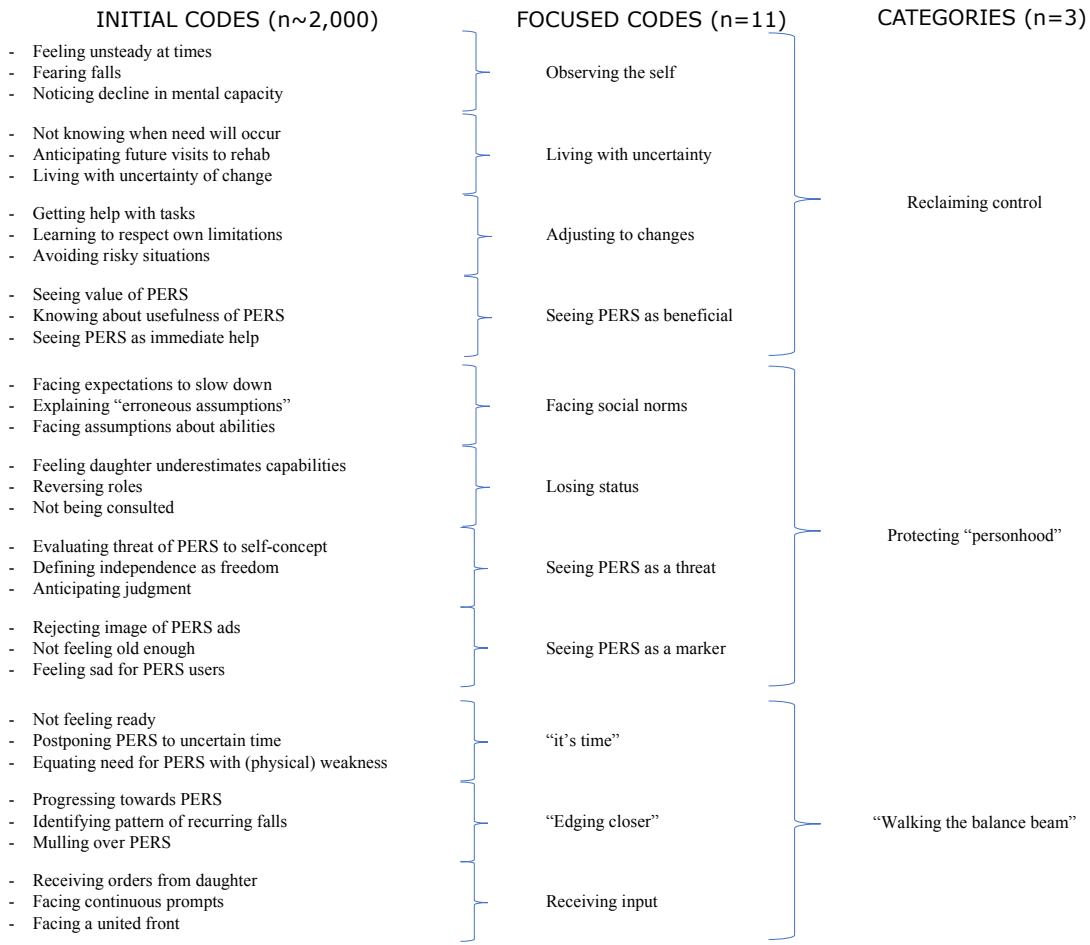



**Figure 4.2 Overview of Initial Codes, Focused Codes, and Categories**

segment as *Rejecting image of "little old grandmother."* By the end of coding all 18 interviews, I had created about 2,000 initial codes.

As I was sorting through my initial codes, I realized that some codes within and across interviews related to similar actions, perceptions, or experiences. For example, I noticed that codes like *taking action to mitigate symptoms*, *adjusting daily routines*, and *taking control through exercise class* referred to actions participants took to deal with the physical changes of aging. Hence, I created a focused code called *adjusting to changes* that subsumed these and similar initial codes. I also realized that participants talked about these actions in the context of losing control over their bodies. Therefore, I grouped these initial codes and created a focused code called *living with uncertainty*. As I reviewed the rest of the initial codes, I saw additional patterns leading me to create additional focused codes, such as *facing social norms*, *seeing PERS as a threat*, and *receiving input*. In total, I constructed 12 focused codes, each of which described a different aspect of how participants reported seeing and thinking about PERS and the context in which these perceptions took place (see Figure 4.2.)

I wrote extensive memos on focused codes to describe patterns that I saw in initial codes belonging to a focused code. These patterns described processes that I saw across participants but also highlighted variations between participants. Through the description of patterns, I was able to construct categories and describe their properties. In the following, I describe the construction of *reclaiming control*. The other categories were constructed through similar processes.

In a memo on *adjusting to changes*, I compared participants and saw that participants engaged in different types of actions: they adjusted daily routines, they prepared for potentially dangerous situations, and they sought help. Thus, memos helped me refine the patterns that emerged from the data. Further, I understood from the data that participants were reflecting on

their physical abilities and losses therein, and took action to adjust to changes based on these self-observations. That is, *adjusting to changes* required self-assessments (see Appendix 10). I also realized that the goal of these actions was to reclaim control over their lives. Therefore, I created a category *reclaiming control* that subsumed these self-observations and their reaction to them. I also identified variations in the ways in which participants observed themselves and the ways they reacted to them.

In many cases, I renamed focused codes to reflect the deeper insights I had gained through my analyses. For example, *adjusting to changes* first became *managing uncertainty* and then *minimizing risk.* I finally settled on the name *taking control* for a process that eventually became a subprocess of the category *reclaiming control*.

Memos also helped me see connections between categories and focused codes. A memo on the focused code *walking the balance beam,* which is a direct quote from a participant, was particularly impactful. The focused code included initial codes such as *not feeling ready for PERS* and *edging closer.* In the memo, I discussed that most non-subscribers were not ready to get a PERS and used their accounts to develop an understanding of why that was the case. I also noticed that subscribers also reported not feeling ready for some some time before they acquired the PERS. On the one hand, I realized that *Not feeling ready for PERS* codes described participants' processes of weighing different ways in which they thought about PERS. These ways pertained to the categories *reclaiming control* and *protecting personhood*. On the other hand, *edging closer* described participants' thoughts about PERS that changed over time. Through more memos and drawings, I got to the conclusion that *walking balance beam* was a process in itself, but that it was linked to the other categories *reclaiming control* and *protecting personhood*.

Moreover, memos helped me to identify gaps that required theoretical sampling. I performed theoretical sampling by asking questions about emerging themes in subsequent interviews. As mentioned in the previous section, participants frequently used phrases such as "I'm not ready" to describe where they saw themselves with regards to PERS. As I analyzed the interviews, I noticed that these phrases were a key element to understanding how participants thought about PERS. However, I did not have a good grasp of what these expressions meant. In subsequent interviews, I asked participants to explain to me what they meant when they used these phrases. Participants' explanations helped me gain deeper insights into their internal processes and refine the category *walking the balance beam*.

After 15 interviews, I felt that I had developed a comprehensive understanding of the processes relevant to the evaluation stage. The categories and subprocesses were well defined and covered the breadth of participants' experience. In other words, I had reached theoretical saturation. To make sure, I conducted three additional interviews. These conversations did not bring forward any new themes. Therefore, I concluded data collection.

In this section, I gave the reader a glimpse of my analytic process and the way I constructed the main categories for this dissertation. The result of the processes is a substantive theory that describes subscribers and non-subscribers' experiences when they considered and evaluated a PERS subscription. What follows is an exploration of the constructed model and its categories. I describe the processes within each category and illustrate them with participants' words.

### *3.2. Overview of Categories*

As explained above, this study focused on older adults' perceptions about and experiences with personal emergency response systems (PERS), especially the transition to

acquiring and using one. This section provides a brief overview of the major results that emerged from the analyses detailed in the previous section. It also outlines the remainder of the chapter, in which detailed study findings are presented.

In the interviews, non-subscribers and subscribers talked about PERS in the context of their own aging experiences. These women and men described the impacts of aging along two dimensions: physical and social psychological. In response to these impacts, participants devised strategies within each dimension to mitigate the consequences of getting older. In the context of aging-related changes, participants evaluated how the potential use of PERS would affect these efforts. They did so by imagining their interactions with PERS and by learning from other people's experiences with PERS.

Interviewees assigned meanings to personal alarm systems based on the extent to which PERS could support or thwart their efforts to cope with aging-related changes in the physical and social psychological dimensions. As participants contemplated a subscription to PERS services, they considered the consequences of this action for their physical safety and the way they saw themselves, which was informed by interactions with their social environment. In many cases, these meanings were at odds with each other. In particular, although PERS were seen as useful to mitigate the risk of bodily harm, participants saw PERS as a serious threat to their independence, the way they saw themselves, and the way they wanted others to see them.

Most participants struggled to reconcile divergent meanings that arose from their interpretations of the impact of personal alarms systems. The struggles emerged from interviews with non-subscribers, who were grappling with these meanings during the interview, and subscribers, who also reported dealing with contradicting meanings before getting the PERS. Both, non-subscribers used phrases like "I'm not ready yet," "I'm not there yet," or "It's not

time" to describe where they saw themselves regarding a subscription to a PERS. Subscribers used similar phrases, but in past tense. These statements suggest that participants had not entirely settled the conflict between the meanings of PERS and, thus, postponed their decision. These statements also indicate that interviewees anticipated they would get a PERS subscription at some point in the future. However, they were not able to specify when, or how they would arrive at that point. Some participants engaged in a process through which they seemed to be getting closer to making the decision to subscribe to a PERS.

For some, this progression towards the PERS was driven by a fear of harm that resulted from direct experience, such as falls, or from indirect vicarious experience, such as falls that occurred to others. Pressure from family and friends was an important force, as participants realized that they were not they only stakeholders in the decision regarding PERS and that others perceived them as needing this service. Some arrived at an active decision to subscribe to a PERS, whereas others passively wound up with a PERS when a family member decided on their behalf.

Figure 4.3. illustrates a model that captures the experiences described above. Participants' experiences can be categorized into three distinct yet related processes: *reclaiming control*, *protecting personhood*, and *walking the balance beam*. *Reclaiming control* and *protecting personhood* illustrate how subscribers and non-subscribers dealt with aging-related changes and provide contexts in which participants assessed and evaluated PERS. The results of these evaluations provided the input for *walking the balance beam,* which represents the process of grappling with conflicting meanings of PERS.

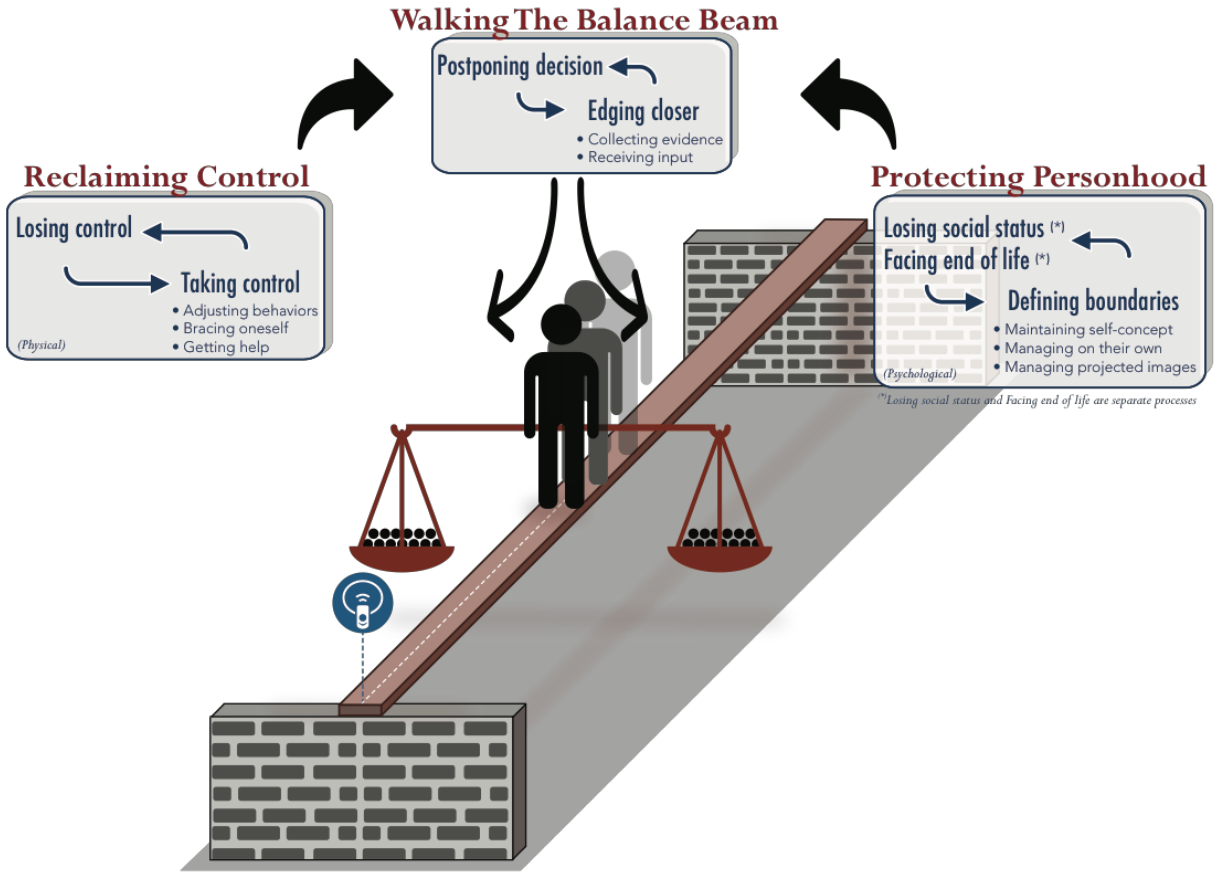



**Figure 4.3 Conceptual Model of Pre-subscription Process**

*Reclaiming control* encompasses participants' descriptions of physical changes they had been experiencing, such as loss of energy, decrease in balance, and disease diagnoses. Through these changes, the interviewees often lost at least some control over their physical bodies. They also reported living in a state of uncertainty of how such changes would impact them in the future.

To minimize the risks associated with the uncertainty of physical changes, individuals sought to take control by finding ways to prevent dangerous situations and to prepare for the eventuality of both gradual or abrupt changes or declines. In this context, individuals evaluated how personal alarm systems could help them minimize the level of risk with which they lived. They also assessed the extent to which they would be able to integrate a PERS into their daily activities.

In addition to aging-related biological changes, participants also experienced shifts in their roles in their families as they lost status associated with being a parent. The loss of their status within the family came hand in hand with a loss of power over their ability to make their own decisions. These shifts were compounded by the physical changes. Many participants felt that their family members saw them as less able because of physical limitations.

Furthermore, subscribers and non-subscribers conveyed that their role in society as a whole had changed over time. They faced normative expectations that aimed to put limitations on their ability to engage in their daily activities, hobbies, and interactions with others. In an effort to protect their personhood, participants considered how the adoption of PERS would impact their self-concept and the values that were integral to their sense of self, such as independence.

In many cases, the meanings participants assigned to PERS as part of *reclaiming control* and *protecting personhood* were in opposition to each other. Most participants thought that PERS would be useful to take control and minimize the risk of bodily harm. At the same time, they saw it as a threat to their personhood that would force them to give up the concept of being young or at least not old.

*Walking the balance beam* represents the process in which participants weighed divergent meanings of PERS and sought to resolve this internal conflict. As a result, many participants did not feel ready to subscribe to a PERS and postponed the decision, although they expected that sooner or later they would end up with a personal alarm system in their homes. At the same time, non-subscribers at the evaluation stage and subscribers seemed to progress towards PERS by gathering more evidence of the benefits of PERS. Prompts from family and friends presented a source of pressure trying to sway them towards PERS subscription.

The analysis of subscribers showed that some of them had delayed the decision until the threat of serious injury superseded the threat that the PERS posed to their self-concept. Several persons delegated the responsibility for this decision to family and friends. Among those who had subscribed, three participants initiated the subscription of PERS, signifying that they were able to finish the process of *walking the balance beam* on their own terms. For four participants, this process was terminated prematurely when family members made the decision to get a PERS on behalf of the parent. Overall, subscribers reported having positive experiences with the PERS and reported feeling more secure than before. However, one participant reported lingering sadness because she had had to admit to herself that she needed the PERS.

This introduction provided a summary of the most important results of this study. The goal of the remaining part of this chapter is an in-depth examination of the presented categories.

I illustrate how common themes emerged from participants' stories while also pointing out key differences between individuals. Section 3.3 presents a discussion of *minimizing risk*, followed by *protecting personhood* in section 3.4. Finally, section 3.5. examines the core category *walking the balance beam*.

## *3.3. Reclaiming Control*

In this section, I discuss in detail participants' perspectives on PERS in the context of biological changes and losses in physical abilities and illustrate these perspectives with participants' words. The physical and biological changes often resulted in a loss of control over their bodies and an increase in uncertainty with regards to future changes and potential harm.

However, the interviewees were not passive recipients of these changes. They took active control of their situation to prepare for and react to changes; likewise, they sought to avoid and mitigate potentially dangerous situations. In following, I address the changes participants experienced, followed by a section on strategies they applied to mitigate uncertainty about themselves in the future. I conclude this section with a discussion of how participants evaluated PERS in the context of increasing risk and their efforts to minimize it.

### *3.3.1. Losing control*

All participants reported noticing changes in their physical abilities, mostly in the form of reduced abilities or increased morbidity, and reflected on risks associated with these changes. With increasing age, many participants reported having more balance issues, having lower energy levels, or being diagnosed with conditions such as arthritis, glaucoma, or diabetes. Six participants had also experienced one or more falls in the past.

As participants reflected on their present physical state and imagined themselves further down the road, they saw a future marked by increasing uncertainty with regards to their physical

capabilities and the potential need for more help and support. This increase in uncertainty was associated with a loss of control and an increased risk for injury and harm. Participants saw losses they had experienced in the recent past as an indication for future losses. However, it was uncertain if, when, and what type of losses would impact them. The women and men in this study worried about falls, loss of mobility, and, among those who were using their own car, loss of the ability to drive. They also reflected on how such developments would impact daily routines and their ability to live in their homes. Isa (NS) expressed her sense of uncertainty through her hope to continue to engage in her daily routines.

> You're always doing something. And, this way you're just by yourself. You just come and go and do your daily routine. You hope.

Some participants felt that their medical condition increased the risk of falls and because of that felt great uncertainty when engaging in activities. Peter (S) was worried that the numbness in his feet caused by diabetic nerve damage put him at risk for a fall. He stated:

> When I go out with [my son], we go for a ride, or to the store. It usually happens when you least expect it, you know? You fall down, and boom, and.. My legs are.. I don't know, I have neuropathy, I have diabetes and it's.. It feels.. not too stable, you know?

Participants also shared that they anticipated further decline or accidents. For example, Blue (S) saw losses as inevitable because "the body has to disintegrate." For her, the question was not *whether* she would fall again, but rather *when* she would experience another one. After three falls, Blue had accepted that she would continue to experience falls:

> But I didn't know I was going to be falling all over the place. And once I started, it seems like I can't stop and that's why I feel sure it's going to happen again.

Laura (NS), on the other hand, felt that she had her arthritis under control. Nevertheless, she was aware that she will likely experience a decline at some point.

> But I've had it under control, medically, very well. It takes its toll over time. But I could see, and people say, "Well, you know, people with rheumatoid arthritis can end up in a wheelchair, and they can't move," and this kind of thing, and I go, "That's true, but I am very grateful that hasn't happened to me yet."

As Laura's statement illustrates, she partially derived her knowledge about future developments from her own experience with arthritis over the past 14 years. In addition, she also received information from others as to how her condition could affect her in the future. At the same time, she also suggested that she does not have full control over the progression of her condition, indicated by her being "grateful."

*3.1.2. Taking control*

Participants genereally did not passively accept that they were losing control over their bodies. Instead, they found ways to mitigate the increased risk of injury and harm. They devised strategies to take active control of their lives and to protect their physical safety. These strategies had two properties: the goal of the strategy and the target. The goals of the strategies differed in that some of them aimed at preventing adverse events whereas others meant to prepare the participant for adverse events. The target of the strategy refers to whether the strategy addressed their behaviors (routines), their bodies, or the reliance on external help.

In this section, I describe three types of strategies that individuals used to take control and manage their risk: *adjusting risky behaviors*, *bracing oneself*, and *getting help*. Within these types, I provide examples for strategies aimed to prevent adverse events and to prepare for adverse events and then relate these to PERS. Importantly, not all participants applied all

strategies, although most used a combination of strategies. That is, the descriptions illustrate the range of strategies that interviewees reported.

*Adjusting risky behaviors*

The strategies grouped under *adjusting risky behaviors* pertain to participants' actions to modify behaviors that could put them at risk of injury. As participants engaged in ongoing self-observation, all of them identified behaviors that posed a risk for adverse events, such as falls or injury. Individuals identified risky situations and behaviors in two ways: by analyzing past experience, or by anticipating how changes in their physical abilities could impact their daily routines. Once a person identified a risky behavior, they looked for ways to modify it or its consequences. Participants mostly talked about behaviors that were part of their daily routines, but some also mentioned other activities, such as hobbies. Examples for both types will be provided throughout this section. Adjustments of daily routines typically entailed modifying behaviors within existing routines, or adding or removing a behavior to make the routine safer. In some cases, adding a new behavior involved the introduction of a tool or device.

Bonnie (S) describes how she modified several of her routines to prevent injuries. In the first example, she added a stool to ensure a safe getting-in-and-out-of-bed routine.

> I have a bed that's high, so I have a little stool. I step on the stool, and then the other foot, and then get into bed. I'm able to do that in the morning. I can't get up like this, like you. I have to turn around with my elbow.

Other examples are environmental modifications such as the installation of hand rails, bathtub mats, and lights to prevent safety issues. Blue (S), for example, installed lights in her bedroom that illuminate the room at night. The light improves visibility and decreases the risk of tripping in case she has to get up at night.

In addition to modifying her bed routine, Bonnie (S) also made adjustments to her morning routine. In the following example, she did not introduce a new tool or device to her routine but added new steps to make it more manageable.

> When I make coffee in the morning, you know, my little trips on the whole bit. If I have to make three trips, I do it because I like to sometimes watch a program that I want in the morning, so I bring my coffee over here, and I put it here. Then I go into the kitchen and get my muffin or whatever I have and I bring it. I don't try to bring two things at a time, because what if you lose the grip?

Laura (NS) and Jessica (NS) provide additional examples of this type of adjustment. They waited to get up until the side effects of their medications pass to avoid the risk of falling. They got up only when they feel that they can move around safely.

Lilly (S) and Laura (NS) reported that they refrained from certain behaviors that could get them into risky situations. Lilly (S) mentioned that she does not go down on the floor because she would not be able to get back up. Similarly, Laura (NS) stated that she does not "get up on anything". She says:

> Not a step stool. Not a ladder. Not anything. Just made a rule, I don't do that. It's because of the arthritis in my knees.

*Bracing oneself*

Nine individuals in this study reported (n=9) taking proactive steps to maintain and strengthen their physical abilities to prevent potentially harmful situations or to deal with emergency situations.

Five participants attended "A Matter of Balance" classes, an intervention program that teaches coping strategies to reduce the risk of falling as well as the fear of falling. During my

visit of a "Matter of Balance" class at the Westchester YMCA, I observed that attendees learn to control the way their fall. Individuals' participation likely indicates that tend to be aware of the risk for falling and want to take control of it to the extent possible.

Two participants went to physical therapy to deal with physical limitations they were experiencing. Lilly (S), for example, used physical therapy to improve her walking. Likewise, Laura (NS) attended physical therapy to ameliorate her arthritis. She also reported going to the doctor for regular check-up to keep her arthritis under control.

Two participants took exercise classes to develop and maintain strength and agility. Some of the exercise classes were geared towards building strength and agility to support the ability to get up after a fall. Sandra (NS) and Maria (NS) attended a class that, aside from general physical activity, also focused on "strengthen[ing] our core so we can get up" (Maria). Others also engaged in exercise outside of structured classes. Laura (NS), for example, continues to go to her physical therapy place after treatment ended to use the available exercise equipment on her own.

*Getting help*

All participants relied on some of form of external help when they deemed the strategies mentioned above were insufficient to deal with changes in their physical abilities. Typically, this approach pertained to more severe or longer-lasting changes in their physical abilities. Lilly (S) discussed how she had to learn "helplessness" in situations she cannot fully handle herself. She stated:

> I have learned helplessness. If I get down on the floor, I can't get back up. I don't do things like that, period. I had to wait until somebody came over and did it for me.

In cases as the one that Lilly described, participants sought help and support from friends and family and also used services and assistive devices. In the following, I report on strategies to get help in more detail.

*Family and friends.* Fifteen participants relied on their family members and friends for help with critical tasks. Isa (NS), Rose (S), Peter (S), and Blue (S) relied on family members to drive them to events, to do shopping, or to engage in other activities. Bonnie (S) had an extensive network of friends to call upon in case she needed help. She recounted the day her cane fell behind the refrigerator:

> One day I was walking with a cane, and I dropped it, and it went behind the refrigerator. I couldn't get it out. It was stuck. The handle was stuck in the back. I said, I'm going to call Frank, my friend over here. I said, see if he's home. He said, "Yes, [Bonnie]?" I said, "I lost my cane. Could you come and…" It was real simple. He just kneeled down, lifted it up, and got it. "Be careful. Don't do that again, [Bonnie]." That's what he did.

Peter (S) shares a household with his wife and his son and frequently receives help from his son for daily activities. When I arrived to the interview, Peter's son excused himself to help his father get ready and dressed for the interview. During the interview, Peter (S) asked his son for water which he brought from the kitchen.

Obviously, the reliance on family members and friends required a certain level of proximity and availability. As an example of the limits, Violet (S) stated that her children lived close, but were not available often because of their busy jobs. Lilly (S) reported that her sons live across the country and were not readily available to provide support in everyday activities.

*Services.* Twelve of the 18 participants had given up driving. To make up for the loss of transportation, most individuals used various services including ride share services, such as GoGoGrandparent, Lyft, or Uber; local transportation services like Dial-A-Ride, a curb-to-curb transportation service in Santa Monica; or services offered by not-for-profit organizations such as Westside Pacific Villages. Ride share services were limited to those individuals who used a smartphone or knew about GoGoGrandparent, which allows users to call Lyft or Uber without a smartphone. Despite having various options, participants noted that these services had limited flexibility and, therefore, did not constitute a perfect replacement for their own driving. For example, Violet (S) limits her ride requests to Westside Pacific Villages because she knows that the organization has limited capacity to provide rides. Lilly (S) notes that her dependence on the transportation services of a local senior center meant that she spends a lot of time waiting for her ride. Other services that participants reported included cleaning services, meal delivery, and home health services.

As mentioned in the section on *losing control*, participants also pictured themselves in the future. Thus, a person could also think about future services that they may need. When Laura talked about the toll arthritis took on her, she also shared that she was "investigating" care services. She says:

> […] I've investigated things like having a live-in caregiver. I could do that in my house, and things that could happen, and so this goes into the could-happen [bucket].

The quote demonstrates that Laura thought about her condition in the future and took action to be prepared when she needed more help to deal with the condition.

*Assistive devices.* Participants also got help by using technology in the broader sense. PERS falls under this category as well. As described previously, PERS serve as a tool that is

available in case an emergency situation occurs. Indeed, Blue (S), Carey (S), Violet (S), Rose (S), and Georgia (S) reported using the alarm service in various situations. Blue and Rose used it when they fell in her home and were not able to get up by themselves—its most obvious use. In Rose's case, her daughter was present but could not help her mother get up. Violet and Georgia pressed the button when they felt unwell: Georgia was diagnosed with a stroke and Violet was experiencing dizziness. Carey used it when she thought that someone was breaking into her house, which is an example of unintended use.

Eleven interviewees also used other assistive devices, such as canes, walkers, or wheelchairs. When Isa (NS) started feeling weak, she decided to start using her walker:

> I'm very unsteady at times. On my feet. And, so I use the walker. I used a cane for a long time. And then I got to the point where I got real shaky. Very shaky. And I go through that periodically now. So, I just sit on the walker.

While some participants used the devices consistently, others turned to their devices when they felt weak or wobbly or in situations when they perceived themselves to be at high risk of injury.

Although interviewees took control using various strategies, they continued to test their capabilities as a way to assess the level of uncertainty and the need for further adjustments. Blue (S) described how she sometimes deviates from her routine use of a walker or a cane and walks around without any assistive devices:

> And usually when I come in, I wheel around with my wheelchair, because it's easier to get around than it is with a cane. And then again, I walk off without my cane many times. […] I don't do it very often, but I can. And then one day I came down the stairs from upstairs and I came down without my cane and I can't believe I did that because it's hard to get down.

However, participants were cautious to not expose themselves to too much risk. After having cataract surgery and experiencing an improvement in her arthritic knees, Laura (NS) does "what I can on a gradual way so that I don't trigger that kind of thing."

### *3.1.3. Evaluating PERS in the context of reclaiming control*

In this section, I describe how participants evaluated PERS in the context of losing control and taking it back. Given the strategies they had at their disposal, interviewees assessed how PERS would increase or impede their ability to reclaim the control over their physical abilities they had lost because of aging-related decline. In evaluating PERS in the context of *reclaiming control*, individuals deliberated the impact of PERS on their lives and the integration of PERS into their lives. Participants' statements mostly revolved around anticipated impacts of PERS. However, factors pertaining to the integration of PERS seemed to play a secondary role. In the following, I describe participants views on PERS in more detail.

#### *Impacts of PERS*

When talking about the impacts of PERS, participants discussed what it would be like to have such personal alarm systems in general. That is, they addressed the concept of having such a system in their lives, rather than considering a specific instance, i.e. a specific brand or model, of a PERS.

Overall, non-subscribers and subscribers—before they got the PERS—acknowledged the value that a PERS brings to safety and security. While they would not be able to prevent falls and other emergency situations entirely, the personal alarm would give them the ability to control what happened in such a case. Participants came to the conclusion in two ways: vicarious experiences of others who benefitted or could have benefitted from PERS and imagined experiences of situations where a PERS could be useful.

Almost all participants (n=15) shared stories of somebody who had been in a situation where they either used a PERS or suffered a negative outcome because they were not able to notify somebody in an emergency situation. These vicarious experiences made evident the benefits of PERS. Violet for example knew that PERS was valuable, because "I knew other people who had [PERS]. Well, one woman said that she had to use the [PERS]. And it saved her life, she said. So I knew."

Participants were also able to imagine themselves in an emergency situation in which a PERS would play a beneficial role. That is, they were aware that even if they had not been in an emergency situation they could not get out of by themselves, they could easily find themselves in such a scenario. For example, Jessica had experienced a few minor falls. Although she had never hurt herself during these falls and was able to get up by herself, she was able to imagine falling and sustaining a serious injury, like a broken hip. She explained why she had started to look into personal alarm systems:

> I did that, because at that time I was living by myself and I had fallen a couple times. Tripping over things and being clumsy. I thought what would happen if I really hurt myself and I couldn't get any help because you know I was by myself. So I thought maybe I better think about getting something, 'cause it scared me when I fell.

In almost all interviews, participants used both vicarious and imagined experience to establish the value PERS could have for them. They used other people's experiences and applied them to their own imagined experiences. Thereby, they were able to imagine how they would benefit from the alarm. In my conversation with Maria (NS) and Sandra (NS), Maria shared a story about another friend who lived with her son:

> He couldn't hear her. Here it was a cold night, and she's in a nightgown. She's lying on the floor until he wakes up and comes into the house the next morning and wonders where she is. That is really not the way I want to spend the night.

This quote illustrates how Maria imagined herself in a similar situation after recounting her friends experience.

*Integration of PERS*

Interviewees also evaluated how the personal alarm device would fit into their daily routines in order to maximize their level of control. In this case, participants took into consideration specific design aspects of the PERS device and service.

With regards to the fit of PERS in their daily lives, participants evaluated various features of the PERS. These features pertained to the design of the device itself as well as the PERS service, as for example regarding who would be contacted in response to the emergency. Several participants thought about the practicality and usability of the PERS device. These considerations were more apparent among participants who had not decided whether to get a PERS, potentially because they were currently thinking about getting a PERS, whereas subscribers were remembering past perceptions.

Patricia (NS) and Laura (NS) were both worried about the practicality of a personal alarm around the neck and wondered whether it would interfere with their daily routines, such as doing the dishes. Patricia also thought it would be uncomfortable. With regards to the service (rather than the device), Karen (NS) did not like the thought of being taken to the hospital because the PERS service would immediately notify 911. In contrast, Jessica (NS) was worried that the service would not call 911 right away.

Financial considerations played a role for a few participants (n=4). Karen (NS), Sandra (NS), and Peter (S) mentioned that they were not able to afford it, or did not want to enter another financial commitment. Laura (NS) was also concerned about the cost until she found out that she had overestimated the monthly fee for the PERS service.

Some participants (n=3) also anticipated issues with their ability to incorporate another daily routine into their already busy schedule. For example, Sandra already had her hands full with numerous doctor's appointments and dreaded having another thing to think about:

> I need new glasses. I've got big dental problems. I don't feel well. I have lupus. I think that pulls me down a lot of times. I get depressed. I get very depressed. I'm not looking for another commitment.

*Summary*

Participants evaluated personal alarms in terms of how personal alarms added value to their existing strategies to reclaim control over their abilities and how it could help them to increase their sense of safety. Individuals also assessed other characteristics of personal alarm services: practicality, financial cost, and ease of integration into daily life.

For the most part, participants saw PERS as a useful tool to reclaim some of the control they had lost with the changes in their physical abilities. However, individuals voiced concerns about financial commitments and the practicality of the devices. The fact that interviewees talked less about characteristics of PERS and more about anticipated impacts suggests that design features of PERS play a secondary role.

This summary concludes the discussion of how participants thought about PERS in the physical dimension in the context of aiming to reclaim control. In the next section, I delve into participants' views on PERS as they relate to their self-concept.

### *3.4. Protecting Personhood*

In the previous section, I discussed that participants evaluated PERS in the context of reclaiming control over physical changes to ensure their safety and security. Simultaneously, participants also talked about the psychological aspect of getting a personal alarm. Lilly (S) said:

> There's a certain psychological part to needing [PERS]. I've always worn glasses. There's nothing psychological about the glasses.

Lilly's quote reflects a common theme across all interviews: the attachment of social psychological meanings to personal alarm services. The interviews indicate that these meanings arise through participants' interpretations of personal alarms in the context of social-psychological impacts of the aging process. In the first part of this section, I describe participants' experiences that shed light on the social psychological impacts of aging. The second part is dedicated to participants' strategies to cope with and minimize these impacts. It is also in the second part that I delve into how participants saw the personal alarm in these contexts.

#### *3.4.1. Losing social status*

Many participants (n=14) reported noticing changes in the way others, such as family members or members of the general public, behaved towards them. Not all participants addressed this topic directly, but many shared experiences that reflected these kinds of behaviors. These behaviors ranged from other people's reactions in everyday situations, such as younger people opening doors for participants or ignoring the participant in conversations, to situations, in which children made decisions on behalf of their parents or pressured parents to do things. In the following, I delve into the spheres in which participants indicated losing status. The first sphere is interactions with members of society at large. The second sphere pertains to the smaller context of the family.

*Losing status in society*

Several participants recounted interactions with people that they did not know who treated them differently seemingly because of their age. Participants did not necessarily interpret these behaviors in a negative way. At the same time, they also did not always understand or a agree with them either. For example, Maria (NS) shared an experience that she had in common with Jessica (NS), Sandra (NS), Carey (S), and Violet (S):

> "You know what I really love about my age now? I think this is so cute. I'm walking down the street, and I come up to the door to walk into the building, where a doctor's office is, of course and some man on the other side is coming out. He opens the door for me and has this warm smile, because I look like a little old grandmother. I know that's why! That's funny! That is really funny!"

This quote illustrates an interesting point: although Maria "loves" being treated that way, she also thought that it is funny. She attributed the man's behavior to the image she projects to him as "a little old grandmother." This phrase suggests that Maria perceived the man's behavior as somewhat belittling. She does not not agree with that image, which is why she finds it "funny", but also has little control over the images that others have of her. However, she would rather be seen as "a little old grandmother" than on "old grumpy [woman]," as she clarifies later on in the interview. That is, Maria was well aware of prevalent perceptions of older adults. Because of the limited extent of control of her image, she appreciated of the fact that the man assigned to her the image that she preferred — "little old grandmother." In addition, she aims to see the positive in the situation and enjoys the benefits of being helped.

While Maria was given special attention because of her age, Rose provides an example of how she was overlooked or ignored in a conversation. After falling and breaking her clavicle, a paramedic reacts to her use of a medical term:

> And it was funny because the paramedic said, "What was the problem?" And I said, "Well, I hurt my clavicle and I couldn't put pressure to get up, and she couldn't get me up because of the pain." So he doesn't talk to me. He turns to my daughter and says, "Does she have some medical knowledge? Because everybody would say "collar bone" and she said "clavicle"." And my daughter says, "Yeah, she was a nurse." So he said, "Oh." (Rose laughs) But anyhow. So he said, "Well, if we take her in the ambulance, it's going to cost. Can you take her to emergency? We'll get her in the car." She said, "Fine."

The quote demonstrates two behaviors that are indicators of Rose's loss of status. First, the paramedic does not reciprocate when Rose explains the chain of events. Instead, he turns to the daughter to continue the conversation. Second, he does not address Rose directly when it came to the decision about transportation to the hospital. That is, decisions were made on Rose's behalf.

*Losing status in the family*

In the familial context, many participants (n=14) experienced changes the form of realignments of the parent-child relationship. Three participants described this change as "reversing roles." Even when participants did not explicitly mention a "reversal" of roles, their stories displayed these dynamics, which manifested in a shift of interpersonal power towards the children. The interviewees in this study described how their children started to make decisions on their behalf and told them what to do and what not to do. Blue (S) was one of the participants who explicitly mentioned the switching of roles:

> "[My daughter is] my mother now. We've reversed roles. She takes good care of me though. She's retiring the end of this month. And I asked her, "What are you going to do?" Not like me. I'm in the seniors and the women's club right away. I did that. And she's not into that

> kind of thing. She says, "Take care of you. That's what I'll do." I don't know. […] I asked my son one time. I said, "When did that happen?" He says, "Mom, that's been a long time ago." She just takes over. […] Well, me and everything. She's a little bossy."

These changes in power seemed to have originated from participants' increased dependence on their children. Almost all participants were grateful to their children and acknowledged that their children provide crucial support in their daily lives. As mentioned in the previous section, participants received support for instrumental activities of daily living such as shopping, managing transportation, home maintenance, and, in some cases, technology setup and maintenance (e.g. computers). However, this partial dependence implicitly pressured participants to acquiesce to their children's actions, even when they did not agree.

However, not all participants experienced this role reversal to the same extent. It was particularly evident when participants had children living close by and being more involved in day-to-day activities. Participants tended to experience a low level of involvement when their children lived further away. For example, Blue (S) says how her son "lives just far enough way, just down in […] that he's just not around here a lot." Through a low level of children's involvement, participants were able to maintain more power and independence.

The relationship between Isa (NS) and her daughter Frances is an exception. Although Frances lives on the other side of the country, Isa receives a lot of input from her daughter. While this is to a large extent explained by Frances' personality, this could be partially attributed to the fact that Frances works in the field of home care and, thus, takes the role and status of an expert with regards to Isa's needs. Despite the distance between her and her daughter, Isa describes her daughter the following way:

> "My daughter is very persuasive. (laughs) And if she had her way, everything would be going her way and I'd have this and I'd have that. And I'd be doing this and I'd be doing that."

As the discussion above indicates, many of the changes in behaviors towards older adults can be attributed to preconceptions of older adults, or, as Laura calls them, "erroneous assumptions." These assumptions are compounded by physical limitations. Some participants reported that family members sometimes saw them as incapable and in need of help. Bonnie, for example, states: "[My daughter] thinks that I'm not capable of a lot of things, that I need help."

As adults transition to "older" adults, they also experience a decrease in status, which is characterized by a loss of control over how others see them as well as a devaluation of their input. These dynamics give rise to specific age norms—expectations and sanctions that prescribe appropriate behavior for older adults. Laura (NS) describes how she faces normative pressure from her family as well as outsiders to behave in certain ways or abstain from behaviors that are seen as age-inappropriate:

> And you should slow down, and you shouldn't do this and you shouldn't do that. Well, you might get hurt. And so, people, again, in deference to that would fill a role that older people were supposed to fill, even the way they dressed. You know? So I'm just saying that it is a different era, but the culture hasn't caught up with that yet.

Laura's statement also conveys that warnings such as "you might get hurt" implicitly instill a fear of injury and place behavioral restrictions on older adults. Laura says:

> However, if I listen to them I might be home all the time. They don't think I should do a lot of the things I do. Well, what do I do? Go to the symphony orchestras and listen to the play, go to the music center, go to the movies? […]

From the emotional and social perspectives, aging is a process that is characterized by a dynamic push-and-pull between society's expectations of older adults to "slow down" on the one hand and older adults' wishes to live their lives on their own terms on the other hand. The interviews show that participants are not naive about aging and how it affects them. At the same time, through the changes in social dynamics they see their status and their agency as a full member of society at risk.

Laura (NS) argued that despite the physical changes and limitations, older adults have the right to make their own decisions without being punished for it, particularly in the family setting. She refers to this right as "personhood" and describes the concept like this:

> But for the present, I think it's important not to make assumptions out of either undo concern or just not wanting to be bothered with it later, or whatever. The person needs to be making for themselves, if you can do it in cooperation together, I think that's really important. But if you can't… if you have a difference of opinion where that line is, then I think that seniors need to be honored and their personhood needs to be honored without turning your back and saying, "You do what you have to do, but you know I'm the one that's going to have to live with it when it happens," and all this kind of … It needs some warmth in there.

That is, Laura claims that older adults have the right to do what they think is best for them, even if their children do not agree.

*3.4.1. Facing end of life*

In the interviews, participants frequently referenced the end of life. Every participant reported having lost important social connections. Thirteen participants were widowed and three individuals were divorced. Many had also experienced the deaths of their friends. As a result of

the loss of important social connections, some participants reported feeling lonely. Carey (S) reported having lost most of her friends.

> I felt so lonely because all my friends are dying, and I don't have any close friends except the one. They've all gone. I'm here by myself.

Lilly (S) shared this sentiment. Although she was active as a volunteer and had many friends in the organization, she felt lonely in her aging experience. She wished she had somebody to guide her through the aging journey. She is almost the oldest in her social group and, hence, does not have anybody who truly understands her aging experience, or who could give her advice on how to deal with aging-related changes. Towards the end of the interview, Lilly (S) reveals that she is open to other people seeking her advice and wants to provide support that she has not had.

While others were not as direct in talking about their death, Blue and Carey, both PERS subscribers, seemed to have accepted their mortality. Blue states:

> I don't really care to live any longer. I mean I have a great family, I've had a good life. And it's only downhill from here. That's the way I look at it. It has to be. The body has to disintegrate.

Much of the focus in this dissertation on negative physical and psychological impacts of aging can be attributed to the fact that PERS is designed to mitigate losses. At this point, these impacts did not mean that individuals had given up on life or that they had did not enjoy living. Overall, participants led very active lives. Laura (NS) sees herself in her "golden years" where she had the time, the money, and the opportunity to play bridge, to learn to play the piano, to go to the theater, and many other activities. Similarly, Carey (S) enjoys spending time with her friends, playing bridge, and doing exercise in the water. Patricia and Robert (both NS) love

spending time together and see each other every day. Blue (S) goes shopping, her favorite hobby, as much as she can. Rose (S), Karen (NS), and Lilly (S) are very active as volunteers.

*3.4.3. Defining boundaries*

As described above, the individuals in this sample reported that aging posed significant threats to their social status and their agency. However, participants did not passively accept the infringement of their personhood and found ways to establish boundaries to protect their status and sense of agency as much as possible. In the following section, I describe three ways in which participants sought to protect their personhood. I also elucidate the role of PERS and the ways participants saw it as interfering or supporting their goals.

*Maintaining self-concept*

Participants aimed to protect their personhood by holding on to their self-concept of being relatively young and independent. The interview with Lilly (S) illustrated this tendency very well and made some of the notions explicit that had been implicitly mentioned by other participants. I asked Lilly how she felt, when her friend suggested getting a PERS. Her answer:

> "Oh no. I can't be bothered with that. I'm fine." Not wanting to admit how old I am becoming.

Lilly goes on to to state that her reluctance is not limited to PERS and extends to walkers and canes. This indicates that the refusal to accept and adopt a PERS is not specifically about the device per se but about a broader desire to maintain a youthful self-concept. Needing a PERS was associated with "old," whereas "young" was associated with not needing it (see quote below). Maria (NS) explains that it is "your attitude towards how old you are" that determines one's readiness for PERS, rather than your numerical age.

Participants described how PERS interfered with maintaining their self-concept. Several interviewees (n=12) saw PERS as a marker for old age, for being "on the downward side of life"

(Maria). Accepting being on the downward side of life also meant accepting physical decline and mortality. There was wide variation in how participants saw themselves in relation to personal alarms. Lilly (S), for example, emphasized her will to be alive and the message she received from the PERS about her current status:

> "I want to continue to be alive and vital and busy and active and aware and alive. That's just a little indication that I'm not so good."

That is, Lilly saw the personal alarm as a symbol or signpost for a journey towards to the opposite of what she wanted: inactivity, disengagement, and death.

In addition, several participants (n=5) saw PERS as a threat to their independence. Isa whose daughter had been mentioning PERS for several years felt that having a PERS would create a reporting or supervisory relationship with others, stripping her of her sense of independence.

> *Isa*: You feel like your independence is gone (laughs). I think.
>
> *Lena*: How do you feel your independence would be gone?
>
> Isa: You have to report to everybody or they have to check with you.

Having to report to "everybody," Isa feared, would interfere with her ability to go and do whatever she wanted.

This excerpt also shows the impact of vicarious experience on shaping perceptions about PERS. Isa's understanding of PERS is based on her father's experience who had to check in with his PERS service provider on a daily basis.

Independence was seen as an integral part of the sense of self. Maria even described it as a fundamental human trait:

> "You realize a baby is born, and he fights from the minute of birth to be independent. Did you ever see a baby fail to walk or roll over or sit

> up? They're fighting from the minute they take the first breath to be independent, to be on their own, to move as they please, to go where they want. That's what makes us human."

From this perspective, the PERS not only threatened to take away participants' independence in terms of daily activities, but also to strip away a part of their humanity. One participant, Karen (NS) thought that the personal alarm would actually support the user's independence. She said:

> And I do believe in being independent, and I do live alone. So in a case like that, I think it adds to your being independent because you know that there's help there if you need it.

For two individuals, the aesthetics of PERS played a big role. Both Blue (S) and Laura (NS) valued their appearance and had concerns about the look of the personal alarm device. They wanted something that went with their clothing style and that was "fun to wear" (Laura.) Thus, Blue and Laura saw PERS as interfering with their self-expression

*Managing on their own*

Managing on their own was very important to many participants, subscribers and non-subscribers alike. Bonnie (S) was proud of her ability to manage by herself and stated that as a reason why she did not feel ready for a PERS. She felt that she could manage her uncertainty and minimize it by adjusting her daily routines and planning ahead to avoid the risk of accidents.

However, managing on their own did not mean that participants did not accept help, as was also outlined in the previous section. Rather, participants saw as part of managing on their own the ability to determine whether help was needed and to choose the type of support. Thus, strategies, such as adjusting routines and bracing oneself, served to take control and mitigate uncertainty on the one hand, and allowed participants to maintain their personhood on the other hand.

Bonnie, for example, has a vast network of helpers at her disposal which she falls back on when she needs help. I asked her whether she had been in a situation where she could have used her PERS, to which she answered:

> No, because in a situation like I had with the cane [the cane had fallen behind the fridge], I called [my neighbor]. Say for instance, if I want to mail out, or anything like that, you know, I call them for little things like that.

*Managing self-projected images towards others*

Participants did not only aim to maintain a youthful self-concept, they also sought to manage the image they projected to the outside world. As described in the previous section, participants faced preconceived notions of older adults that devalued their wishes and contributions.

In an effort to not be "written off," participants had to manage the way others perceive them, to the extent possible. For example, although Lilly (S) had admitted to herself that she needed a PERS, she did not share this realization with others. Laura (NS) sees herself in her golden years and takes advantage of the time she has now. Importantly, participants were not naive about their abilities and were well aware of potential risks, such as falling. Lilly, for example, admitted in the interview that she had troubles walking and could benefit from a walker.

> However, privately, between you and me, I'm not doing so good in the walking department, which is why I'm going back to physical therapy. […] I'm very aware that a walker would be helpful to me, but I'm really trying not to get one. It'll seal the deal, "Yes, she's so old she uses a walker"

In this context, PERS was seen as potentially making weaknesses visible to other people and, thereby, exposing them to other people's judgments. For example, Emily (NS) saw the PERS user as someone who is "a much older person who is less capable than I am" and also implied that identifying somebody as being a candidate for a PERS is "judgmental." Robert (NS) also reflected on the image the PERS could paint of its user:

> Except I get the feeling that if you wore one, doesn't it indicate that you're a little bit off balance or slightly lowered or something, psychologically? […] Yeah, indicates that you have a weakness or something. […] You have a flaw in yourself, right. Certain people might not take it generally nice. Most people wouldn't care, other people might think down of you, a little bit.

The quote illustrates two important points. First, Robert perceives that PERS can be an indicator of weakness for others. Second, and more importantly, he thinks some people might judge the PERS user and treat them differently. Thus, Robert thinks that wearing a PERS can be risky as it can lead to a loss of status and result in negative consequences for the user.

Maria (NS) conveyed a similar message when referencing a scene from the TV show *Grace & Frankie*. In the scene, the protagonist, an older woman called Frankie, accidentally activates her PERS and struggles to turn off the the speaker through which the PERS responder asks: "Shall I call 911?" All this happens while she is in a business meeting to negotiate funding for her company. Maria brought up this particular scene to explain why she did not like the thought of a PERS. Her reference suggests that she is concerned that the PERS could interfere in serious situations and lead to a loss of respect and standing in the eyes of the counterpart.

*Summary*

Participants perceived a serious encroachment on their personhood as they grew older in terms of their social status within their families and society at large. In response, they aimed to protect their personhood as much as possible by holding on to their values and their self-concept and managing how other people saw them. In this context, participants saw personal alarms as a hindrance to the protection of their self-concept. Thus, participants' evaluations of personal alarms in the physical dimension of *reclaiming control* and the social psychological dimension of *protecting personhood* resulted in conflicting meanings. In the next section, I explore and analyze how participants grappled with this inconsistency.

### *3.5. Walking the Balance Beam*

*Walking the balance beam* is an in-vivo code from Maria, a non-subscriber, who had been thinking about personal alarms for about ten years. In the following quote, she discusses the troubles she had in identifying the right time to get a personal alarm.

> This is where I walk a balance beam. Until I have hurt myself, I can always say, "Why do I need one?" but if I go that far, then I've injured myself and maybe gotten into bad trouble, when I could have avoided part of it. I'm at the point now that I'm kind of, "When is the right time? Do I wait or do I do it before I have something really nasty happen to me?"

In many ways, this excerpt reflects the sentiment among many study participants who struggled to reconcile the meanings of personal alarms. I subsumed this struggle in the category *walking the balance beam.*

With the formulation of this category, I suggest that the adoption of personal alarms is an interpretive process in which individuals attempt to resolve the inconsistency that is caused by

the conflicting meanings of PERS in physical and psychological dimensions. As I showed in the previous section, participants evaluated PERS in the context of these changes related to the aging process. Losses in their physical abilities and the resulting increase in risk for injuries and serious harm led interviewees to appreciate the value personal alarms systems could bring to ensuring their physical safety.

At the same time, participants perceived a serious threat emanating from the PERS service. They feared that getting a PERS would lead to a loss of independence. In addition, the PERS threatened to further diminish their social status, which they had seen decline with increasing age. Furthermore, participants associated the PERS with being on the "downward side of life" and were reluctant to give up their self-concept of being "young and alive."

In other words, PERS was seen as a way to save one's life, while also being interpreted as a marker for the end of life. This conundrum often led participants to feel "not ready" to get a PERS subscription, leading them to postpone a decision about PERS. Even among subscribers, most participants reported a period of time in which they did not feel ready to acquire the PERS. Participants edged closer to the decision as they continued to process the meanings of PERS. For some participants, the inconsistency in the meanings of personal alarms seemed to be greater than for others, which could explain why some interviewees were at the evaluation stage for a longer period of time than others.

Ten participants were still in the process of navigating the balance beam. Eight persons had reached the end of the balance beam, albeit in different ways: two women had initiated the PERS acquisition and reached the end of the beam by themselves; two women got their cues and reminders from family and friends; and three women and one man left the beam prematurely when their children got a personal alarm for them.

In the following, I describe how the inconsistency of meanings towards PERS emerged through participants words and provide detailed insights into the ways participants handled the conflict. I then conclude this section with how subscribers came to be subscribers.

*3.5.1. Postponing the decision*

Because the PERS had conflicting meanings, most participants who were nonsubscribers did not feel ready to make a decision about getting a PERS. That is, they had not decided to get one but they also had not decided to not get one. Subscribers also reported having felt like this at some point before they acquired a PERS. An exchange between Sandra (NS) and Maria (NS) illustrates why making the decision was hard.

> Sandra: Sometimes making the decision is the hardest thing.
>
> Maria: It is.
>
> Sandra: It is, because for some things it's so final.
>
> Maria: Yeah, it is final. It really, really is. It's giving up. You're on the downward side of life.

Participants (n=14) frequently used the phrases "It's not time," "I'm not there yet," or "I'm not ready" to describe why they had not subscribed to a PERS. However, they did not know when they would feel ready, how to get "there," or what feeling ready or being "there" actually entailed. Isa (NS) told me that she had been throwing out advertisements for PERS that she had gotten in the mail because she was not feeling ready:

> Isa: […] Like I say, I have gotten several pieces in the mail advertising on these. And I just throw them away. So, I felt, I guess, I'm not ready yet.
>
> Lena: What do you think it would take for you to feel ready?
>
> Isa: *(laughs)* That's a good question. When does anybody feel they're ready?

Isa's question about whether anybody ever feels ready suggests that she is unsure if she will ever be ready to get a PERS. This sentiment comes up several times in her interview. The following statements illustrate her wavering commitment to getting a PERS, which is symptomatic for the internal conflict between meanings of PERS.

> Isa: And I may even give in to it, who knows. I don't know yet. […] And, like I say, I'll probably give in. But I'm not sure, when. […] If the two of them get together and say "Hey mom, this is it. You gotta do it," I'll probably do it. I will do it. I'll probably do it.

On the one hand, Isa states that she does not feel ready "yet." The use of the adverb "yet" indicates that although Isa is not ready at this time, she anticipates that may be ready to get a PERS at some point in the future. Isa's first statement suggests that while she was not ready at the time, she would get to a point at which she would need the PERS. This notion is supported by other statements earlier in the interview.

The following statements convey Isa's anticipation of reaching a point of readiness at which a PERS subscription becomes necessary to deal with physical changes:

> And I know it's getting to that point where I'm gonna need that one of these days. […] It's just the way I walk. And I did take a good fall not too long ago. So, - it's gonna be there that I'm going to need it […] But like I said, every day changes. And you don't know what the changes are gonna be so you figure you're probably gonna need it some time.

Isa (NS) had experienced a fall just a few days before the interview, which makes it noteworthy that she did not feel that it was time to get an alarm. Simultaneously, she felt very strongly that a personal alarm would infringe her independence. In other words, she perceived

the threat of the PERS to her independence to be greater than the threat of being harmed by a fall.

Robert (NS) also had direct experiences with falls. He has had balance problems for several decades due to an accident and reported falling several times. He stated:

> I guess if you needed it, if you were that fragile, right. But neither one of us [Robert and Patricia] are fragile. Except I have a terrible balance problem, yeah, but other than that.

Karen's (NS) accounts show a similar pattern. She shared four vicarious experiences, in which individuals had fallen and sustained serious injuries. The first experience entailed the fall of one of Karen's clients, who was able to call for help using a PERS and was admitted to the hospital. The second experience pertained to her friend who was feeling unwell and was having difficult walking. Karen shared that she feared "for her every step," in case something happened. The third experience was the fall of Karen's mom many years ago. Karen received a call from her mother and went to help her get up. The last experience was the death of an exercise instructor who had fallen in his home and "never came out it." Karen shared these stories because they made her think about the usefulness of the PERS. Despite these experiences, Karen did not feel ready to get a personal alarm for herself.

The following excerpt from my interview with Lilly (S) demonstrates the conflict reported by many participants and provides an example of the internal debate in the form of "self-talk."

> Lena: Why are you refusing [walkers and canes]?
>
> Lilly: Because I have ego.
>
> Lena: You have ego?
>
> Lilly: Oh definitely. "I don't need that." I do need that.

Lena: You do need that?

Lilly: Yeah. I'm going on to my second series of physical therapy appointments now, to make my walking not look like a drunk. I don't drink. There's an ego there. I've got to admit it.

Lena: What does the ego tell you?

Lilly: "You're young, you don't need that." I walk funny, and I'm aware I walk funny. I have a son that rides me about my walking. Several years ago I had several falls in the same year. I decided I'm done doing that, and I'd better get something.

As the quote demonstrates, these conflicts are not limited to PERS and also occur with regards to other assistive technologies. Thus, the process of postponement is not unique to PERS and represents a broader process in which individuals deal with conflicting meanings.

However, not all participants experienced the same level of dissonance. Compared to others in the sample, Violet (S) was quick to decide to get a PERS and acquired it several months after her first children mentioned it to her. Violet had had a brain tumor over 30 years earlier leaving her with balance problems. For several decades, she had been able to manage without any assistive device, until her condition worsened and she decided to use a cane. When her children started "bugging" her about the PERS, it did not take her long to make a decision because the PERS helped her mitigate the risk of falling and not being able to get help. She differs from other participants because she associated the PERS with the long-term effects of her brain tumor rather than aging-related decline. In other words, she did not feel that her self-concept was threatened by the PERS. Rather, the personal alarm was just another tool to manage the symptoms of a condition she had been dealing with for decades.

Mara (NS) is another example of relatively little internal conflict about PERS. Because she lives alone, she had briefly thought about getting a PERS. Because of her high level of

fitness, demonstrated by her ability to run half-marathons, she came to the conclusion that she was currently not at risk of harm. Thus, she did not see that a personal alarm would add real value. As a result, she did not report having any conflicting evaluations about the PERS and, hence, rejected getting a personal alarm.

A comparison of Violet's and Mara's cases with other participants suggests that having consistent meanings of PERS across dimensions was an important factor to make a decision about PERS. As participants struggled to resolve the conflicting meanings of PERS, nine of the ten non-subscribers had postponed their decision about a PERS subscription to a future time point. Mara (NS) was the exception because she did not postpone the decision; she decided against a PERS. In addition, seven of the eight subscribers had postponed the decision before getting the alarm. The duration of this postponement varied between participants and ranged from a couple of months in Violet's case to approximately 20 years for Laura. While participants put the decision off, they continued to grapple with the meanings of personal alarms.

A driving force for many participants in this phase was the involvement of family members and friends, who, with varying intensity, aimed to persuade participants to get the PERS. In the following section, I delve deeper into what happened when participants postponed the decision.

*3.5.2. Edging closer*

Almost all participants who had postponed their decision about PERS (n=16) continued to think about and evaluate personal alarms. Although Maria (NS) was not sure when she was going to get a PERS, she was *edging closer* (in-vivo code from Maria) as time progressed. When analyzing the interviews, I saw two ways in which participants *edged closer* to their decision:

individuals collected more experiential evidence on the benefits of personal alarms and they experienced pressure from family members or friends.

*Collecting evidence.* Part of *edging closer* was mulling over the meanings of PERS and convincing oneself of the need. Participants collected evidence in three different ways: through imagined, actual, and vicarious experiences.

The following excerpt from Maria's (NS) interview shows how she collected evidence in the form of imagining situations in which PERS would be imperative:

> I think, "What if [my son] were out of town for two or three days and I fall and I can't get up? How in the name of god would I ever alert anybody? I could probably die on the floor before somebody found me." You see I'm edging closer. I am. I am edging closer. […]
> It's a process I think. You don't just say.. At least I can't, I can't just say, "I'm going to do this." I've really gotta mull it over. I really do. I have to look at it from every angle, because usually when you do something like this, it's something that you really don't want to do, for whatever reason. The reasons may not be good, or they may be very good, but you don't. This, when I was younger, I would've considered a little intrusive, "Why in the world do I need a thing like this?" Now that I'm older and I see that I'm getting more fragile, then it's beginning to make more sense. That's it.

As she continued thinking about the PERS, Maria imagined more and more scenarios in which she could see the benefit of having a PERS. In a way, she needed enough evidence to convince herself that she should get a PERS, which was "something that you really don't want to do." In other words, she was aware that she needed to overcome the threat that the personal alarm posed to her sense of self. Her experience of getting more fragile provided such evidence.

However, she had not fully resolved the conflicting meanings yet, although she stated that she had "accepted the fact that [she was] not young anymore." This goes to say that collecting evidence was a process in itself in which the dissonance was decreased little by little.

Blue (S) edged closer with every fall she actually experienced. Although Blue for a long period of time had dismissed getting a PERS, she initiated the PERS subscription when she realized that her falls were a sign of a continuing trend. She decided after three falls to take action and explained:

> Actually, see, I fell three times before I ever got it. And it would have been greater if I'd had it before. But I didn't know I was going to be falling all over the place. And once I started, it seems like I can't stop and that's why I feel sure it's going to happen again.

It was only after recognizing that the falls were not going to go away that Blue took the initiative to get a PERS. To say it in Blue's own words, "it certainly took the falls to bring it home."

Karen (NS), for example, had multiple vicarious experiences in addition to having experienced a fall. As mentioned previously, she shared stories about friends and acquaintances who had gotten into serious trouble after falling. She stated that her financial situation as the main reason for not getting the alarm. She would, however, consider it, if her financial position allowed it. However, other responses in her interview indicate otherwise. The following excerpt indicates that Karen has a very strong sense of independence and feels that she can manage by herself.

> Karen: I'll definitely consider it. But I must admit, I'm a rebellious person and I've often felt, I don't want to do this or similar things. But I see this as very practical.
>
> Lena: So what part of you does not want to do this?

> Karen: The part of me that wants to feel that I'm still independent, I don't need any help. I like to feel that I can depend on myself, find my own way. Mostly I'm able to take care of my needs, and so I don't get concerned about it. Mostly it isn't even on my mind, because I just go from day to day feeling, I'll get up in the morning, do what I have to, and live the way I have to.

In addition, she does not commit to getting a personal alarm once she could afford it. Instead, she uses the word "consider" to keep her options open. Compared to Maria's deliberation earlier in this section, Karen's statements from her interview suggest that her evaluations of PERS stand in greater conflict with each other and that she might not be *edging closer* at all.

However, I followed up with Karen to ask about her occupation and education about six weeks after her interview. During the call, Karen spontaneously, i.e. without me asking, shared with me that she had been experiencing some illness in the past weeks, which made her rethink her position on PERS. She stated that she would maybe get a PERS if she were in a "state of readiness." She further explained that a "state of readiness" might be reached if she "caught something" or recognized that there might be a "legitimate reason." That is, she is still keeping her options open by saying that she "maybe" would feel ready and "maybe" get a PERS. However, her statements also suggest that she had *collected evidence* of the benefits of PERS through the experience of feeling unwell. Through this new evidence, she had *edged closer* to PERS.

To sum up, *collecting evidence* presents a process in which participants processed imagined, vicarious, and actual experiences, and then updated their perspectives on personal alarms in response to these experiences. In addition to this internal process, eleven participants

received prompts from family members or friends. The following section is dedicated to the various persuasion techniques that participants encountered.

*Receiving input*

In the context of deciding about personal alarms, interviewees talked about tactics their family members used to influence their decision. Friends were also reported to attempt to influence participants' decision. Through my analyses, I identified various strategies through which participants reported family members and friends aiming to impact participants' decision-making process. These strategies were characterized by the use of power to affect the desired outcome and the level of interaction in participants' lives. Based on these insights, I constructed three ideal types[8] of roles that family members and friends could play: the captain, the coach, and the companion. In the following, I provide a characterization of participants' interactions with these ideal types.

*The captain*. Several participants (n=3) implicitly and explicitly characterized children who I categorized as captains as being very involved in their parent's life, spearheading decision-making in the household, and sometimes being bossy, with an implicit expectation that the participant would comply with their decisions. Captains made decisions in the care of parents on behalf of the older adult without getting much if any input from them, which is a reflection of the role reversal discussed in the section on *protecting personhood*. For example, Rose (S) had been thinking about getting a PERS when she got a call from one of her daughters informing her about the installation of a PERS that same day.

[8] I use the term "ideal type" in Weber's sense. [139] to describe characteristics and elements common to most of participants' description of their interaction with members of their social environment. These ideal types are not meant to apply to all characteristics in any one particular case.

> "Actually, I'd thought about it, but one day my daughter called me and she said, "Someone's coming out from XXX with the [PERS]. We have arranged for it. They're coming at such and such a time, and you just be there." […] And I've been pretty self-sufficient, but [my daughters] were not comfortable that I was a widow, and I had had a hip replacement, not from falling, but from arthritis, and my eyesight was not as bad at the time, although I'd already had several surgeries. So they just said, "We're not waiting for you. This is it. You're getting it."

Others reported similar experiences. Bonnie (S) received her PERS from her daughter via mail. Other participants, such Georgia (S), knew that their children would make a decision but they themselves were not actively involved in the process.

Another example is Blue (S.) She wanted to get a PERS and had asked her daughter for help to research available options. In the interview, she reported feeling left out left out when her daughter decided which PERS was most appropriate and did not consult Blue about her needs and wants with regards to PERS and its features.

> "I was staying with her and we had discussed it. She just went online and she looked at all kinds of them and then she made a decision. She didn't even ask me what I might want."

In one case, the spouse took the role of captain. Peter (S) lives with his wife, who suggested it would be a good idea to get a PERS. Despite Peter's objections, which were based on a lack of need and the presence of financial concerns, Peter's wife decided to order a PERS for herself as well as for Peter.

Interestingly, this ideal type also emerged in brief conversations with attendees of the presentation at the Westchester Senior Center. One woman, who was a PERS subscriber, but did

not want to participate in the study, described her experiences like this: "You're out and wake up with this thing around your neck."

*The coach.* While captains made decisions on behalf of participants, coaches continuously prompted participants to take action, but did not take matters into their own hands. Family members as well as friends embodied the role of coach, as opposed to captains, a role which only direct relatives took. The prompts and reminders took various shapes and forms in terms of their directness and persistence. Participants used words such as "push," "bug," "badger," "bother," or "nag" to describe others' action towards them. Overall, six interviewees (four non-subscribers and two subscribers) shared experiences with coaches.

Some participants (n=4) described their children as "pushing" them to get a PERS by trying to convince them of the need for a PERS. Isa's daughter Frances continued to tell Isa that she needs a PERS. Isa also noticed that Frances had brought her brother to join her in the quest to convince her mother. Even the interview for this study, which was initiated and arranged by Frances, seemed to be another way to increase pressure on Isa to agree to get a PERS.

Maria's (NS) son took another, subtler approach to persuade his mother. Rather than openly confronting his mother, he leaves information materials about PERS on her desk. Maria suspects that her son moved in with her to watch over her.

> My son now lives with me. He came to me about three years ago and said, "It's really silly that we maintain two households." He's been my alarm. That's really why he moved in. He's been after me to get an alarm system. I just haven't really followed through on it yet. […] I find all kinds of little things left on my desk telling me about alarm systems.

Two participants had coaches who were not family members. Karen (NS) stated that a close friend was very concerned about her and kept saying "You should do that." Lilly (S) experienced a friend "badgering" her to acquire a PERS by mentioning it every few months over several years.

> "Badgering me. She'd bring it up every two or three months. I live alone. I'm on my own a lot. I no longer drive. She felt that I should have something besides me in the house."

Similarly, in a joint interview Maria (NS) attempted to persuade Sandra (NS) during the interview to at least consider a PERS. The following interaction between Maria and Sandra demonstrates Maria's use of fear-based persuasion tactics to convince Sandra.

> Maria: Even though I have [my son] living with me, that doesn't take away the danger of your falling when nobody's in the house.
>
> Sandra: I'm very aware of that.
>
> Maria: [Your son-in-law] is out of town.
>
> Sandra: I'm quite aware of that.
>
> Maria: [Your grandchild is] in school.
>
> Sandra: I'm lying there, right?
>
> Maria: mm-hmm (affirmative).
>
> Sandra: Yeah, I've thought about that.
>
> Maria: You really need something, even if somebody is living with you, because it doesn't take away all the danger.
>
> Sandra: No, because sometimes you're alone. I know.

The excerpt illustrates how Maria leads Sandra through an imagined experience of a dangerous situation, leading Sandra to acknowledge the benefit of PERS. To reinforce her point, Maria follows up the imaginary scenario with a real example of a mutual friend who had fallen

and had spent all night on the floor, despite her son living with her. Sandra concedes that the story "is a perfect example of why it's necessary, really."

Some participants (n=3) reacted to coaches by delegating the responsibility for the decision to them. Although Maria stated that she was "just about there" to get the PERS, she did not take any initiative to further the process. Once in a while over the past ten years, her son had been putting info brochures about PERS on her desk. When reflecting on her thoughts about these information materials, she wished her son would initiate a conversation about the PERS. She said:

> Maria: You know, if he would come to me and give it to me and we could sit and examine it and talk about it, I'd be much closer to doing it than just having [info materials] show up.
>
> Lena: Why is that?
>
> Maria: I don't know, because then there's a conversation about it. If there's something I need to know that I don't know, he could inform me, because he's the one who's been responsible for wanting this.

Isa behaved in a similar way. At this point, it is useful to provide some context of how I got to interview Isa. In November, I received a call from Isa's daughter asking if I had any information materials about PERS that could help her to decide which PERS to get. I had agreed to put together some information materials and delivered them to the daughter who was staying at Isa's apartment during her visit. That day I also made the appointment for Isa's interview. During the interview, Isa confessed that she had not read the material until the day of the interview. When asking her for the reason, she answered:

> Isa: Just… (laughs) It didn't interest me. (laughs) I wasn't (pause) eager.
>
> Lena: So what made you read it today?

Isa: You were coming. (laughs)

Lena: So that was kind of a deadline?

Isa: Uh-huh. I better read up on something. You might ask me a question about it. (Laughs)

This snippet of our conversation illustrates that Isa had absolutely no interest in moving forward with PERS and had delegated all of the responsibility for the research and the decision to her daughter. Similar to Maria, Isa was expecting her children to make the next step. In fact, Isa believes that her children's pressure was necessary for her to get the PERS:

> Oh, I would probably linger on until… If I had to make the decision on my own and decide when I was going to do it. I might just keep going and never get it and have an accident or something.

Although she says she made the call, Lilly goes as far as crediting her decision to her friend who had been "badgering" her for several years to get a PERS. She says:

> She knows that I give her credit. It was not a decision I made. She bugged me.

This statement indicates that her friend's repeated prompts were an effective tool to move Lilly closer to getting the PERS.

*The companion.* Compared to captains and coaches, companions were more hands-off in the lives of their parent. These children often lived further away and were less involved in the day-to-day lives of their parents. This ideal type emerged from five interviews. For example, Isa (NS) is visited by her son on a regular basis. Although he, like his sister, believes that Isa would benefit from a PERS, his visits are centered around Isa's needs, such as going grocery shopping.

Lilly's (S) sons can also be characterized as companions. She maintained her decision-making power, but asked her son for help in selecting a PERS.

> Lilly: I just told [my sons], "I'm getting [a PERS]. I'm gonna get one of these things," and the researcher son said, "I'll help you." […] He chose because he said, "The two top are these two, and this one's a lot cheaper." He's very financially-minded. I respect his research on anything and everything. Whenever I have a big purchase, I talk to him first, because he researches it.

Similarly, Karen stated that she could rely on her family, who respected her independence and did not interfere with her way of life.

*Fluidity of ideal types*

Although children tended to fit one ideal type, they could and often did change the role they played, especially over time. For example, Rose (S) recounts that her daughters tried to persuade her for a couple of years before they decided to act and not wait any longer for Rose to act on her own. In other words, Rose's (S) daughters went from being coaches to captains and taking the lead in the PERS decision. Similarly, Isa (NS) perceived that her son, who I categorized as a companion, was starting to get more involved in his sister's persuasion efforts, thus transitioning into the role of a coach.

In addition, the representations provided above go beyond the adoption process of PERS and are applicable to a variety of contexts, such as decisions regarding driving or living in one's own home. Children and friends represented different characteristics depending on the the topic or situation and, thus, embodied different ideal types at the same point in time. For example, Blue's (S) daughter made decisions about the PERS (captain) and pressured her to give up driving (coach), but did not push her to get in-home care (companion.)

By setting boundaries, participants determined, at least partially, the type of role another individual could occupy insofar as these roles are constructed through the interaction and power structure between individuals. For example, while Blue (S), Bonnie (S), and Violet (S) tolerated their children's input and interventions with regards to PERS, they set very clear boundaries when it came to assisted living. As Violet stated:

> Violet: I mean, I've resisted a lot of things that they suggested to me. Which is another thing.
>
> Lena: Yeah. Like what?
>
> Violet: Like, "Maybe, you know, you should move into an assisted living." And stuff like that.
>
> Lena: But that's an absolute no from you?
>
> Violet: Absolute. More than an absolute no.

Carey (S) recounted how she pushed back on her children's announcement to sell the house.

> They said, "Mom, we decided that you're going to sell the house." […] I went to bed that night, and I said, "You know, I don't have a friend in that world." I said, "I'm going to just put my foot down, they're going to carry me out." That's how independent I am. […] I felt so bad. I went to bed and then I cried. I felt so bad. They want me to leave, after losing my husband. […] I just said, "I'm staying." They accepted that.

*3.5.3. Summary*

This section elucidated two key elements of *walking the balance beam*. On the one hand, participants *postponed the decision* about a PERS subscription. On the other hand, they

continued to process the idea of subscribing to a PERS and *edged closer* by collecting evidence and receiving input from family and friends.

### *3.6. Becoming a subscriber*

To conclude the analysis of *walking the balance beam*, I provide a description of the eight individuals who had become PERS subscribers before the interview. I describe how they arrived at this transition and also share insights into how they felt after subscribing to the PERS. In the cases of Rose, Bonnie, and Georgia, their adult children, i.e. captains, made the decision for them. For Peter, his wife, also a captain, had decided to order the personal alarm. In Violet's and Lilly's cases, their coaches' efforts turned out to be fruitful. For Violet, her children "bugged" her, whereas it was Lilly's friend who kept "badgering" her until she got the alarm. Two participants initiated PERS by themselves: Blue and Carey.

Those interviewees whose family members made the decision about the PERS generally accepted the decision in this situation. They justified their children's behavior reasoning the captains had good intentions and cared greatly about their parent. Even when participants did not fully agree with their children taking over, they often did not openly voice their opposition. Interestingly, participants bore the costs of the PERS service although their family members had made the decision for them.

Rose accepted her daughters' decision because she appreciated the attention she received from her children and did not take this attention for granted. Implicit in this statement is also Rose's fear that if she showed resistance, she might lose her children's support:

> I felt good that they were that considerate. Because I know people whose families are not considerate with them, that they don't seem to give that much attention to their parents, whatever. So I thought, "Well, they're thinking of me and my wellbeing."

As mentioned previously, Violet made her decision fairly quickly—within a couple of months as compared to several years in Lilly's case. Her reasoning was based on the PERS being a helpful tool for her balance problems that stemmed from her brain tumor 30 years earlier.

In contrast, Lilly was not able to fully articulate how she had arrived to her decision suggesting that in her case the process was less conscious. After several years of her friend "badgering" her to get a PERS and experiencing several falls, Lilly decided at one point: "Yep, it's right this time." She described her decision as sudden when she realized that "it just felt like the right thing, after many years of saying no." She further explains:

> Maybe common sense reared its ugly head, I don't know. I just knew in November, "Ah, [my friend is] right, I'm gonna do it."

This sudden realization indicates that Lilly had *edged closer* in a subconscious way at the end of which she felt ready to get a PERS subscription. She followed up on her decision with immediate action and asked her son for help to decide which model was the most appropriate.

Although Blue had dismissed personal alarms for a long time, her tendency to fall increased her perception of the threat of harm to the point where it superseded the threat of the personal alarm encroaching on the self-concept. Her realization that the falls were an indication of trend of physical decline and that the falls "wouldn't stop," seemed to have a particularly strong impact on her decision to get a PERS.

A different and distinctive reason drove Carey's decision. She got her PERS shortly after her husband's sudden death ended her decades-long and very happy marriage. Suddenly living all by herself and struggling with her grief, she started looking for something that could provide relief. Here is how Carey describes her journey:

> I got that a year after [his death], and it took me a long time to adjust to living by myself. I could depend on, this was a help to me. My family

wasn't such a help calling me at all, but I couldn't see why he had to die so fast. I felt really bad because my son who was just graduating, he got a nice job, and it was XXX in the marina, and he took me on Sunday to see the office, he had a great big private office overlooking the [inaudible]. I was so proud of him. They have a wonderful gym and all there [inaudible]. I was sorry that my husband couldn't see that. The baby of the family, and to see that, it made me feel bad. As far as it was a bad time. This was a big help having that security, a little. I guess it helped.

Carey's case may seem like unique at first. At a closer look, however, her story reflects the same basic pattern of evaluating PERS that was presented in other instances. Carey had been been married to the "love of her life" for a very long time. With his sudden death she lost a very important relationship that constituted a huge and defining part of her self-concept. Like others, she evaluated PERS in the context of *protecting personhood*. She saw the personal alarm as a way to fill the void and provided her dependability and security in a time of emotional turmoil.

Nevertheless, part of her did not want the PERS, which is illustrated in this quote:

Lena: Do you remember the first time you got the device and how was that for you having all of a sudden this thing around your neck?

Carey: You could have it, at first I said I didn't want it. I tried to hide it as best I can. When I was playing Bridge, I never did tell everybody what I have. It's nobody's business but my whatever I had, and I just didn't tell anybody. Oh gosh, it's just something else when you're getting older you have to do.

Her hiding the PERS demonstrates that she did have an internal conflict, although it seemed to be smaller than among other participants. Thus, her balance beam turned out to be shorter than

that of others. Nevertheless, the interview with Carey provided some hints of a potential, if minor internal conflict: She reported hiding the PERS under her sweater for the first few months.

Overall, the device made subscribers feel more secure no matter how they had obtained it. All subscribers made statements to that effect. Although Lilly initially had doubts about personal alarms, she realized after she had made the decision to get it that she had subconsciously felt unsafe all along: "I didn't know I didn't feel safe before, until I got [the PERS]."

Thus, the PERS made her feel more secure. At the same time, she also shared that she felt sad. When I asked her about her thoughts of other people who needed an alarm, she responded:

> Lilly: Sad. So sad. They need those things.
>
> Lena: Why sad?
>
> Lilly: Because I don't want to need one. Would it feel sad if you have to wear one, for you? It feels sad for you. I definitely don't want one. Now I have one.

The statement indicates that Lilly still assigned a negative meaning to PERS in that the device meant a loss of status. That is, it was not necessary for her to fully resolve the conflict between the meanings she had assigned to PERS. However, the subconscious threat of being unsafe seemed to supersede the power of PERS as a symbol for old age.

### *3.7. Seeing the study as a prompt*

Having taken a symbolic interactionist perspective in this study, I cannot ignore the impact of this study on participants' perceptions of PERS. In the following, I present examples showing that the interviews partially reshaped some participants' thoughts, feelings, and actions with regards to personal alarm systems. These examples are a reminder that the "results" presented in this dissertation are not objective observations by a disinterested scientist, but that I

also played a role in constructing these results. This construction occurred not only after the interviews when I started interpreting participants' words, but also through my social interaction with the participants before and throughout the interview.

For example, when I recruited Patricia and Robert, they stated that they had considered PERS at some point. During the interview, Robert revealed that he had never thought about getting a PERS. Throughout the interview, I saw that Robert thought more and more about the PERS and started to evaluate it. Although he had not thought about it before, he started to think about the value of PERS for physical health:

> I guess if you needed it, if you were that fragile, right. But neither one of us are fragile. Except I have a terrible balance problem, yeah, but other than that. Well maybe that is a reason to have one for the balance problem. Never thought of it.

Also, Laura had asked me to share some information material with her (the same as I had done for Isa and her daughter.) Towards the end of the interview, I asked Laura what she would do with the pack of information. She interpreted the information, and the interview as a whole, as a sign of God: "I think it was kind of the Lord saying to me 'You ought to do something about this'." Being a woman of faith, she also points out that while she does not always listen to her sister, brother-in-law, and daughter, she does pay attention to God's word.

Similar to Laura, Peter saw the interaction with me and my questions about the PERS as a reminder to use the personal alarm his wife had gotten for him: "I guess you reminded me, I should use it when I go. Might as well, paying for it, you know? Put it and go."

Particularly relevant were the circumstance under which Isa's interview came about. As I mentioned before, Isa's daughter Frances had contacted me asking me for more information about personal alarms. When I met with Frances, I scheduled the interview with her, not Isa

herself. Although Isa was at home when I came over, she was in another room laying down because she was not feeling well. When scheduling the interview with Isa's daughter, I asked her to get her mother's consent. She went to the room to ask the mother for permission to proceed. I subsequently called Isa after my meeting with her daughter to get Isa's verbal consent to meet with her and to confirm the day and time. During the interview, Isa told me her version of what had happened that day:

> Lena: What did your daughter say, when she gave this information to you?
>
> Isa: She just said, "Here, this is..", and that you'd be here today and we had an appointment. "Ok."
>
> Lena: And you accepted that?
>
> Isa: Sure. Yeah, she had already made the appointment and everything. So, I said ok. She said, "Mom, do it" and I said "Ok."

Based on Isa's statements, it seems like Frances had used the interview as a way to engage her mother in this process and to make her think about and consider PERS. Without her daughter's initiative, Isa may not have considered participating in the study at all. And she would not have received the information pack that made her aware of the multitude of available options of personal alarm systems.

As the examples above show, the interviews did not only reveal existing perceptions that participants already had. Instead, these perceptions were created and developed, at least in part, through the social interaction with me as I asked participants to reflect about PERS.

### *Summary*

This chapter was dedicated to the results of this dissertation research that emerged from the analyses of interviews with 18 participants. Section I demonstrated that interviewees'

attitudes towards and experiences with digital technologies varied between technology-based devices and services. Section II addressed the broad range of participants and illustrated that interviewees were at different stages with regards to PERS adoption. Section III constituted the core results of the study and elaborated three categories that characterize participants' experiences with the evaluation of PERS prior to subscription to the service: *reclaiming control, protecting personhood,* and *walking the balance beam*. In the next chapter, I discuss the results in the context of existing research and theoretical models and highlight the implications of the results for research and practice.

# CHAPTER 5

# DISCUSSION

## Overview

The goal of this dissertation was to explore older adults' perceptions and experiences with and meanings ascribed to Quality of Life (QoL) technologies—devices and services that were designed and developed to support older adults' ability to live independently and to increase or maintain their quality of life. One set of such technologies is comprised of personal emergency response systems (PERS), a combination of a small wearable device and an emergency service that allows the subscriber to set off a call for help in case of an emergency. This study focused on older adults' thoughts about and experiences with PERS.

The research was driven by low adoption rates of PERS, the stark increase in the reliance on technology-based interventions to mitigate aging-related changes on the individual level, as well as changes in the age structure on the societal level. Furthermore, the review of the research literature showed there was a gap in the understanding of how older adults perceive the need for PERS and how they negotiate the uptake and use of PERS within themselves and with others. I conducted this research study to address these shortcomings. I collaborated with three community-based organizations in western Los Angeles, California to interview 18 persons, eight PERS subscribers and ten non-subscribers, about their perspectives on general technologies and PERS. In my analyses, I applied methods of constructivist grounded theory—initial coding, focused coding, and theoretical sampling—and constructed a substantive theoretical model that maps processes and trajectories in the adoption of PERS.

In the previous chapter, I reported in detail the results of this study and used participants' words to demonstrate how these results emerged through my analyses. First, I illustrated participants' attitudes towards digital technologies, such as smart phones, e-mail, and social media. Second, I demonstrated how the women and men in this study aligned along a spectrum of adoption stages for PERS. Third, I described the categories that I constructed based on the participants' stories about their views on PERS. These categories were *reclaiming control*, *protecting personhood*, and *walking the balance beam* and pertain to the phase prior to the subscription to PERS.

*Reclaiming control* and *protecting personhood* are processes that take place along physical and social psychological dimensions, respectively. Both processes represent individuals' efforts to counteract the impacts of aging. Participants engaged in actions to *reclaim* some of the control they had lost over their bodies due to aging-related changes. At the same time, interviewees sought to *protect* their personhood from social and societal forces that encroached on their sense of self. Participants appraised PERS with regards to the utility of PERS to achieving this goal. In many cases, these appraisals stood in opposition to each other.

As part of *walking the balance beam*, the resulting internal conflict typically led participants to postpone their decision with regards to PERS. At the same time, they entered a process in which they evaluated and re-evaluated the meanings of PERS. Over time, participants *edged close*r to acquiring a PERS with the help of evidence they collected through imagined, vicarious, and actual experiences of emergency situations. Additionally, input from members of their social environment facilitated interviewees' progression towards PERS. Participants reached the end of the metaphorical balance beam in two ways: the threat of injury exceeded the

threat of PERS to their personhood; or a family members decided on behalf of the participant to acquire a PERS.

This chapter connects these results to the aims of the dissertation and situates them in current empirical and theoretical landscapes. Section I provides an overview of the results and their relation to the specific aims and research questions presented in the first chapter. Section II places the results of this study in the context of previous research findings. Section III links the results to existing theoretical and conceptual models. Section IV discusses the study's strengths and limitations and Section V explores the implications of the results for research and practice in public health and in technology design and development. I conclude the dissertation by highlighting the major conclusions of this research study.

## SECTION I - Summary of Results

In this section, I discuss the results of this dissertation study as they relate to the specific aims and research questions set forth in Chapter 1. The aims and research questions were directed towards older adults' experiences with general technology as well as QoL technology. Aim 1 was to elicit participants' experiences with recent technologies, such as smart phones, TVs, and activity trackers. It set the stage for the further exploration of older adults' perceptions about QoL technologies in Aim 2 and the role of the social environment in the adoption of QoL technologies in Aim 3. I chose to limit the study to personal emergency response systems to be able to study these experiences in depth and to develop theory-level inferences. I selected this technology-based service for three reasons: (1) personal alarms have been on the market since the 1970s and are some of the most widely used QoL technologies and, thereby, allowed me to study individuals' experiences not only before subscription but also afterwards; (2) PERS are a

tool to mitigate the impacts of falls, which are a major public health problem; and (3) there is a reported discrepancy between older adults' positive attitudes towards PERS and resistance in its uptake and use, which hampers the potential of PERS to improve lives.

The scope of the dissertation spanned pre- and post-subscription phases. Therefore, the sample included individuals who were considering acquiring a PERS and those who already had a subscription to a PERS service. However, the experiences that were most salient in interviews pertained to the pre-subscription phase. Given the flexible nature of grounded theory methodology, I developed the pre-subscription processes as they emerged from the data through analyses.

The salience of pre-subscription experiences can partially be attributed to the composition of the sample. Ten of the 18 participants were non-subscribers who shared their current and past experiences of considering personal alarms. In addition, the eight subscribers did not show much variation in their use of PERS as most of them reported wearing the device consistently. However, they did vary with regard to their experiences in adoption PERS in the first place. That is, the interviews focused on the pre-subscription phase for both sets of participants. Hence, the categories that were constructed based on accounts of both non-subscribers and subscribers revolve around major processes participants engaged in before subscribing to PERS. These categories roughly correspond to the three aims of this study. In the following, I present and discuss the results of this dissertation in relation to each aim and the corresponding research questions.

### *Aim 1: Delineate older adults' experiences with new technology in general*

The first aim was to explore the technological context and environment in which participants lived. The goal was to elicit participants' experiences with recently developed digital technological devices, such as smart phones and TVs, activity trackers, or medication dispensers.

*RQ 1.1: What experiences do older adults have with technology?*

Most participants in this study had some experience with new technology. Most individuals used a computer and the Internet, several persons had an iPad, and two and actively used a Facebook account. Ride-sharing was another technology-based service that many interviewees used. Some of them had smartphone applications such as Uber or Lyft on their smart phones, whereas others used the adapted version of GoGoGrandparent. None of the participants mentioned using other recently developed technological devices, such as smart TVs, medication dispensers, or vacuum robots.

*RQ 1.2: What attitudes and beliefs do older adults have about technological innovations in general?*

In general, participants felt foreign in a world that overwhelmingly relies on technology. Nevertheless, some participants were curious to learn about new devices and services because they saw a certain level of fluency in the use of technology as necessary to be a full member in a technology-driven world. However, some felt that they did not know how to keep up with learning.

These attitudes and beliefs varied across different types of technologies. Participants who had experiences with ride-sharing services were very enthusiastic about this type of technology, because it gave them increased flexibility and mobility. This impact was particularly salient to individuals who had given up driving and were dependent on these services.

Interviewees were less enthusiastic about other types of technologies, such as computers or iPads. With regards to this kind of technology, attitudes varied between individuals, which may be a reflection of personal preferences. For example, some participants loved using the iPad whereas others saw the value of it but were indifferent about it.

Several participants had concerns about digital innovations. These concerns revolved around social implications and security. With regards to the social implications, some individuals were worried that an overreliance on technology and its overly extensive use, particularly in the context of child-rearing, could be detrimental to communication. Some participants were also worried that certain technologies, such as online banking, were not secure, and, thus, refused to use these technologies.

*RQ 1.3: How do older adults perceive that technology has impacted their lives?*

Participants reported that some technologies great impact on the lives of participants such as ride-sharing among who were not able to drive any longer. Participants with social media accounts felt this type of technology helped to keep them connected to their families and friends.

### *Aim 2: Explore older adults' experiences with QoL technologies*

The second aim was to explore how older adults negotiate the use of PERS. As mentioned before, the results mostly focus on pre-subscription processes because they played a central role in the interviews. Although the sample was comprised of subscribers and non-subscribers, the interviews and analyses showed similarities in the ways participants thought about PERS before getting a subscription.

*RQ 2.1: What are older adults' experiences with PERS?*

Although non-subscribers did not have direct experience with the PERS, they frequently referred to vicarious experiences through family members, friends, or acquaintances. Through

these vicarious experiences non-subscribers were able to imagine how a PERS would impact their lives.

Before getting a PERS subscription, subscribers had experiences similar to those of non-subscribers in that they imagined having a PERS and evaluated PERS based on these experiences. Although many subscribers had had doubts about getting a PERS subscription, most reported feeling more secure.

*RQ 2.2: How do older adults think and feel about their use of PERS?*

With regards to pre-subscription, both subscribers and non-subscribers described a journey during which they examined and evaluated PERS from physical and psychological perspectives. From the point of view of their physical bodies, participants thought about how the PERS could help them counteract and control aging-related changes. I called this process *reclaiming control*. From a psychological perspective, they considered how the PERS would impact their self-concept and their ability to make their own decisions. In other words, they evaluated to what extent PERS could help them *protect their personhood*.

In many cases, the evaluations in the context of *reclaiming control* and *protecting personhood* stood in opposition to each other. Participants who were not able to resolve this internal conflict seemed to postpone the decision whether to get a PERS subscription. Over time, some participants were able to reconcile the evaluations and acquired a PERS. The strategies participants used to resolve the conflict are described next.

*RQ 2.3: In what ways do older adults explain their use and non-use of PERS?*

Both subscribers and non-subscribers frequently used the phrase "I'm not ready yet" or "It wasn't time" to explain why they were hesitant to get a PERS subscription. These phrases

were an expression of the aforementioned internal conflict. Participants explained that they saw the benefits of PERS but they did not think of themselves as old enough to have a PERS.

*RQ 2.4: What are perceptions and feelings older adults experience before, during, and after the use of PERS?*

This research question specifically pertains to the experiences of subscribers. Overall, subscribers reported that they wore the PERS device consistently. Five of the eight subscribers reported having activated the alarm in an emergency situation. None of the subscribers reported using the alarm more than once. In emergency situations, participants used the PERS once they realized that they were not able to resolve the situation on their own. In those cases, the interviewees appreciated having the PERS, which contributed to their feeling of increased safety.

***Aim 3 - Analyze the role of the social environment in the uptake and use of QoL technology***

The third aim was to examine the role family and friends play in the uptake and use of PERS. As mentioned earlier, the analyses focused on the uptake of PERS rather than the use of PERS post subscription. Thus, the role of family and friends also pertains to the pre-subscription phase.

All three research questions ask about older adults' perceptions of the influence of the social environment. However, the interviews indicate that not all influences of the social environment were consciously perceived by the individual. Thus, the answers address conscious and subconscious processing of social influences.

*RQ 3.1: How do older adults perceive the attitudes and beliefs of their social environment towards PERS?*

In most cases, family members or friends brought PERS to participants' attention. Although all participants had prior knowledge about PERS from TV or mail advertisements, they

had largely ignored these messages. The fact that others brought up the PERS was a sign for interviewees that their children or friends thought of PERS as useful and beneficial for themselves. It also showed the participant that the child or friend thought that they were in need of a PERS. That is, the initiation of the conversation about PERS revealed to participants how their children or friends thought about them.

*RQ 3.2: How do older adults perceive their social environment as shaping their perceptions and beliefs about PERS?*

The social environment shaped participants' views and beliefs about PERS in three distinct ways: 1) through societal norms and expectations; 2) through vicarious experiences; and 3) through prompts and reminders. Participants perceived that societal norms and expectations about aging put limitations on what they could do and also contributed to their loss of status in society. These perceptions led some participants to see PERS as yet another infringement on their personhood.

Furthermore, participants' social environment provided them with important vicarious experiences with the value of PERS in emergencies. By observing and learning from other people's experiences, participants were able to imagine the value of personal alarms for themselves. These vicarious experiences were an important tool in the progression of participants towards PERS subscription.

Finally, participants often received input from their family and friends with regards to personal alarms. Based on the way family and friends provided their input, I constructed three ideal types: captains, coaches, and companions. These ideal types represent roles that family or friends took with regards to PERS.

*Captains* are very involved in their parent's life, spearheading decision-making in the household, and sometimes being bossy. To continue the metaphor, I introduced with the walking the balance beam, captains can be imagined as getting the participant to the end of the balance beam by cutting it off.

*Coaches* continuously prompted and reminded participants to acquire a PERS. Both family members and friends functioned as coaches and used several tactics to persuade participants. The first tactic aimed at increasing participants' perception of the need with regards to PERS. In other words, they took a fear-based approach to convince the participant of the need for a PERS by emphasizing that participants were at serious risk of injury. The second tactic involved reminding participants that they worried about them. This strategy may have evoked guilt.

*Companions* were not very involved in their parent's decision making. They typically took a supportive role in the lives of participants.

Importantly, family and friends could switch between roles. For example, some participants reported that children who had previously been in the role of a coaches had switched to the role of a captain and had gotten the PERS subscription on behalf of the participant.

*RQ 3.3: How do older adults perceive their social environment as shaping their use of PERS?*

This question pertains specifically to subscribers. Most subscribers had used the PERS in an emergency. However, they did not explicitly mention any influences from social environment. Among those subscribers whose family member had gotten the PERS subscription for them, most reported consistently wearing the device and using it in emergency situations. One subscriber whose wife had acquired the PERS for him reported not wearing or using the device at all.

### *Summary*

The discussion above illustrates the complexity of the adoption process for PERS. Overall, the results suggest that individuals process PERS through different lenses and struggle when these lenses offer conflicting views on PERS. These conflicts seem to impede the adoption process and the timely uptake of personal alarms. Moreover, the pervasive role of family and friends, as well as society at large, in the adoption of PERS makes obvious that the adoption process is embedded in, facilitated by, and limited by the social context and environment of the individual. In the following section, I discuss the results in the context previous research and the contribution of the results to the existing body of knowledge.

## SECTION II - Results in the Context of Previous Research

To my knowledge, this dissertation research is the first study to develop a substantive conceptual model that (1) focuses on the pre-subscription phase; and (2) elucidates dynamics between factors of PERS adoption. In addition, the dissertation provides a critical perspective on social influences on older adults' PERS adoption. In the following, I discuss these contributions in more detail.

### *2.1. Focus on Pre-subscription*

Key to the development of the model was the conceptualization of the entire adoption process, including the pre-subscription phase, as processual and dynamic. Although other studies have examined technology adoption from a process perspective, the vast majority focuses on how older adults interact with technology after it was acquired. [8, 19, 81, 84, 86, 87, 90, 97-99, 101, 107-110] I found one study that addressed how individuals become PERS users.[140] There is some overlap with the results of this dissertation study with regards to individuals' efforts to

manage the uncertainty of their health and physical abilities. However, McKenna and colleagues' [140] study falls short of presenting a conceptual model that encompasses older adults' multidimensional experiences prior to subscription to PERS.

Although there are theories that touch on the pre-acquisition phase, they are not sufficient to explain why and how individuals postpone their decision to get a specific technology. In Chapter 2, I presented two theories that describe technology adoption processes. First, in the theory of the domestication of technology [102] the adoption process starts with the appropriation of technology, i.e. the transition of technological devices into the household. In contrast, the conceptual model presented in this study examines the processes that take place prior to the decision to acquire the PERS. Hence, the domestication theory provides limited help in understanding the processes prior to PERS subscription.

Second, in the Diffusion of Innovations Theory, Rogers [64] elaborates three stages that precede the acquisition of an innovation. In the knowledge stage, individuals become aware of an innovation stage. In the persuasion stage, an individual forms a favorable or unfavorable attitude. In the decision stage, a person engages in activities to choose to adopt or reject the innovation. Notably, Rogers points out that attitudes do not perfectly predict actions—a discrepancy he refers to as the knowledge-attitudes-practice gap. This gap has been shown to exist in the context of PERS adoption and was one of the main drivers to conduct this study.

Rogers suggests that knowledge-attitudes-practice gaps are more likely to occur in the context of "preventive innovations" (p.176) that individuals adopt in order to avoid an undesired event that may or may not occur. Rogers claims that individuals' motivation to adopt preventive innovations is weak because of the uncertainty of the occurrence of the event. PERS can be seen as a "preventive innovation" because it is activated only in the case of an emergency. However,

the results of this study suggest that the uncertainty of the occurrence of an emergency only partially explains the knowledge-attitudes-practice gap. Instead, the theoretical model posits that individuals' postponement of PERS subscription arises from the complex dynamics between conflicting factors for PERS adoption. Thus, this study provides crucial insights to expand the understanding of Rogers' knowledge-attitudes-practice gaps by elucidating the social nature of technology adoption and specifying the dynamics between physical and social psychological factors of PERS adoption, which I discuss in the next section.

### *2.2. Dynamics between Factors of PERS Adoption*

The results of this study go beyond previously identified factors by: (1) specifying primary and secondary factors in terms of their relevance to PERS adoption; and (2) explicating dynamics between important factors. Several studies have shown that uptake and use of QoL technology are impacted by a variety of technology-based and person-based factors as well as the sociocultural context in which an individual resides. Technology-based factors pertain to perceptions of features and characteristics of a device or service, including cost [75-77], practicality[77, 81, 83, 84], intrusiveness[8, 11, 12, 89], reliability, and accuracy.[77, 83, 85, 87, 93, 97] Person-based factors are beliefs and attitudes towards technology, such as perceived need [8, 11, 12, 77, 81, 89, 98], experience and familiarity with technology, and self-efficacy.[78, 79, 81, 87, 99] Expectations about the consequences of the use are also included in this category, as for example impacts on safety, independence, autonomy, privacy, and health.[8, 12, 76, 77, 79, 81, 86, 87, 91, 94, 99-101] The sociocultural context of technology use refers to influences of the individual's social network, and perceived impacts on the social network.[81, 86, 87, 92, 93, 98, 99]

While these factors were identified through studies on a variety of QoL technologies, many of them pertain to PERS specifically and, to a large extent, also emerged from my analyses. Participants voiced concerns about design features of PERS, such as high cost and unpleasant aesthetics. Further, participants also addressed person-based factors. For example, most non-subscribers and, for at least some period of time, subscribers did not perceive the need for a PERS or were worried about the impact of PERS on their independence. Nevertheless, the women and men thought that a PERS would be beneficial for their sense of safety and their health. Finally, participants talked extensively about their social environment, particularly family members and close friends.

The analyses in this research suggest design features only come into play once other more fundamental factors are addressed, a contingency that is not addressed in existing research. In the interviews, participants talked about PERS primarily as a concept. That is, they did not evaluate a specific device or service, like Life Alert or Philips Lifeline. Rather, they considered what PERS in general meant for them in terms of *reclaiming control* and *protecting personhood*. Even when people talked about design features they talked about them in relation to their self-concept. That is, specific design aspects, such as aesthetics, usability, or cost became relevant once participants had resolved underlying issues of anticipated impacts of PERS on their self-concept and physical safety. In some cases, however, participants used the factor of cost or usability to circumvent dealing with this issue.

This insight is important because the results indicate that at the evaluation stage participants primarily struggled with the meanings of PERS for their self-concept and their physical bodies—evaluations that pertain to the conceptual design of PERS. However, many efforts to improve PERS focus on aesthetic and functional features instead, which may have

limited impact on older adults' adoption of this technology. That is not to say that design characteristics of PERS are not important, but reframing the challenge to a conceptual re-design and improvement may have greater impact.

The results also demonstrate the dynamics between fundamental factors with regards to PERS adoption. As discussed in the previous section, participants balanced conflicting evaluations of PERS. The categories *reclaiming control* and *protecting personhood* shed light on the struggles that older adults may experience throughout the aging process. Faced with aging-related losses in their physical abilities and the resulting uncertainty, individuals aim to reclaim some lost control by adjusting their behaviors, by preparing themselves for further decline, and by getting help from others or through assistive devices. Against this backdrop, individuals evaluate the usefulness of PERS to reclaim control. Simultaneously, individuals aim to protect their sense of self from the impacts of feeling lonely and the consequences of partially losing their social status. Again, they evaluate how PERS can contribute to the goal of protecting their personhood. In most cases, participants saw PERS as beneficial to reclaiming control, but as detrimental to protecting personhood.

Although such ambivalent perceptions of PERS have been reported in the past[11, 12, 140, 141], the dynamic tensions between them have not been addressed. In the study conducted by McKenna and colleagues[140], the authors discuss that participants decisions to acquire a PERS took place in two main contexts: the desire to live independently and retain control over one's life; and the necessity of living with a PERS to remain independent by reducing fear of the unpredictable. Similar to the results presented in this dissertation, the authors conclude that older persons see PERS as a way of "controlling or managing the unpredictability [of their health]."(p.7)[140] This insight parallels the claim of this study that older adults evaluate PERS

with regards to its contribution to *reclaiming control*. However, McKenna et al. do not explore the apparent conflict between the need to control unpredictability and the desire to be self-reliant.

One study explicitly addresses conflicting perceptions, but with regard to assistive devices like canes and walker, not PERS. Gitlin and colleagues[112] conducted a study on older stroke patients' concerns about the use of assistive devices. The authors found that the interviewees faced "value dilemmas," which the authors describe as "conflicting sets of sociocultural beliefs and values relevant to devices or contrasting normative expectations or ideals" (p.11). Further, the authors explain that study participants balanced social expectations of older adults' aesthetic appeal and ideals of functional competence and independence.

The proposed conceptualization of PERS adoption further elaborates these findings. The category *walking the balance beam* elucidates older adults' journey through balancing and resolving conflicting evaluations of PERS. It demonstrates how factors that have been identified in previous research interact with each other. In evaluating PERS as a tool to *reclaim control* and as a hinderance to *protecting personhood*, participants faced a value dilemma similar to the one Gitlin et al.[112] described. This dynamic relationship gives rise to a complex process of the continuous formation of cognitive appraisals—a process that can take anything between a few months to a couple decades. While participants initially postponed the subscription of PERS, the cognitive appraisals of PERS changed over time. Many of them *edged closer* as they collected more evidence of their need for a PERS through imagined, vicarious, and actual experiences. This process emerged from the conversations with non-subscribers as well as subscribers. Another major influence on the voluntary or involuntary resolution of this dilemma was the input provided by family members and friends (see 2.4. Social Influences on PERS Subscription).

Importantly, the results also indicated that a complete resolution of the dilemma is not necessary for individuals to acquire a PERS, a completely novel finding. First, although family members prematurely ended the process for some participants by making the decision on their parent's behalf, individuals nevertheless used the PERS. Second, a few participants showed that they still had ambivalent feelings about PERS after adopting it. Thus, the results of this study go a long way in explaining the dynamics of the interplay between factors and highlight the processual nature of PERS adoption.

### *2.3. Social Influences on PERS Subscription*

A major contribution of this study is the critical examination of social influences on PERS adoption. Specifically, I have identified two ways in which social influences impact PERS adoption. First, societal expectations of aging shape how older adults evaluate PERS in the context of *protecting personhood*. Second, family members and friends actively attempt to influence participants decision-making process on the balance beam, including extreme pressure bordering on coercion. The following sections explicate these interactions in more detail.

*PERS rejection as a way to dissociate from ageist stereotypes*

This study expands our understanding of the impact of the societal context on PERS adoption by specifying the nature of the impact in the pre-subscription phase. Previous studies have reported that the use of technologies "colonizes perceptions" [99] and signalizes to others the user's age, thus emphasizing limitations.[97, 99] In addition, the use of technology can reinforce ageist stereotypes [99] or change how other people view the user, thus potentially changing social dynamics and relationships.[109] These insights largely focus on post-acquisition.

This study suggests that societal norms of aging shape the way older adults think about themselves with regards to the adoption of PERS. Participants saw the acceptance of PERS as an implicit acknowledgment of being old. In this context, they implicitly and explicitly talked about the impacts of ageist views of member of society at large. Previous research on ageism has shown that older adults are aware the ways they are perceived and treated by the larger societal context. Similar to participants in this study, interviewees in a study on older adults' perceptions of ageism.[142] recognized ageist stereotypes with regards to personality traits, behaviors, and perceptions. Participants resisted the internalization and acceptance of these stereotypes, partially because they also exhibited ageist views. Thus, the reluctance to subscribe to a PERS service can be seen as an act to "dissociate the self from the 'old' group."[142]

*PERS and intergenerational power*

The results of this study identify novel ways in which family members and friends impact PERS adoption. The finding that children, in some cases, take over the decisions with regards to PERS is particularly relevant. Many studies have emphasized the importance of family and friends in the adoption of new technologies. However, these influences were often characterized as unilateral and advisory. However, one study claimed that the pressure service providers and family members put forth constitute a form of coercion.[109] In addition, Aceros and colleagues [84] reported that members of the social network perform "identity work" on older adults to persuade them to use PERS consistently by frequently prompting individuals and persistently expressing concerns about health, safety, and self-care.

The results of this study explicate the influence of family members in methods beyond coercion or identity work. Participants in this study reported that a child or a spouse had acquired a PERS without their explicit consent or against their wishes.

The results of this study demonstrate the intricacies of older adults' interactions with their adult children. These interactions are shaped by a partial or complete shift of power from the older parent to the adult children. In some cases, this shift can result in children taking over decision-making for their older parent. Studies on familial relations have shown that the redistribution of power within families is directed by covert and overt power processes. [143] Overt power refers to an individual's ability to carry out his or her will despite the resistance of others. Covert power on the other hand manifests when "more powerful individuals subtly influence decisions of the less powerful in ways that comply with their interests"(p.662). [143]

Instances of these power processes can be observed in participants' stories in this study and represented in the proposed ideal types of adult children. Participants reported *captains* using overt power to decide on their parent's behalf although participants had voiced their resistance. Covert power processes are at play in the dynamics between participants and their *coaches* who repeatedly attempted to influence their parent's decision.

Several studies suggest that family members should be involved in decision-making about technologies.[144, 145] For example, Lorenzen-Huber et al.[145] suggest the introduction of the "family technologists." In their essay, the authors discuss what technology should be introduced when and how. As part of the "how," they suggest strategies that include the use of cautionary tales. Thus, the authors suggest the application of fear-based strategies to convince an older family member to adopt a technological device or service. Based on the results of this study, such recommendations can be problematic given that their enactment could lead to further loss of older adults' status and sense of self.

The insights on social influences are consistent with the Theory of Normative Social Behavior [146, 147], which posits that descriptive and injunctive norms impact individuals'

behaviors. In this study, descriptive as well as injunctive norms seem to be at play. Participants reported feeling more comfortable with the adoption of PERS when they had peers or friends who had a PERS. On the one hand, participants were able to learn about the benefits of PERS. On the other hand, the fact that peers or friends had a PERS can be seen as a change in descriptive norms in that having a PERS became more normalized. At the same time, participants also reported facing injunctive norms in the form of prompts, expectations, and pressures they experienced in their interactions with family members and friends.

To sum up, the results of this study suggest that societal norms and expectations of aging shape the adoption of technologies such as personal alarms. In addition, children's use of their power to push older adults to get a PERS subscription can be problematic because it undermines the status of older adults and could lead to increased resistance to PERS adoption.

### *Summary*

This dissertation research is the first study to elucidate intrapersonal and interpersonal processes prior to the subscription to PERS. Taking the perspective of older adults, the study presents the dynamics of factors that impact PERS uptake and provides insights into social influences that play a key role in the adoption of PERS. In the next section, I discuss how the results of the presented study align with existing theories.

## SECTION III - Theoretical Perspectives on PERS Adoption

In the second chapter of this dissertation, I presented several technology adoption models and theories that take various perspectives on adoption stages, processes, and behaviors. In this section, I present theoretical perspectives on the results presented in this dissertation that may

further elucidate processes underlying the decision-making with regards to PERS and inform the development of interventions to increase the adoption of PERS.

### *3.1. PERS Subscription and Decision-making Theories*

The proposed conceptual model elucidates the decision-making process for PERS in which a dilemma arises from conflicting meanings individuals ascribe to these personal alarm systems. Conflicts in decision-making have been explored in a range of theories including the theories of cognitive dissonance [148] and decision conflict. [149] Although these theories differ in important aspects, they address conflicts that arise in the decision-making process and propose different mechanisms of how individuals solve these conflicts and reach a decision.

To discuss these theories in detail would go beyond the scope of this discussion section. Therefore, I describe the main tenets of the theories and discuss their relevance in the context of the proposed substantive theory. The theory of cognitive dissonance posits that individuals aim to minimize the levels of cognitive dissonance because of the psychological discomfort such dissonance causes. Dissonance can be defined as the misalignment or contradictions of cognitions, which include attitudes, beliefs, and perceptions about behaviors. According to the theory, individuals choose the behavioral option that decreases the dissonance in their cognitions.

*Walking the balance beam* can be viewed from the perspective of the minimization of cognitive dissonance. Participants' stories suggest that initially acquiring a PERS would have created greater cognitive dissonance with *protecting personhood*, than the dissonance caused by not acquiring a PERS and *reclaiming personhood.* Over time, participants experienced more physical decline leading to an increase in the dissonance between not acquiring the PERS and *reclaiming control*. In some cases, it increased to the point where the dissonance between not

acquiring a PERS and *reclaiming control* exceeded the dissonance between acquiring a PERS and *protecting personhood*, leading the individual to subscribe to a PERS.

Janis and Mann's conflict theory posits that decision makers find themselves in a decision conflict when being confronted with behavioral options that are risky. If they have no hope of finding a better solution, individuals respond with defensive avoidance, which includes procrastinating and putting the decision off until later, shifting responsibility for making the decision to others, or reinforcing the alternative that is least objectionable. [149, 150] The results of this study partially reflect elements of this theory. Participants were faced with two options: acquire the PERS or reject the PERS. Both decision options bore their own risks. Acquiring PERS risked infringing on the individual's personhood and sense of self, which participants deemed a certain outcome. Rejecting the PERS meant risking an outcome that was uncertain: injury and, potentially, death. The response with defensive avoidance is particularly relevant for the processes described in this study. Most participants had postponed their decision to a later point in time. When children or friends were involved by prompting individuals to get a PERS, some interviewees delegated the responsibility for the decision to others.

As mentioned above, this section was meant to give a brief overview of theories that could be helpful to further the understanding of the pre-subscription process. The theories of cognitive dissonance and decision conflict provide a starting point for this exploration.

### *3.2. Technology Adoption as Behavior Change*

The results of this dissertation suggest that individuals progress through stages towards PERS uptake and, thus, individuals at each of the stages may constitute distinct audiences for behavior change efforts. As discussed in Chapter 2 of this dissertation, various models have been applied to explain the uptake of PERS and other QoL technologies. Some of these models

specifically address the use of technology such as the Technology Acceptance Models and the Unified Theory of Acceptance and Use of Technology, whereas theories like the Theory of Planned Behavior or Social Cognitive Theory pertain to behavioral intentions and behaviors in general. These models assume that individuals weigh the expected benefits of a behavior or technology against associated costs and adopt it if the balance is favorable. However, these theories provide little guidance as to how the uptake of PERS can be impacted because of the implicit assumption that all individuals behave in similar ways.

The stages proposed in Section II of Chapter 4 were based on the study sample without the application of pre-existing knowledge. Notably, the proposed stages closely resemble the Stages of Change of the Transtheoretical Model (TTM) [151] and those of Weinstein's [152] Precaution Adoption Process Model. These models conceptualize the adoption of new behavior as a dynamic process that is impacted by a variety of determinants. The processes are characterized by a person's progression through a set of stages, each of which is a step closer to action and maintenance of a new behavior.

Common to both stage models is the claim that a person has to be aware of the risks associated with their current behavior and accept their susceptibility to be harmed in order to change their behavior or adopt a new one. In this study, many participants did not see themselves as susceptible to falls or other emergency situations. This perception was further reinforced based on the negative impacts of accepting PERS—a symbol of old age—on personhood and self-concept that participants anticipated.

The analysis of participants' readiness to take action and subscribe to a PERS (Chapter 4 Section II) suggests that some individuals were closer to changing their behavior than others. Viewing the adoption of PERS through the lens of stage theories can be beneficial for the

development of interventions because these theories suggest that (1) individuals at different stages behave in qualitatively different ways, and consequently, (2) at every stage different intervention and communication strategies are needed to move people closer to acquiring and using a PERS. [152]

### *Summary*

This section provided theoretical perspectives on the results of this research study. These insights can be used to inform future research to gain a better understanding of mechanisms underlying the PERS adoption process. In addition to the substantive theory in this study, the suggested theories can also be used as a basis to develop interventions to remove barriers to PERS adoption. Section IV discusses the strengths and limitations of this study to further assess the quality of the research.

## SECTION IV - Strengths and Limitations

### *Strengths*

This is the first study to develop a substantive theoretical model that focuses on the pre-subscription process in the context of PERS adoption. The proposed substantive theory constitutes a unique contribution to existing research. Rigorously following grounded theory methodology and letting salient themes emerge from the data, rather than applying preconceived concepts, allowed me to develop categories that explicate a previously understudied part of the PERS adoption process.

The sample captured broad range of participants and a great variety of experiences with personal alarm systems. It included individuals who had never thought about PERS and those

who have had their PERS for several years. The resulting breadth of experiences among individuals allowed for the in-depth exploration of processes shaping PERS adoption.

### *Limitations*

The individuals in this study were all non-Hispanic white and born in the US, except for one participant. Furthermore, the sample was limited to persons who were proficient enough in English to conduct an interview, leading to a culturally homogeneous sample. Other studies have shown that cultural norms impact individuals' attitudes towards technology. Therefore, it is possible that adoption behaviors differ between cultural groups. Consequently, the results of this study do not account for these differences.

Moreover, only two out of 18 participants were men. There are several reasons that may explain why men are underrepresented in this sample. First, the sex ratio above the age of 65 favors women. In other words, there are fewer men than women in the population. According to the 2010 census [153], there were approximately 60 men per 100 women at age 85, which was the mean age of this sample. Second, men are less likely to live alone than women. In 2015, 20% of men aged 65 and older lived alone compared to 36% of women. The difference is likely to increase with increasing age as women tend to outlive their male counterparts. Among those who live independently, individuals who live with somebody are less likely to acquire a PERS.

While men seem to be underrepresented in this study, sex differences in the prevalence of falls renders this limitation somewhat less significant. Based on data from the 2014 Behavioral Risk Factor Surveillance System survey, women are more likely to report falling than men (30.3% vs. 26.5%) and are also more likely to report a fall injury (12.6% vs. 8.3%.)

Finally, the study was conducted in Santa Monica and Westchester, situated in the Western part of Los Angeles County. The population in this area is characterized by relatively

high socioeconomic status (SES) compared to other parts of the county. As a result, the individuals in this sample were also of higher SES, although some variations exist. This is problematic as adoption behaviors may differ significantly based on the social and economic resources available to a person.

Because of the monthly financial expenditure required for the subscription to a PERS, individuals with higher SES are more likely to have the ability to enter such a commitment. This was partially reflected in the failed outreach to organizations serving lower income communities. It also highlights the fundamental problem of technological developments primarily benefitting higher SES groups, thereby perpetuating and exacerbating the health disparities between rich and poor.

## SECTION V - Implications for Research and Practice

In the previous sections, I illustrated how my dissertation research expands present-day research findings and theories. In this section, I discuss how the results inform future efforts in research and practice in public health and technology design.

### *5.1. Implications for Research*

This research study provided novel and important insights into pre-subscription processes for PERS. However, some findings require further elaboration. The results highlight the importance of social influences on PERS acquisition, particularly those of family and friends. Members of the close social environment play different roles which I categorized into captains, coaches, and companions. However, the mechanisms through which these ideal types influence PERS adoption and the impact on the use of PERS are still unclear.

The theoretical model suggests that coaches have a significant impact on individuals' progression towards PERS subscription. The data also indicates that this impact is created by increasing the perception of threat of injury or creating feelings of guilt within the individuals. However, there is a need for further exploration as to how coaches impact older adults' self-perception. Furthermore, the ethical implications of these impacts also need to be studied.

Moreover, it is unclear how the premature termination of the reconciliation process impacts the use of PERS in the long term. Although the results showed that three of the four subscribers whose family members had acquired the PERS for them consistently wore and used the PERS, it is unclear whether the family member's behavior could hamper PERS use in the long run. Therefore, more research is needed to elucidate the effect of interference in the reconciliation process on PERS use.

In addition, the constructed ideal types of captains, coaches, and companions may provide a structure to study interpersonal interactions in other situations. For example, study participants mentioned that children took on similar roles in the context of assisted living and in the discussion of giving up driving. Given that children's roles are constructed through the interaction with their older parent, the question arises to what extent children are able to take on the roles of captains, coaches, and companions and how these roles impact older adults' behaviors. These insights can provide useful guidelines for practice by identifying approaches that yield positive outcomes for older adults as well as their children.

The proposed model suggests that social norms play an important role in PERS adoption as individuals aim to distance themselves from ageist stereotypes. The results of this study also indicate that individuals react differently to the social norms with which they are confronted. As mentioned previously, the Theory of Normative Social Behavior [146, 147] provides a useful

framework to understanding the influence of social norms. The theory posits that the impact of descriptive and injunctive norms on behaviors are moderated by other individual-level and societal-level factors. Some of the factors that have been identified in previous research include self-efficacy, social comparison tendency (predisposition to compare themselves to others), or the level of interdependence.[146] In the context of PERS adoption, more research is needed to identify the extent to which social norms impact the adoption of PERS and what factors moderate the effect of normative influences.

Furthermore, I previously discussed that individuals contemplate the meaning of the concept of having and using PERS rather than a specific instance, model, or brand of PERS. This insight suggests that the conceptual model may be applicable to other technological devices that could potentially threaten the user's personhood, such as remote patient monitoring, environmental modifications, and social robots. In addition, further research is necessary to elucidate to what extent this model is transferable to other populations, such as other age groups, cultural groups, or populations with different socioeconomic characteristics.

### *5.2. A Call for Action in Public Health*

Throughout the study, I found that participants (and some of their family members) lacked the appropriate information to make an informed decision about personal alarms and other health-related technologies. Participants reported not knowing how to choose a personal alarm and which service would provide the best fit for their needs. While information materials can be found online,[9] it is not accessible for older adults in this form for many because they are not skilled at accessing the Internet or do not us it at all. Furthermore, the material is often dedicated to family members rather than the affected person. This orientation is problematic because it increases older adults' dependence on children or others, contributing to shifts of

[9] see for example the AARP website: https://www.aarp.org/caregiving/home-care/info-2017/medic-alert-systems-options.html

familial power to the children. While "baby boomers" are more likely to use the Internet than previous generations, it is important to remember those who for one reason or another do not access the internet. Therefore, I call on senior service agencies as well as public health agencies to increase efforts to disseminate appropriate information about PERS and other beneficial health-related technologies directed to the end user across the digital divide and beyond.

Technology-based solutions are often touted as the magic bullet to deal with the effects of population aging. Part of these effects are aging-related impacts on health which fall under the purview of public health efforts. This field has yet to embrace its role in studying technology and informing technology development. As this and other studies others have shown, the development and adoption of technology-based solutions is not only a question of improving the health of older adults but also a matter of social justice, because current models of delivery of technology-based solutions put at risk older adults' (sense of) agency and personhood.

Public health professionals possess the tools and experience to engage in this effort. I showed that technology adoption is a process that closely resembles that of behavior change. Using the transtheoretical model or the precaution adoption model, a frequently used behavior change model, public health professionals can design and implement interventions that increase adoption of health-related technologies among older adults. In addition, the conceptualized ideal types of social connections—captains, coaches, and companions—can be used to develop nuanced guidelines for the involvement of friends and family members.

Finally, ageism is reified in many ways and some ways are more subtle than others. This dissertation addressed how ageist stereotypes can prevent older individuals from adopting personal alarm systems. As with other "-isms", ageism has been shown to be detrimental to

health. Given that most of us will join the group of "older adults" at some point, it is in everybody's interest to continue and to expand the efforts to fight ageism.

### *5.3. Implications for Technology Design and Commercialization*

The analyses of the interview data suggest that the anticipated impacts of PERS uptake and use play a more fundamental role than specific design features, such as the aesthetics or usability. However, many efforts to improve PERS and other health-related technologies focus on these design characteristics.

Hence, the results call into question the conceptual design of the PERS. The insights also warrant a reassessment of current design processes in terms of user involvement and approaches to testing QoL technologies. Along with usability, technology developers should take into consideration the adequacy of the technological device or service and its impact on older adults' self-perception and social status.

Technology developers—individuals and organizations—would benefit from the insights of this study: designing and developing technology with the understanding of the importance of maintaining personhood has the potential to increase the uptake and use of the technology and realize the developer's business goals.

The results of this study can also provide important insights for marketing and communication efforts. Current advertisements tend to take fear-based approaches to convince consumers to adopt PERS. This research, however, suggests that these approaches may be counterproductive. Communicating the positive impacts a PERS can have on individual's independence and safety may represent a more effective approach.

# CONCLUSION

The purpose of this study was to advance research on technology adoption by further analyzing the meaning of such technologies for older adults and processes that lead to acceptance or rejection of personal emergency response systems (PERS) among their intended users. Applying grounded theory methodology, I developed a novel substantive theory that addresses interpersonal and intrapersonal processes in the pre-subscription phase of PERS adoption.

The uptake of PERS is preceded by a set of complex processes of evaluations of PERS along physical and psychological dimensions. Reconciling conflicting meanings of PERS in these dimensions requires individuals to re-evaluate PERS. Family members and friends play a crucial role in this process as they push the person closer to PERS subscription and in some cases make the decision for them.

The theory takes the perspective of the older person and expands the current body of knowledge in four distinct ways: (1) it demonstrates the processual nature of technology adoption; (2) it expands our understanding of previously identified factors of technology adoption by conceptually elaborating the constructs; (3) it specifies the dynamics between these constructs; and (4) it provides a critical perspective on the impact of social environment on older adults' adoption of technology. The theory informs the design of technology and the development of interventions that aim to improve the uptake and use of such technologies.

In conclusion, older adults' appraisal of QoL technology and the meanings they ascribe to them are critical importance to the uptake and use of such technologies and are crucial to realizing the value of QoL technologies for our fellow human beings.

# APPENDIX 1: Newsletter and follow-up

Newsletter November 2017

## Special Study About Personal Alarm Systems

[redacted]

Hello Westside Pacific Villagers! We would like to introduce you to Lena Riess, a new volunteer at WPV. She is a doctoral student at the School of Public Health at the University of California, Los Angeles (UCLA). Born and raised in Austria, Lena moved to Los Angeles in 2014 after working as a health researcher in Germany for a while. In her doctoral thesis at UCLA, Lena explores how people above the age of 65 experience the use of various technological devices. In particular, she focuses on experiences with so-called personal alarm systems – you may know them as LifeAlert, LifeLine, or Alert-1. Her goal is to make these kinds of devices more accessible to individuals who could benefit from them.

Lena would like to interview WPV members who are using personal alarm systems (for example Life Alert, LifeLine, BayAlarm Medical or other brands) or are considering getting one of these systems and who are willing to share their experiences.

At our Coffee & Conversation meeting on November 29, Lena will talk about the study and answer questions. In the weeks following the presentation, she will be calling WPV members to ask if they would like to participate in the study. If you do not want to be contacted, please let the WPV office know. You may also reach out to Lena anytime by phone at [redacted] or email at [redacted]

If you are eligible to participate, you will receive a $25.00 gift card after completing a 60- to 90-minute interview. The interview will be used for research purposes. Participation is completely voluntary and whether you participate or not will not affect your relationship with Westside Pacific Village in any way.

We hope to see you at the next Coffee & Conversations on November 29th!

[redacted] page 4

Follow-up January 2018

## Emergency Response Systems Survey

We would like to remind you of the research study that was introduced in the November newsletter. WPV Volunteer Lena Riess is interested how people aged 65 and older experience the use of personal alarm systems such as LifeAlert, LifeLine, Alert-1, or other brands. She would like to interview WPV members who are using personal alarms systems or are considering getting one of these systems, and are willing to share their experiences. Lean would also like to talk to people who have decided not to get one of these devices. This month, Lena will be calling WPV members to ask if they would like to participate in the study. If you do not want to be contacted, please let the WPV office know. You may also decline to participate when she calls. If you prefer, you may reach out to Lena directly by phone at [redacted] email at [redacted] The interview will take 60 to 90 minutes, and if you are eligible and decide to participate, you will receive a $25.00 gift card. As a reminder, the interview will be used for research purposes only and participation is completely voluntary. Whether you participate or not it will not affect your relationship with Westside Pacific Village in any way, and your participation will be kept confidential.

[redacted] page 3

## APPENDIX 2: Recruitment flyer

**ARE YOU 65 YEARS OR OLDER?**

**DO YOU USE OR OWN A PERSONAL EMERGENCY SYSTEM OR FALL DETECTOR?**

**OR ARE YOU CONSIDERING GETTING SUCH A DEVICE?**

You may know these devices by names such **as LifeAlert, Philips LifeLine, Alert-1, and BayAlarm Medical** (other brands are ok too).

If yes, you may be eligible to participate in a research study at UCLA and receive **a $25.00 gift card** after completing an interview.

The interview will last 60 to 90 minutes and involves questions on why and how you use your device and what role family members, doctors, and friends play in its use.

Please call [redacted] to speak to Lena Riess. She will give you more information about the project and can answer any questions you may have. If you qualify and you want to participate, Lena will work with you to set a time and place at your convenience for the interview.

Thank you!

Lena Riess, PhD student, UCLA Fielding School of Public Health
phone: [redacted]
email: [redacted]

# APPENDIX 3: Phone recruitment script

Hello Mr./Mrs _____,

My name is Lena Riess. I am a volunteer at Westside Pacific Villages and a doctoral student at the UCLA School of Public Health. I got your number from the Westside Pacific Villages office. As you may have read in the WPV newsletter, I am conducting a study with WPV members about personal alarms and how they decide to get an alarm or not.

I am calling to tell you more about the study and to see whether you are interested in participating.
Is it ok if I tell you more about the study?

The purpose of this research study is to understand more about how older adults use electronic devices that help them live independently. Specifically, we are interested in medical alert devices or fall detectors and why people sometimes decide not to use it. We are interested in learning how older persons come to the decision to get such a device and what role family members, friends, or health professionals may play in that decision. The findings of this study may be helpful in designing technological devices in a way that they are more helpful to older adults. They may also help organizations to create services that distribute these and similar devices.

Now that you know more about the study, would you be interested in participating in this study? If you would like to take more time to think about it, you are welcome to call me anytime or, if it's ok with you, I can call you back.

*If member is interested, continue with Screening Script*

## APPENDIX 4: Presentation script

Hello everyone,

My name is Lena and I am a doctoral student at the School of Public Health at UCLA. I am here today to talk about a research study that I am doing for my dissertation. The study is on how people above the age of 65 experience the use of various technological devices.
But before I tell you more details, I would like to introduce myself: I was born and raised in Austria. After working in Germany as a health researcher for a while, I moved to Los Angeles in 2014 and started my doctoral degree in Public Health at the University of California Los Angeles (UCLA). As I mentioned, in my doctoral thesis, I explore how people above the age of 65 experience the use of various technological devices. I focus on experiences with personal emergency response systems – you may know them as LifeAlert, LifeLine, or Alert-1. I am interested in this topic because I want to make these kinds of devices more accessible to individuals who could benefit from them. To do that, I first need to understand how people use these devices.
The best way to learn about people's experiences is by talking to them. So I reached out [redacted] and she offered to help me to find people who might be interested in sharing their experiences with me. So here I am, reaching out to any of you who are using a personal alarm system (for example, LifeAlert, LifeLine, BayAlarm Medical or other brands) or are considering getting one of these systems.
This is what you can expect if you are eligible to participate:

- meet with me in a location of your choosing
- participate in one or two in-person interviews
- share your thoughts about why you use your technology or why not
- describe the role of friends, family, and healthcare providers in your use of technology
- be available for potential follow-up questions by phone

At the end of each interview, you will receive a $25 gift card. Participation is completely voluntary and whether you participate or not will not affect your relationship with WISE & Healthy Aging in any way.

Does anybody have any questions?

If you are interested in participating, please come and talk to me so we can schedule a brief phone call so I can determine whether you are eligible. I will also leave flyers with my contact information, so you can get in touch with me, if you are interested.

# APPENDIX 5: Screening script

*It is most likely that interested individuals will contact me via phone (SCENARIO 1). But in some cases, community partners from WPV might refer potentially eligible to me by sharing the individuals' contact information (at the individual's request). In that case, I will call the individual to determine whether they are interested and eligible to participate (SCENARIO 2).*

Hello Mr./Mrs _____,

SCENARIO 1
Thank you for calling me. I would like to share more information with you and ask a few questions in order to determine whether you may be eligible for the study.

SCENARIO 2
My name is Lena Riess and I am a doctoral student at the UCLA School of Public Health. I got your number from _____, who said you might be interested in participating in my study. Is that correct?

I would like to share more information with you about the study. Is it ok if I continue?

The purpose of this research study is to understand more about how older adults use electronic devices that help them live independently. Specifically, we are interested in medical alert devices or fall detectors and why people sometimes decide not to use it. We are interested in learning how older persons come to the decision to get such a device and what role family members, friends, or health professionals may play in that decision. The findings of this study may be helpful in designing technological devices in a way that they are more helpful to older adults. They may also help organizations to create services that distribute these and similar devices.

SCENARIO 3*: Continue here if individual agreed to be screened in phone recruitment.*

Next, I would like to ask you a few questions about your age, where you live, and the device you are using or thinking about using. Is it ok for me to continue?

If yes:
1. How old are you?
2. Where do you currently live? Do you live in your own home, independent or assisted living facility, or somewhere else?
3. Are currently using a tool or device that can provide help in case of emergencies or a fall? You may know these devices by names such as LifeAlert, Philips LifeLine, Alert-1, and BayAlarm Medical, but other brands are ok too.
4. Are you currently considering using such a tool or device in the near future?

If yes to question 4:
5. Can you describe your device to me in a few words?
6. Do you remember when you got the tool/device?

If yes to question 6:
7. Are you thinking about a specific device? What device would that be?

**If NOT eligible** (no to questions 5 & 6 or age below 65 in Question 1):
I see that you _____ and _____ [insert eligibility criteria that the individual did not meet]. Therefore you are not eligible for the study for the study, so I will end the interview here. Thank you for your time.

**If eligible:**
You meet the study criteria to participate in this study because you are 65 years or older are currently using a medical alert device or are considering using one in the near future.

This study consists of a one-on-one interview with me. The interview will last about 60 to 90 minutes. It will take place in person and you can choose where you would like to do the interview. This could be in your home, in a private room in a library, or any other place where you feel comfortable and safe to talk. In this interview, I will ask you questions about how you found out about the device, how you came to your decision to get it or not, and (*if participant is currently using device)*, how you use the device. I will also ask questions about the role of your family, friends, or health professionals when it comes to using the device. We will discuss this as much as you are willing and comfortable. Taking part in the interview is voluntary and entirely your decision. You can skip questions you do not want to answer and end the interview at any point. At the end of the interview, you will receive a $25 gift card for Target, independent of whether you complete the full interview or end earlier. Whether you participate in an interview or not will not impact your relationship with Westside Pacific Village in any way.

If you are interested in doing the interview we can choose a time and a place right now, and I will meet you there. Would you like to take part in this study and schedule an interview appointment?

Do you have any questions about the research? I am going to give you my cell phone number, if you have any questions about the study or if you need to make any changes to our appointment. Do you have a pen? My phone number is 949-383-7806. I am happy to answer your questions.

If you have questions about your rights as a research and would like to talk to someone other than the researcher, please call the UCLA Office of the Human Research Protection Program at (310) 206-2040.

Thank you again for your willingness to answer my questions.

## APPENDIX 6: Informed consent form

University of California, Los Angeles

## CONSENT TO PARTICIPATE IN RESEARCH STUDY

*Older Adults' Experiences with Quality of Life Technology*

*Lena Riess, MS*, a doctoral student in Community Health Sciences Department at the Jonathan & Karen Fielding School of Public Health at the University of California, Los Angeles (UCLA), is conducting a research study.

You were selected as a possible participant in this project because you expressed interest in participating and have experience using a personal emergency response system or fall detector or are considering using one in the near future. Your participation in this research study is voluntary and confidential.

**Why is this study being done?**

The goal of this study is to understand how older people use technological devices that support them to live independently. We want to learn from their experiences and the role of family, friends, and healthcare providers play in the decision to use of these devices.

**What will happen if I take part in this research study?**

If you volunteer to participate in this study, the researcher will ask you to do the following:

- meet with Lena Riess in a location of your choosing
- participate in one or two in-person interviews
- share your thoughts about why you use your technology or why not
- describe the role of friends, family, and healthcare providers in your use of technology
- be available for potential follow-up questions by phone

The interviews as well as potential follow-up conversations by phone will be audio-taped. You have the right to review the tapes made as part of the study to determine whether they should be edited or erased in whole or in part.

**How long will I be in the research study?**

The interview will last between 60 and 90 minutes.

**Are there any potential risks or discomforts that I can expect from this study?**

I will ask you to share your experiences with technology, relationships with your family and friends, and potentially your health. In some cases, you might feel unpleasant emotions or remember situations that made you feel uncomfortable.

**Are there any potential benefits if I participate?**

While you will not directly benefit from taking part in this project, the information you provide contributes to increase our knowledge about older adults and the way they use technology. The results of the research may inform technology developers to create technological to better suit older adults' needs. They may also be used to create and improve programs that provide older adults with technology.

**Will I be paid for participating?**

- You will receive a $25 gift card at the end of each interview for a possible total of $50.

**Will information about me and my participation be kept confidential?**

Any information that is obtained in connection with this study and that can identify you will remain confidential. It will be disclosed only with your permission or as required by law. Confidentiality will be maintained by means of keeping recorded interviews in a secure location. Only Helene Riess will have access to this location. Any identifying information will be removed from interview transcripts. Quotes may be used in publications, but will not contain any identifying information.

**What are my rights if I take part in this study?**

- You can choose whether or not you want to be in this study, and you may withdraw your consent and discontinue participation at any time.

- Whatever decision you make, there will be no penalty to you, and no loss of benefits to which you were otherwise entitled.
- You may refuse to answer any questions that you do not want to answer and still remain in the study.

**Who can I contact if I have questions about this study?**

- **The research team:**
  If you have any questions, comments or concerns about the research, you can talk to one of the researchers. Please contact:

  Lena Riess
  phone: [redacted]
  email: [redacted]

- **UCLA Office of the Human Research Protection Program (OHRPP):**
  If you have questions about your rights while taking part in this study, or you have concerns or suggestions and you want to talk to someone other than the researchers about the study, please call the OHRPP at (310) 206-2040 or write to:

  UCLA Office of the Human Research Protection Program
  Box 951406
  Los Angeles, CA 90095-1406

***You will be given a copy of this information to keep for your records.***

**SIGNATURE OF STUDY PARTICIPANT**

_____
Name of Participant

_____ _____
Signature of Participant Date

**SIGNATURE OF PERSON OBTAINING CONSENT**

| Name of Person Obtaining Consent | Contact Number |
| --- | --- |
| Signature of Person Obtaining Consent | Date |

# APPENDIX 7: Semi-structured interview guide

Thank you for letting me interview you. As I mentioned before, I am interested in hearing about your experiences with your medical alert device. I want to emphasize again that anything you say is confidential. You can skip any questions you don't want to answer and you can end the interview at any. Do you have any other questions after going over the information sheet?

1. Introduction

**I would like to start by talking with you about your experiences with new technologies. By new technologies I mean things like computers, smartphones, tablets, or smart TVs.**

- What role does technology play in your life?
- What kinds of gadgets or appliances do you have?
- Which one is your favorite device?
- How do you generally find out about new gadgets?
- Which gadget or appliance is the most useful and why?

**Instead of saying "device", use the word the participant uses to refer to the device*

2. Deciding to get the device

**Now let's talk about the medical alert device that you have. Tell me about how you decided to get this *[device]*.**
**If participant is a non-user (either still considering or decided against it), rephrase the question, but the probes will be very similar.*

- How did you become aware of the [*device]*?
- What was going on in your life that made you consider getting the [*device]*?
- What were your initial thoughts and feelings when you first found out or heard about the device? How, if at all, did these thoughts and feelings change over time?
- What role, if any, did family members, friends, doctors, or others play?
- How long did it take to decide whether to get it or not?
- What were some of the things you considered when deciding to get the [*device]*?
- What other changes have you made to deal with possible falls?

3. Using the device

**Tell me about the time when you first got the *[device]*.** *Get a general feeling about how they integrated it into their lives and how they use the device.*

- What was happening that day?

- How did you become familiar with the *[device]*?
- What did becoming familiar entail?
- On a scale from 1 to 10, 1 being really easy and 10 really hard, how easy or hard was it for you to learn how to use the *[device]*? What does that number mean to you?
- Who, if anyone, was involved in this process and how?
- How, if at all, have you been able to integrate the *[device]* into your daily life? *Probe if they had to make changes to their everyday life to make room for the technology, or whether it was easy to integrate it.*
- At what point, if at all, did you feel comfortable with the *[device]*?

**Tell me about the situation, when you first set off an alarm with the *[device].***

- What was going on that day?
- What happened?
- What went through your mind?
- What did you do?
- Did you immediately think of using the *[device]*? Did you do anything else to resolve the situation? **probe if participant used any other strategies to get out of the situation*

**Tell me about a situation, if there was one, when the *[device]* was most useful.**

- What was going on that day?
- What happened in the situation?
- What did you do?
- How was it useful? For what?
- What did you think or feel after you used it?
- Who, if anyone, was involved, and how?

**Tell me about a situation, if there was one, where the *[device]* really bothered you.**

- What was going on that day?
- What happened in the situation?
- What did you do?
- What did you think or feel?
- Who, if anyone, was involved, and how?
- What bothered you?
- How was this situation different from other times when you used your device?

**Tell me about the most recent situation, if there was one, where you decided not to use the *[device].***

- What happened?

- What was going through your mind when deciding whether to use the device or not?
- Who, if anyone, was involved, and how?
- How was this situation different from other times when you used your device?
- What happened after you decided not to use it? *Probe for consequences with regards to health, social relationships etc.*

4. Current thoughts about the device

**Tell me what you think or feel now, looking back on some of the experiences you shared with me.**

- Would you act differently if a situation similar to the ones you described occurred? If yes, how?
- Has there been a recent situation in which you acted differently than you did before?
- How would you compare the way you saw the *[device]* in the beginning and the way you see it now?
- How do you like the device now?
- Are you open to get other gadgets that could support you to live independently?

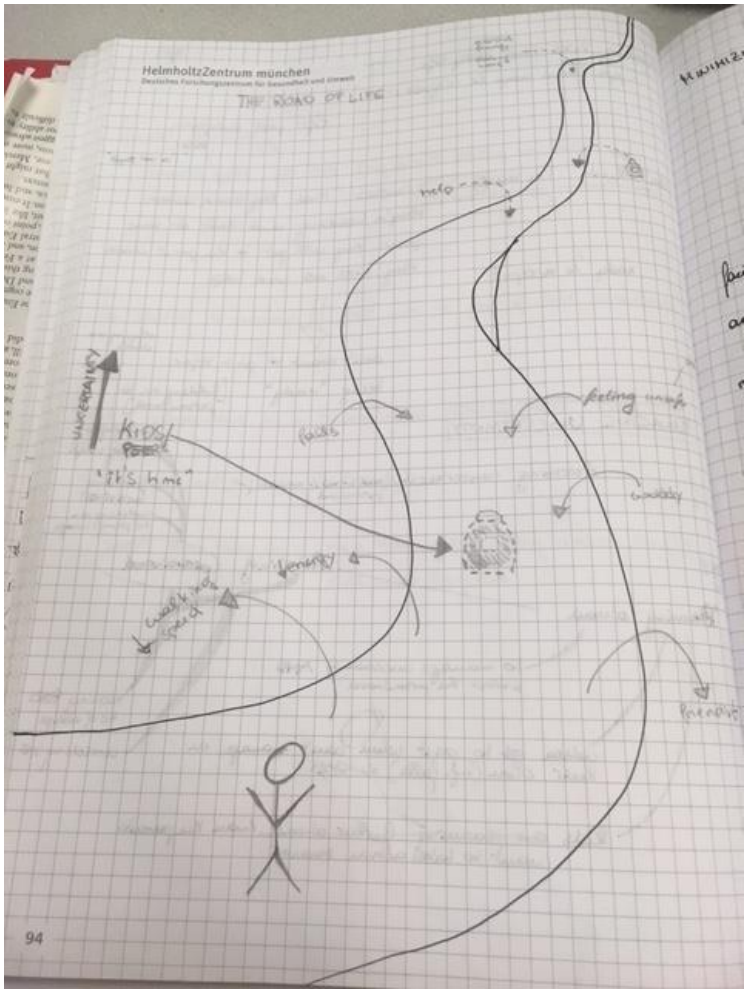
5. Ending questions **End on positive note*

- What are some of the things you appreciate most about the *[device]* you have?
- What would you advise someone who is thinking about the *[device]* for themselves based on your personal experience?
- Is there anything else you would like to tell me?
- Is there anything you would like to ask me?

# APPENDIX 8: Visualizations

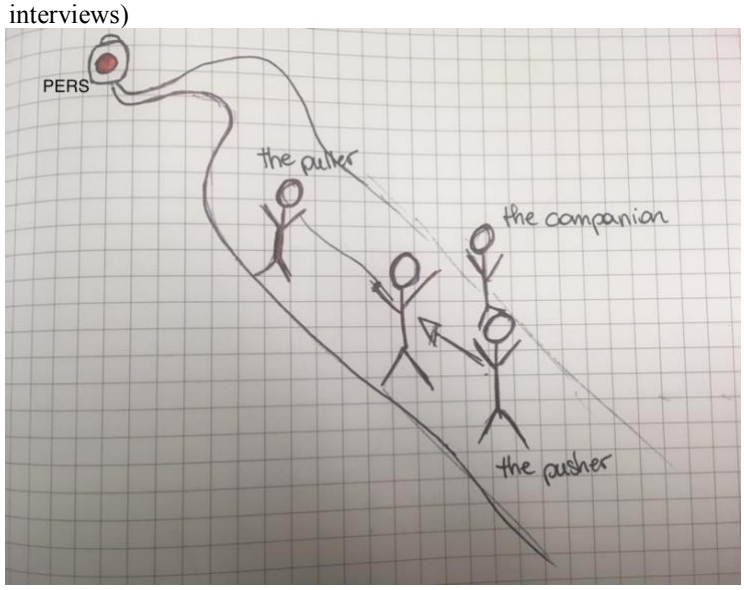
Road of life

February 2018



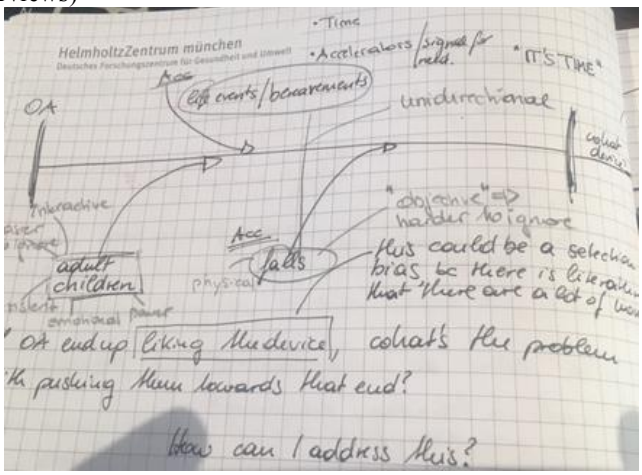
Positions of ideal typical family/friends

February 2018 (after 13 interviews)

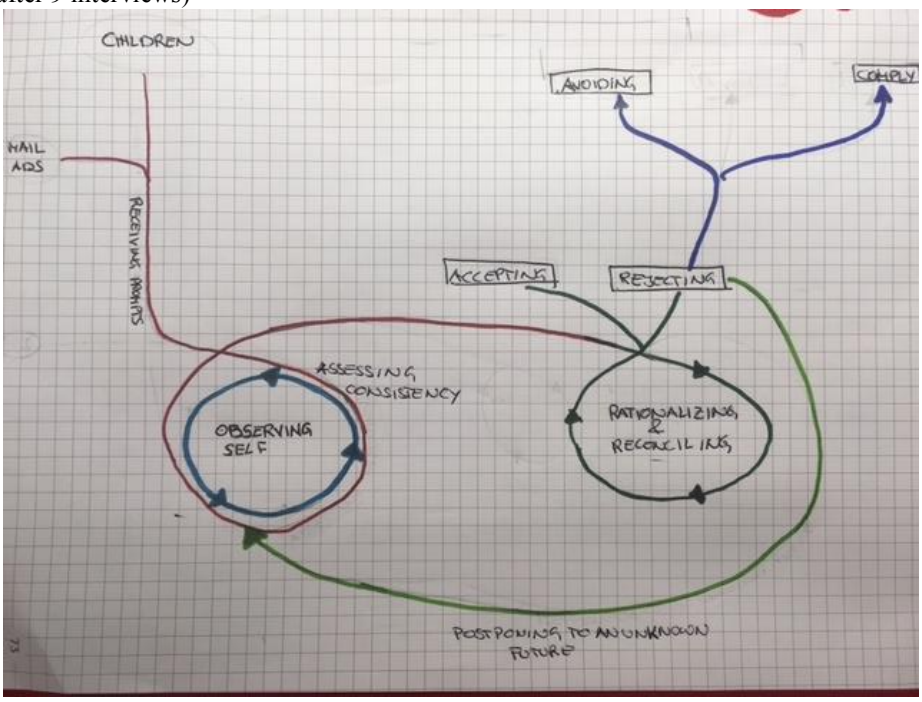



Early conceptualizations of pre-subscription processes

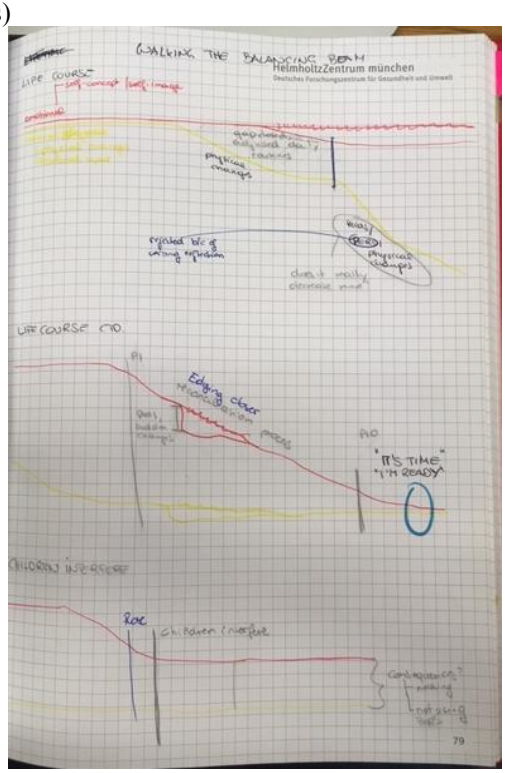
December 2017 (after 3 interviews)



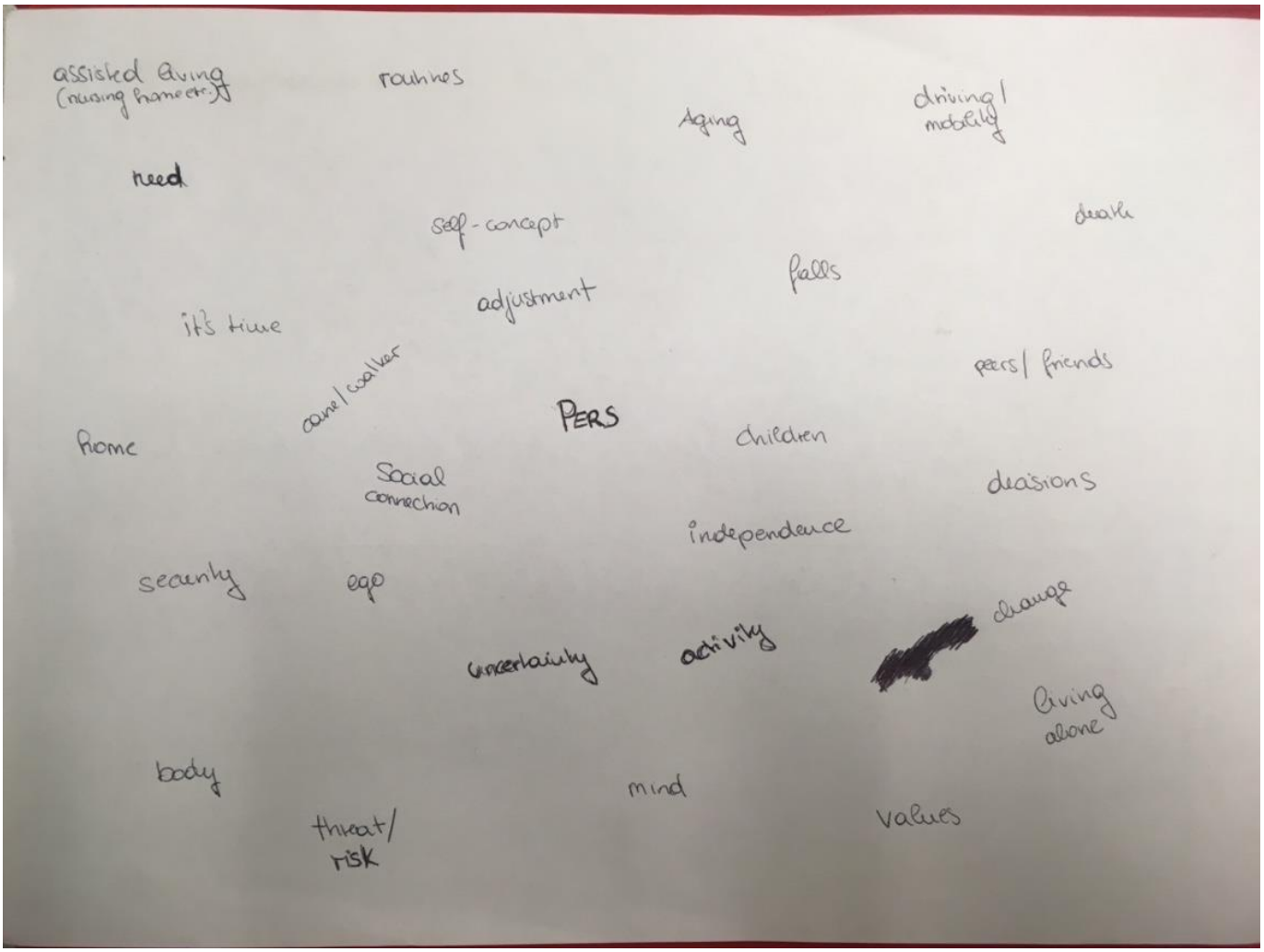
January 2018 (after 9 interviews)




February 2018 (after 11 interviews)



## APPENDIX 9: Situational Map



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