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BY

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B.A., Communication, University of California Los Angeles, 2010

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DISSERTATION

Submitted in Partial Fulfillment of
the Requirements for the Degree of

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ABSTRACT

Information and resources are needed to promote quality of life and access to health resources for older adults. Physical activity is an effective health prevention strategy that can help increase older adult life satisfaction and maintain functional ability. Communication technologies like the Internet and smartphone are also useful tools that provide older adults needed resources to stay educated and engaged in healthy aging. This study investigated older adult perceptions of aging, communication technology, and physical activity for older adults. Literature on theories of aging, physical activity strategies, behavior change, and technology use was gathered to understand how these concepts contribute to healthy aging. A mixed methods research design was used to understand older adult perceptions on aging, technology and physical activity. Constructivist Grounded Theory and Constant Comparative Analysis were used to qualitatively analyze interview and focus group transcripts for emergent themes on these topics. Hierarchical logistic and multiple regressions were used to quantitatively test the relationships between attitudes toward aging and technology beliefs, technology

ownership/use and physical activity self-efficacy. Aging was found to be a time of a change that necessitated acceptance and adjustment to the declines associated with aging. Older adults in this study balanced their concern for the harms of the Internet and smartphones with the benefits these technologies offer. Participants were concerned about the ways communication technology may harm human interactions, but these older adults also admitted to the benefits of using these technologies to communicate with family and search for health information online. Also, physical activity was an important strategy participants used to maintain health and have control over their aging experiences. Attitudes toward aging were found to predict smartphone ownership in older adults, though this relationship was weak. The findings argue that society has something to learn from older adults' balanced and mindful use of communication technology. This study also argues a sense of control in aging experiences may influence older adult physical activity self-efficacy. More research is needed to understand the complex role aging perceptions play in older adult physical activity and older adult use of technology for health purposes.

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Chapter 1:

INTRODUCTION

When I was a young man, I was my grandfather's palliative (end-of-life) caretaker. During this time, I witnessed a World War II veteran struggle with the daily tasks of dressing himself and getting up and down from a chair. I distinctly remember seeing a scar on his outer left hip whenever I assisted him in the shower. This scar was the remnants of a shrapnel wound he received in the battle of the Hurtgen Forest in the European front of World War Two. The scar was earned by a young man and worn with dignity by an old one. When I was a child, he would tell me the story of the day he was hit and wanted me to be inspired and courageous like him. I was honored to be my hero's companion and share in his last days on earth. My grandfather faced the challenges of aging with courage but uncertainty. He told me once, "they never told me I wouldn't age in my mind. My hands say 79 years old, but my mind says 23." I held my grandfather's hand as he passed away from this life. The older adults in my life spur my interest in aging and health.

Older adults are the one of the fastest growing age demographics in the world and this increase in the older adult population demands investigation in older adult health and disease prevention strategies. Physical activity is one preventive strategy that needs to be considered for the improved health of older adults. Physical activity offers many benefits to all, particularly adults ages 50 and older. Though the benefits of physical activity are known, many adults, including older adults do not meet national standards of physical activity needed to maintain good health. Because the need for physical activity is important and since a considerable number of older adults are not sufficiently active, it is

important that health research investigate older adult lack of participation in physical activity behaviors. The positive implications of physical activity and low participation in these behaviors necessitate programs and interventions to motivate and persuade older adults to adopt physically active behaviors to improve their quality of life and contribute to healthy aging.

An important factor in the quality of life for older adults are the attitudes older adults have toward aging. Negative aging attitudes and ageism act as significant barriers to active aging and physical activity in later life (Swift, Lamont, & Drury, 2017). Programs and interventions for older adult physical activity need to consider how these attitudes of aging impact older adult health. A positive factor for older adult attitudes and health may be information communication technology. These technologies may positively impact older adults to stay active, connected and healthy (Center for Disease Control and Prevention [CDC], 2011; Department of Health and Human Services, 2012). Physical activity, attitudes toward aging and communication technology use are important topics for older adult health.

Introduction to the Study

The primary goal of this study is to expand knowledge on older adults' perceptions of aging, physical activity, and communication technology use for health purposes. To support this goal, the following aims guide the investigation of these specific concepts:

Aim 1: To understand the perceptions older adults in the community have toward aging, technology use and physical activity.

Aim 2: To assess whether the attitudes community older adults have toward aging impact their communication technology perspectives and use.

Aim 3: To assess whether the attitudes community older adults have toward aging impact their physical activity self-efficacy.

The study is important because the topics being considered and the ways in which they are being researched positively contribute to healthy aging and quality of life for older adults. The inclusion of older adults in this research and development process empowers older adult voices and perspectives and provides older adults the opportunity to contribute to their community.

This study arose from my interest in older adult health, healthy aging and health promotion. In view of the importance of using a community-based approach to impact social change and address health disparities (Robinson, 2005), I approached the Department of Senior Affairs in Albuquerque, New Mexico, with my research interests and goals. The Department of Senior Affairs is the division of the city governance that manages the senior and multigenerational centers within the metropolitan area. This division ensures that city development and operations address the needs and services of older adults in the community.

Through a series of meetings with these community officials, we were able to identify mutual goals and available resources.

Senior Affairs has multiple projects that would be well served through this study. After several months of collaboration, the Senior Affairs city department decided this study would fit best in an accreditation process they are currently processing. Several of the senior center locations are currently applying for national accreditation with The

National Institute of Senior Centers (NISC), a division of The National Council on Aging (NCOA). This accreditation is official recognition of standards of excellence of senior center operations and programs. Simply stated, senior centers that possess NISC accreditation demonstrate best practices in principles and operations that provide older adults the resources needed to be active, engaged and independent in their communities (NISC, 2019). This accreditation process involves self-assessment, where the senior centers in question evaluate adherence to the Department of Senior Affairs mission statement as well as ratings and feedback from center members. Senior Affairs identified two significant contributions this current study makes to their assessment process:

1. The topics of this study, specifically, attitudes toward aging, technology use, and engagement in physical activity are concepts that significantly inform criteria for the assessment process.
2. The interviews and focus groups with community older adults needed for this study, give Senior Affairs access to community member ratings of and feedback for senior center operations.

Both I and Senior Affairs needed participation from community older adults for our respective goals. My resources as a researcher who could facilitate conversations with community members were valuable to Senior Affairs. Senior Affairs offered resources of official support, and recruitment assistance where officially sponsored calls for participants increased my credibility with community older adults. These mutual goals and pooling of resources marked this collaboration as follows:

1. The Department of Senior Affairs granted me permission to recruit research participants through senior center newsletters and provided senior center rooms where interviews and focus groups were conducted.
2. Senior Affairs provided questions for the survey instrument of this study to solicit feedback on senior center services and programs.
3. I provided Senior Affairs a summarized report of the qualitative results from this study, specifically how these results demonstrate local senior centers contribution to older adult socio-emotional, intellectual/cognitive, and physical/activity quality of life as well as ways Senior Affairs could improve on these quality of life metrics.

The collaboration combined my interest to understand older adult perspectives on aging, physical activity, and technology with the city's need to understand older adult use of services pertaining to physical activity, technology use, and quality of life in their aging experiences.

Problem Statement

Physical activity is an important strategy to maintain and improve older adult health. According to the CDC (2015) lack of physical activity is a key indicator for health risk behaviors for older adults. In 2015, 31.6% of older adults engaged in no leisure time physical activity. The Agency for Healthcare Research and Quality and the CDC report that only one third of older adults in the United States meet recommended levels of moderate physical activity (2002). Older adults age 50 and over participated in less physical activity than those 65 years and older (CDC, 2017). According to the New Mexico Department of Health (NMDOH), older adults in that state are more likely than

people in other age categories to be inactive (2016). The NMDOH advocates for increased availability of fitness programs for older adults in order to prevent diseases and disabilities due to sedentary and inactive lifestyles.

Older adults experience many barriers to physical activity such as personal health and safety, lack of time, lack of resources and social influence (Macera, Cavanaugh & Belletiere, 2017; King, Castro, Wilcox, Eyler, Sallis & Brownson, 2000). Along with explicit barriers, psychosocial barriers such as negative attitudes toward aging negatively impact older adult participation in physical activity. Negative age perceptions are associated with less participation in preventive health behaviors, while low expectations in regards to age are independently associated with little participation in physical activity (Sarkisian, Prochaska, Wong Hirsch & Maglione, 2005). Swift, Lamont and Drury (2017) argue that negative aging attitudes and ageism act as significant barriers to active aging and physical activity in later life. Though negative attitudes toward aging are detrimental to healthy behaviors, Levy, Pilver, Chung, and Slade (2014) found that improving negative perspectives on aging increases physical activity behaviors. Age stereotypes are one major contributor to negative attitudes toward aging. Age stereotypes are generalized beliefs about older people that tend to focus on negative attributes of loss and decline where older adults internalize these attitudes, which in turn discourage physical activity behaviors (Levy, 2009). Age stereotypes are a significant psychosocial barrier to physical activity for older adults and should be addressed in physical activity promotion for older adults.

It is important this study considers the different ways physical activity is defined and understood. Physical activity is often conflated with fitness, exercise, and even

leisure activities. Though these conflated meanings may stem from convenient generalities, the differences among these activities have cultural, racial and economic implications (Mier, Medina, & Ory, 2007). Most research on physical activity considers it an activity of health done during recreation, leisure or spare time, but these concepts of leisure and free time can alienate some people who do not have the privilege of such resources and can overlook variations in cultural and moral attitudes (Caperchione, Kolt, Tennet & Mummery, 2011; Henderson & Ainsworth, 2001; Lusmägi, Einasto & Roosmaa, 2016). Health researchers must consider how populations understand various health concepts. A cultural approach to health and physical activity is warranted.

This study adopts a cultural approach to health. A cultural approach to health is a process that considers how social relationships and beliefs impact health behaviors and allow researchers and health promoters to connect with audiences in substantive ways (Airhihenbuwa, 1995; Dutta, 2008).

One effective strategy for older adult health promotion may be the incorporation of information communication technologies in the dissemination of information and interaction with older adults. The Department of Health and Human Services (2012) posits that ICTs positively impact the aging population and improve health outcomes. The Center for Technology and Aging (2014) advocates for “connected health,” where Internet based technologies and mobile devices specifically help adults stay connected and provide resources for healthy and active aging. The CDC (2011) considers how the use of mobile technology for health (mHealth), such as mobile phones, tablets and their Internet capabilities, could enhance health promotion efficiency and reduce cost. Older adult adoption and use of mobile technologies are increasing (Anderson & Perrin,

2017) and evidence shows use of these technologies can contribute to healthy aging (Abdulrajak, Malik, Arab & Reid, 2013; Dasgupta, Reeves, Chaudhry, Duarte, & Chawla, 2016). Though there are many benefits of older adult technology use, there are sociocultural, psychological and physiological aspects that might prevent older adult use of technology and hence deny integration into the modern social world. Most older adults still do not use ICTs for everyday or health related purposes and this digital divide (Levine, Lipsitz & Linder, 2016) between older “have nots” and the rest is a real concern for a connected world. Understanding older adult perspectives and use of technology may uncover the appropriateness of their inclusion in older adult health promotion.

Lack of older adult physical activity, diverse perspectives on physical activity, negative attitudes toward aging, and older adult use of technology are all important aspects to consider for healthy aging for older adults.

Statement of Purpose

The purpose of this study is to gather and understand older adult perspectives on physical activity, aging, and technology. A secondary purpose of the study is to explore whether and how attitudes toward aging impact older adult physical activity self-efficacy and technology use. It is important for any research on older adult physical activity to consider attitudes toward aging since prior research demonstrates the relationship between these two concepts. A third purpose of the study is to understand older adult use of various technologies and their role in healthy aging.

Research Questions

In order to fulfill the purposes and goals of this study, several research questions are posed:

Research Question 1 (RQ1): How do participants perceive their aging experiences?

Research Question 2 (RQ2): What are participant perspectives of communication technology use?

Research Question 3 (RQ3): How do participants perceive the role of physical activity in their aging experiences?

Research Question 4 (RQ4): What is the relationship between participants' perceptions of aging and perceptions of communication technology?

Research Question 5 (RQ5): What is the relationship between participants' perceptions of aging and use of communication technology?

Research Question 6 (RQ6): What is the relationship between participants' perceptions of aging and physical activity/exercise self-efficacy?

Overview of Methodology

To answer the proposed research questions about older adult physical activity, aging perceptions and technology use, a Mixed Methods Research (MMR) approach is required. Henderson and Ainsworth (2003) previously noted that MMR is an appropriate method to investigate physical activity because physical activity involves complex human behavior and attitudes that need diverse ways of asking and answering questions.

Physical activity involves subjective elements of individual perspectives and sociocultural attitudes as well as objective biomedical metrics of physiological health that frequently guide physical activity research (Henderson & Ainsworth, 2003). MMR is a

method and methodology of research that utilizes both qualitative and quantitative methods of design, sampling, and analysis (Tashakkori & Teddlie, 2008).

Purposive and snowball sampling techniques were used to recruit community dwelling older adults age 50 years and older within the city limits of Albuquerque, New Mexico to participate in this study. The study consisted of the research instruments of interviews, focus groups, and a survey. There were 37 individual interviews and two focus groups with seven to ten participants each. The interviews and focus groups used semi-structured schedules to guide the conversation about perceptions of physical activity, aging and technology. The transcripts of these conversations were analyzed with the qualitative methods of thematic cyclical coding and constant comparison analysis. The qualitative analysis arm of this study adopted a constructivist grounded theory approach (Charmaz, 2014).

The survey instrument included 30 questions that contributed to the quantitative arm of the study. The questions consist of demographic information, questions about technology use, previously developed scales of Attitudes Toward Own Aging (Lawton, 1975; Liang & Bollen, 1983), Images of Aging Scale (Levy, 2004), self-ratings of health (Fayers & Sprangers, 2002) The International Physical Activity Questionnaire for older adults (IPAC-E) of self-reports of physical activity types and amounts (Craig et al., 2003; Hurtig-Wennlöf, Hagströmer & Olsson, 2010) and the Exercise Self-Efficacy Scale for Older Adults (Neupert, Lachman & Whitbourne, 2009). The responses to these survey questions were developed into variables of ratings of health, attitudes toward aging, aging stereotypes, physical activity behavior types and amounts, use of technology, and types

and amount of technology use including technology use for health purposes.

Relationships among these variables were tested with hierarchical multiple regressions.

The use of qualitative methods simultaneously with quantitative methods to understand a phenomenon is a simultaneous method triangulation (Morse, 1991) that utilizes the strengths of each method. This study uses a qualitative and quantitative complementarity triangulated simultaneous design since both qualitative and quantitative methods are done simultaneously and their respective results are combined in the discussion where the results are compared to complement and elaborate on the different types of findings (Creswell et al., 2007; Morse, 1991).

Rationale and Significance

The rationale for this study is the need for older adults to have the knowledge and resources necessary for healthy aging. Healthy aging is an important topic due to the increase in the older adult population.

According to the US Census Bureau (2014), older adults are projected to make up almost 30% of the national population. By the year 2050 almost half of the countries in the world will have a population where older adults over the age of 65 will make up more than half of those nations' populations. In the United States, the population of adults age 65 or older is expected to double by the year 2060 and the population of those 85 years or older will triple within the same timeframe (Administration on Aging [AOA], 2014). The "greying" effect in the United States and throughout the world demonstrates the improvement of living conditions where medical advancements have increased life expectancy. With increased life expectancy, however, comes the increase in older adults with chronic health conditions needing professional medical attention and resources. This

increase in the older adult population may have a significant impact on the resources of the healthcare industry and shift cultural and social ideas of what it means to age.

According to the National Council on Aging (NCOA, 2017) 80% of adults 65 years and older have at least one chronic disease, and 77% have at least two. The Centers for Disease Control and Prevention (CDC, 2015) report older adult chronic diseases account for 66% of the nation's healthcare budget. Older adult health is a topic with personal, social and economic implications. Health interventions that can reduce the instances and impact of older adult chronic diseases and encourage healthy aging for older adults are needed.

Physical activity is an appropriate health strategy for older adults to improve their quality of life and can be adapted to many levels of ability or health limitations (WHO, 2015). Also, promoting physical activity levels for older adults is an effective strategy, even indirectly, to address ageism and improve older adults' quality of life, attitudes toward aging and social positioning (Levy, Slade, Kunkel, & Kasl, 2002). It is important that this study addresses ageism, since ageism leads to internalized negative stereotypes (Levy, 2009) that encourage older adults to expect social isolation, physical and cognitive decline, lack of physical activity and economic burden in old age (Angus & Reed, 2006). Physical activity promotion could reduce the impact of these internalized stereotypes.

Another rationale for this study is the need to increase older adult participation in health research. To accomplish this, community member input and participation is sought, and older adult perspectives are discovered, utilized, and empowered. This approach can inform future interventions. Older adults are significantly underrepresented in health research and their participation is needed for greater accuracy in health

statistics, health intervention development, and a greater understanding of public health issues (Cherubini & Gasperini, 2017).

Another important contribution of this study is the consideration of ICTs and their role in successful aging (DHHS, 2012). This study explores ways in which older adults use these technologies and attempts to understand how ICTs can contribute to older adult health promotion. The World Health Organization (2011) argues that mHealth use in health promotion may be convenient and cost effective. Utilizing ICTs could be an effective strategy for city departments to utilize limited financial resources to reach intended audiences as well as further develop older adult use of technology and possibly address low older adult use of ICTs and the older adult digital divide.

Theoretical Framework

Theoretical concepts ground the conceptualization and utilization of the concepts of physical activity, attitudes toward aging, and technology use. These frameworks will guide the analysis of the research findings.

For health communication research on physical activity, it is important to consider behavior change theories and how they can impact older adult perceptions and behaviors of physical activity. The Transtheoretical Model (TTM) or stages of change theory, Theory of Planned Behavior (TPB) and community empowerment are excellent concepts to apply to older adult physical activity and physical activity self-efficacy. TTM posits that an individual's readiness to engage in change can be organized into a continuum of thoughts and behaviors (Prochaska & DiClemente, 1983). TPB attempts to predict behavior by gauging one's intention to change and also considers those influences to intention (Ajzen, 1991). Community empowerment is when community members define,

control and participate in developing their own health environment (Minkler & Wallerstein, 2005). These behavior change constructs address those aspects of behavior that are both within and out of the control of older adults.

To consider those forces that influence readiness to change and behavioral intention for physical activity, theories of subjective aging, successful aging, and Age Stereotype Embodiment Theory are used to understand older adult perceptions of aging. Subjective aging is a lifespan process of development that entails bidirectional and dynamic interactions between individual, social and cultural components that influence an individual's understanding of what it means to age (Diehl, Wahl, Brother & Miche, 2015). Successful aging encompasses individual and social components of the aging experience. Successful aging is also the adoption of behaviors and the experiences of disease avoidance, maintenance of physical and cognitive function and engagement in productive social activities (Rowe & Kahn, 1997). Stereotype Embodiment Theory argues that stereotypes become embodied in older adults through reinforcement of sociocultural practices and beliefs that lead older adults to define themselves through these imposed stereotypical categories and behaviors of frailty and incompetence (Levy, 2009). Stereotype embodiment is the process that demonstrates how negative attitudes toward older adults are pervasive and have a significant impact on older adults' beliefs about themselves and aging (Hess, 2006).

This study also considers older adult use of communication technology. The Diffusion of Innovation Theory (Rogers, 2003) is used to help explain how older adults perceive the usefulness of communication technology in their lives and how they adopt these technologies. Diffusion of Innovation Theory explains how the adoption of

innovations like communication technology is determined by characteristics of innovations and how people differ by when they adopt technology and how their resources and social position influence innovation adoption.

Assumptions

This study is based on assumptions deemed as evident and beneficial for older adult health:

Assumption One. Older adults want to live healthy and fulfilling lives.

Assumption Two. Physical activity behaviors contribute to healthy aging.

Assumption Three. Older adult perspectives on physical activity, aging and technology shared in this study will reflect their attitudes and beliefs about these topics.

Role of the Researcher and Researcher Bias

The role of the researcher is to promote the research study, recruit participants, organize and analyze the data, draft the results and share the results of the study with the Department of Senior Affairs and the older adults in the Albuquerque community.

Personal experiences and professional research interests may bias perspectives and interactions with older adults in this study. I have been a caretaker for older adult members of my family and my time with these older adults shaped my passion and interests in older adult health. I was my grandfather's palliative (end-of-life) caretaker. I was also a caretaker for my grandmother. During this time, I drove her to doctor appointments, took her to grocery stores and ran her errands. I also cleaned house and cooked for her.

In these instances, I witnessed both the frailty and resilience of older adults. I consider myself privileged to have had these opportunities. It is important I recognize

these experiences as influencing my research and balance my passion with empirical, evidence-based and peer reviewed research, and consider theoretical constructs in my own research. The use of extensive literature and theoretical frameworks in this study grounds my passion and interest in academic, medical and public health research conversations and constructs.

Definitions of Key Terminology

Ageism. Ageism is the stereotyping of and discrimination against individuals or groups based on their age (Butler, 1980).

Attitudes toward aging. Attitudes toward aging are the connections between social and individual attitudes such as cognitive and evaluative aspects of aging that influences perspectives and behavior (Diehl et al., 2015).

Culture. Culture is a people's shared language, history, psychology, and lineage (Airhihenbuwa, 1995) and is a force that both constrains and empowers behavior (Dutta, 2008).

eHealth. eHealth is the use of technology for health purposes, such as health information seeking and participating in support groups (Czaja & Lee, 2012).

Health. This study adopts the WHO (2015) definition of health as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity.

Information communication technologies (ICT). ICTs are technology devices (e.g., smartphones), related communication functions (e.g., texting) and include relationships that form through technology use (e.g., social networking) (Lievrouw & Livingstone, 2006).

mHealth. mHealth is the integration of mobile technology, health care and behaviors, specifically in regards to smartphones, mobile phones, feature phones and tablets (Abidi, 2015).

Older adult. For this study, older adult is defined as any individual age 50 years and older. Though much research considers older adults to be 65 and older, 50 years of age and older includes a demographic of particular interest to this study. Fifty years of age is the lower age limit when a resident of Albuquerque can become a member of the senior centers. The Department of Senior Affairs in the metropolitan area of this study operates these senior centers. Membership in these centers allows one to participate in the physical activity resources provided by the centers. Since the Department of Senior Affairs is interested to promote its existing services and resources, it is important this study utilize the city's adopted older adult age category of 50 and older.

Physical activity (PA). For this study, physical activity is understood in broad terms as any movement at varying levels of intensity that positively contributes to health (CDC, 2008). This definition is different than exercise, which is a more specific type of movement (Henderson & Ainsworth, 2001), though research on physical activity considers it an activity of health done during recreation, leisure or spare time (Henderson & Ainsworth, 2001).

Physical activity self-efficacy. Physical activity self-efficacy is defined as the belief in one's capabilities to organize and execute the courses of action required for physical activity (Bandura, 1997).

Subjective aging. Subjective aging is a lifespan process of development that entails bidirectional and dynamic interactions between individual, social and cultural

components that influence an individual's understanding of what it means to age (Diehl, et al., 2015).

Successful and healthy aging. Successful aging is the adoption of behaviors and the experiences of disease avoidance, maintenance of physical and cognitive function and engagement in productive social activities. Healthy aging is an integrated model of aging where physical activity, social interactions, and nutrition influence physical and mental health (McKee & Schuz, 2015).

Organization of the Dissertation

Chapter 1 contains the introduction to the study and presents the statement of the problem of older adult healthy aging and physical activity and use of technology. The purpose of the study is articulated and the research questions that guide the study are also identified. This chapter also contains an overview of the methodology and the data analysis techniques. The significance, rationale, assumptions and definitions of terms are also presented.

Chapter 2 presents the extensive literature review. This review discusses physical activity, perspectives on aging, a cultural approach to health, and older adult use of and attitudes toward technology. Older adult use of technology is also discussed with consideration on technology use for health purposes. This chapter also includes a conceptual framework that demonstrates the connection of these concepts and theoretical constructs. This conceptual framework informs the use of theory in the analysis of the research data and explains how these concepts work together to explain older adult physical activity, attitudes toward aging, behavior change theories and constructs, and older adult use of technology.

Chapter 3 describes the methodology and methods used for the study. The sampling process, recruitment, screening, and informed consent are identified. This chapter also explains the instruments of interviews, focus groups, and survey and their respective protocol. The data management and analysis are also presented.

Chapters 4 presents the results of the study. Emergent themes from the qualitative arm of the study are provided. For the quantitative arm of the study, hypotheses for research questions 4-6 are explained and tested with hierarchical logistic and multiple regressions.

Chapter 5 discusses the results of this study. Findings for each research question are discussed. The integration of the qualitative and quantitative data is also discussed. This discussion chapter presents the inferences from the results and examines the limitations and contributions of this study. Future direction for research is also provided.

Chapter 2:

LITERATURE REVIEW

In this chapter, the literature pertinent to inform this mixed methods study on physical activity promotion for older adults in Albuquerque, New Mexico is reviewed. The increase of the older adult population demands health researchers investigate ways to improve older adult health behaviors that promote healthy aging. This study investigates older adult perspectives on physical activity, aging, and technology use for health purposes. The theories and concepts of this review provide the foundation for the rationale and methods of this study, specifically concepts of older adult physical activity, theories of aging, behavior change theories, cultural approaches to health, and older adult use of mobile technology.

This literature review begins with an overview of the importance of physical activity for older adults and the benefits physical activity provides. The section ends with discussion of unique older adult considerations on physical activity, including barriers and motivators.

The next section addresses one of these barriers. A significant barrier that prevents older adults from engaging in physical activity behaviors is the psychosocial influence of negative attitudes toward aging. Theories on aging explain this barrier; specifically, subjective aging and how sociocultural concepts influence individual psychological dispositions of older adults. Subjective aging explains the process where social practices and beliefs reinforce negative assumptions of aging, which in turn lead older adults to develop negative attitudes toward aging. These negative attitudes toward aging negatively impact older adult health and discourage engagement in health

behaviors like physical activity. This section concludes with examples how changes in these negative aging attitudes lead to health behavior changes, i.e., adoption of health prevention behaviors like physical activity.

In this next section, behavior change theories and their application to older adult health are discussed. The importance of theory and the types of theory that are effective for older adult physical activity are presented. The behavior change theories of Transtheoretical Model (stages of change), Theory of Planned Behavior and community empowerment are explained. The Transtheoretical Model is one of the most used theories in physical activity promotion and research. The Theory of Planned Behavior has also proven effective for older adult physical activity and may effectively address the psychosocial physical activity barrier of negative attitudes toward aging. Community empowerment is a community-based approach to behavior change that considers the social environment of a behavior and may effectively address those factors that are out of the control of older adults, specifically the sociocultural influence of ageist attitudes. These behavior change constructs are used to inform the data analysis of this study.

This research considers how a cultural approach to health encourages input and collaboration from community members. A cultural approach to health addresses the social and subjective ways in which health, and specifically physical activity, is considered within diverse populations.

The last section of this review presents literature on older adult use of mobile technology. The WHO argues mobile technology may be a cost effective and easy to use tool in health promotion. This section discusses older adult increased use of mobile technology and how older adults use technology for health purposes (mHealth). This

section begins with an explanation of the technology adoption theory Diffusion of innovation. This section concludes with a discussion about how technology contributes to successful and healthy aging.

The inclusion of older adult mHealth and its application to health promotion may demonstrate technology's contribution to older adult health and successful aging.

Review of Literature

Older Adult Physical Activity

Physical activity is a health behavior that can maintain and improve older adult health. According to the CDC (2011), lack of physical activity is a key indicator for health risk behaviors for older adults. In 2009, one third of older adults engaged in no physical activity for health purposes. The Agency for Healthcare Research and Quality and CDC reported that only one third of older adults in the United States meet recommended levels of moderate physical activity (2002).

Benefits of physical activity. Exercise has multiple benefits for older adults. Consistent physical activity has physiological and psychological benefits, contributes to emotional well-being, improves personality and increases cognitive function (Blumenthal & Gullette, 2002). Brawley, Rejeski, Gaukstern, and Ambrosius (2012) found that physical activity improves social cognitions and facilitated mobility improvements in older adults. Physical activity plays an active role in promoting all around good health, functional independence, and quality of life for older adults (Wyman, 2001). Umstadd, Wilcox, and Dowda (2011) found physical activity enhances body satisfaction in midlife and older adults.

Elward and Larson (1992) found that a regular exercise routine can slow the physiological decline associated with aging, counteract the negative consequences of non-use of faculties, reduce chances of falls and decrease all-cause mortality. Conversely, physical inactivity and sedentary behavior leads to mortality and disability. According to the WHO, sedentary and inactive behavior is one of the ten main reasons for global mortality and disability (2013).

Physical activity recommendations for older adults. Older adult physical activity needs do not differ that much from those recommendations of other age groups. According to the American College of Sports Medicine (ACSM) (2007), the American Heart Association (AHA) (2007), and the WHO (2015), older adults need to adhere to the following exercise guidelines to assist in optimal health: 1) *Moderately intense aerobic physical activity for 30 minutes/day on at least 5 days or more a week or vigorously intense cardio 20 minutes/day, on at least 3 days a week.* Moderate intense aerobic is activity that increases the heart rate and vigorous intense cardio is activity that increases heart rate and causes sweating. 2) *Strength Training, 8-10 exercises, 8-12 reps for 2 days a week.* Strength training is any type of activity that uses resistance and/or muscle tension. 3) *Balance exercises daily.* This includes activity that challenges balance and coordination. 4) *Flexibility exercises daily.* This includes activity that improves or maintains joint range of motion and muscle suppleness.

These guidelines apply to all age groups with only the balance and flexibility exercises as specific recommendations for older adults. Intensity of these exercises is not uniform but rather individually guided by each individual maximum heart rate and strength. ACSM recognizes these as optimum, and even if disease and or disability

prevent such standards, effort can and should be made within individual capacity to work toward these standards. The goal of physical activity for older adults is to reduce sedentary behavior and manage risks of age-related disease and injury.

Older adult considerations for physical activity. The important considerations regarding physical activity for older adults encompass many aspects: barriers and motivators, and specific older adult considerations, including community and environmental factors.

Barriers and motivators. To better understand how older adult participation in physical activity can be increased and promoted, it is important to recognize the multiple barriers and motivators older adults face regarding physical activity. These various barriers and motivators are important to consider since they highlight the different levels of individual, communal and even environmental considerations of physical activity promotion for older adults.

Barriers. So as to impact long term changes in older adult health behavior, it is important to identify older adult barriers to physical activity that may prevent older adults from modifying sedentary behaviors (Dishman & Sallis, 1994). Sallis and Owen (2002) define barriers as actual or perceived intrapersonal, interpersonal or contextual factors that hinder individuals from participating in an activity. Factors of older adult health behaviors are multiple and often differ from those of general audiences or other age specific groups. Murdaugh and Insel (1998) delineated complexity of an intervention, need for information, physiological and psychological changes attributed to the aging process, lack of emotional health or appropriate social environment as important factors older adult physical activity interventions need to address.

Often cited older adult barriers to PA are personal health and safety, lack of time, lack of resources and social influence (King, Castro, Wilcox, Eyler, Sallis, & Brownson, 2000; Macera, Cavanaugh, & Belletiere, 2017; Wilcox, Castro, King, Housemann, & Brownson; 2000).

Personal health and safety as barrier. Perceived poor health, fear of injury, fear of falling, and perceived lack of skills are the most common barriers to PA reported by older adults (Brawley, Rejeski & King, 2003). Kowal and Fortier (2007) found that inactive older adults report higher levels of barriers than those who remained active or improved their physical activity. In a series of focus groups in Washington State, older adults frequently stated physical limitations a reason to not participate in community physical activity programs (Bethancourt, Rosenberg & Beatty, 2014). In a cross-cultural study between Mexican American and European American older adults in southern Texas, Dergrance, Calbach, Dhanda, Miles, Hazuda and Mouton (2003) also discovered that lack of perceived good health was identified as a barrier by both groups of participants. The perception of health status as a barrier can also lead to fear of falling or injury due to participation in physical activity programs (Macera, Cavanaugh & Belletiere, 2017). King, Rejeski and Buchner (1998) identified perceived safety of exercise a barrier for many older adult fitness interventions.

Lack of time. Perceived lack of time is also identified as a barrier, which prevents older adults from participating in physical activity (Baert, Gorus, Mets, Geertz, & Bautmans, 2011; Macera, Cavanaugh & Belletiere, 2017). Though being older can entail more free time due to retirement, many older adults are occupied by caregiving for grandchildren and elderly parents and identify these caregiving obligations as preventing

physical activity behaviors. Manson, Tamin, and Baker (2017), in qualitative interviews with ethnically diverse and low-income older adults in Ontario, Canada, found that these caregiving obligations as well as the need to visit other facilities for other services barred older adults from engaging in physical activity.

Lack of resources. Similar to time, lacking resources such as transportation to facilities and financial resources to pay for classes and exercise programs can prevent older adults from more engagement in physical activity behaviors. Manson, Tamin, and Baker (2017) found that older adults admitted that the cost and access to transportation were difficult barriers to overcome when it came to getting to physical activity programs. Also, the cost of physical activity programs and/or facility memberships may be too prohibitive for many older adults living on a primary fixed income (Macera et al., 2017). Garber and Blissmer (2002) identified economic barriers such as low income and insufficient retirement funds as preventing participation in fitness and exercise classes and facilities. Hildebrand and Neufeld (2009) also found that scheduling and cost of programs were barriers to community dwelling older adults.

Social influence. Hawley-Hague, Horne, Skelton, and Todd (2016b) identified barriers of identity (exercise not for older adults), choice (activity must be the decision of the older adult) and social influence (just retire and relax). Garber and Blissmer (2002) identified the social influence on older adults as barriers through assumptions and expectations older adults are to be less active and that older adults are too frail for physical activity. It has been found that young and older people alike hold beliefs that older adults are to be less active as a social norm (Ostrow & Dzewaltowski, 1986; Ostrow, Keeney, & Perry, 1986). Though well intended, these types of assumptions and

even social support meant to protect older adults from injury, may in fact encourage a sedentary lifestyle (Garber & Blissmer, 2002) and embody ageist attitudes (discussed in a later section).

Motivators. Though significant barriers do exist for older adults, there are multiple motivators that encourage older adult participation in physical activity programs. Of these motivators, the most important and influential for physical activity are physical and mental health benefits, social benefits of participation in a physical activity program, and emphasis on enjoyment.

Physical health benefits of physical activity. Many older adults, regardless of actual physical activity behaviors, admit of the health benefits of physical activity (Costello, Kafchinski, Vrazel, & Sullivan, 2011). This recognition of the health benefits of physical activity has also been seen across cultures (Dergrance et al., 2003). The ability of physical activity to improve the physical health of older adults as a motivator is a salient theme throughout much older adult physical activity research (Baert et al., 2011; Devereux-Fitzgerald, Powell, Dewhurst & French, 2016; Macera et al., 2017). Hildebrand and Neufeld (2009) found more older adults were recruited into a program when program information included realistic and applicable information on the health benefits of physical activity specific to older adults. Macera et al. (2017) illustrate the positive benefits physical activity has for older adults, specifically in the prevention and management of various chronic diseases, such as arthritis, osteoporosis, cardiovascular disease, diabetes and cancer.

Mental health benefits of physical activity. Mental health benefits of physical activity are just as important as physical health benefits for older adults. Bethencourt et

al. (2014) found that it is important for programs to promote both physical and mental health benefits so as to garner greater interest of older adults. Killingback, Tsofilou, and Clark (2017), in their multi case analysis of older adult physical activity programs, found programs that addressed the psychological and social (psychosocial) aspects of health, such as fun and enjoyment, were more successful in long-term program adherence. Manson et al. (2017) also found among an ethnically diverse and low-income population that both mental and physical health were important promoters for community-based activity programs.

Social benefits of physical activity. Physical activity programs offer older adults opportunities to interact with community members and maintain diminishing social circles due to retirement from work places and the passing away of family and friends. Killingback et al. (2017) discussed the benefits of social interaction where the notion of togetherness among physical activity participants contributed to the identified psychosocial gains and satisfaction with physical activity programs. Manson et al. (2017) also found that socialization motivated greater participation in community-based programs. Van Uffelen, Khan, and Burton (2017) found that both men and women admitted of social benefits of physical activity. Here, women identified spending time with others as motivating participation and men admitted to engaging in competitive activities with others as an important motivating factor. Social interaction has also been seen to contribute to greater physical activity adherence. Hawley-Hague et al. (2016b) found that older adults' dropping out of physical activity classes was associated with a lack of confidence to attend a fitness class or program alone.

Emphasis on enjoyment as a motivator. Devereux-Fitzgerald et al. (2016) argued that fun and social interactions should be the focus of interventions, especially since enjoyment contributes to greater perceived success of physical activity programs. Costello et al. (2011) found that inactive older adults admitted that physical activity was boring and needed more motivation beyond just physical health benefits. Devereux-Fitzgerald et al. (2016) developed a model that explains acceptability of physical activity programs for older adults. Here older adults engage in physical activity so as to increase social connections and where promotion of fun creates a more enjoyable program. Personal enjoyment of physical activity is then increased by the physical and psychosocial benefits as a result of participating in the program (being more active).

Domains of older adult physical activity. These motivators and barriers of older adults toward physical activity can be understood and should be categorized along intrapersonal, interpersonal and communal domains (Baert et al., 2011). This categorization is significant because it highlights the multilevel aspects of older adult health participation in physical activity. This multilevel understanding of motivations and barriers allows researchers and community health practitioners to consider both those aspects that are within and those outside the control of older adults. More importantly, this understanding of various domains highlights the importance of context and the role physical environments and ecological considerations have in regards to older adult physical activity programs.

Physical environment considerations. Moran, Cauwenberg, Hercky-Linnewiel, Cerin, Deforche, and Plaut (2014) found five important environmental considerations that impact older adult physical activity programs: pedestrian infrastructure, safety, access to

amenities, aesthetics and environmental conditions. Thornton et al. (2017) found older adult physical activity correlated with urban density, proximity to parks, proximity to recreation facilities, and self-reported neighborhood environment characteristics. These findings argue for significant consideration into the environment when designing and evaluating older adult physical activity programs. Van Ufflen et al. (2017) found that older adults want programs that are close to home. Killingback et al. (2017) identified the location and even music of an older adult PA program classes as important factors for program success.

Ecological considerations. Ecological models emphasize the connection between individual behaviors and the physical, sociocultural, and infrastructural constraints and contexts in which these behaviors occur. When considering barriers and motivators, it is important to consider how social and cultural constraints impact personal behavior where social norms and attitudes can actually dictate one's ability or desire to perform a health behavior like physical activity. Dergance et al. (2003) found that social expectations about aging promoted less active and sedentary behaviors, making it more difficult for older adults to consider physical activity. Swift and Lamont (2017) described these social attitudes toward aging as significant barriers to active and healthy aging lifestyles, which can lead to negative health and decreased functional ability for older adults later in life.

This section discussed the importance of physical activity for older adults, physical activity recommendations and various motivators and barriers to older adult participation in physical activity behaviors. The next section discusses theories of aging and how aging perceptions impact physical activity behaviors. Specifically, negative

attitudes toward aging is explained as a psychosocial barrier to older adult physical activity.

Perspectives on Aging

Perspectives on aging can have a significant impact on older adult physical activity. Physical activity has many benefits for older adults; it promotes all around good health, functional independence, and older adult quality of life (Wyman, 2001).

Unfortunately, psychosocial influences such as attitudes toward aging can act as a barrier that impacts older adult perceptions of physical activity and discourages physical activity behaviors.

There are multiple theories and concepts of aging from psychological to sociological perspectives. These perspectives elucidate the complex and sociocultural implications of the personal and individualized experience that is known as aging. The following section provides multiple theories and concepts that have been utilized in research on the aging process and health outcomes. Concepts of aging such as subjective aging, healthy/active aging, and Stereotype Embodiment Theory are discussed. This section presents examples of how negative perceptions of aging negatively impact physical activity behaviors as well as ways positive attitudes toward aging increase physical activity behaviors and improve overall health. The section concludes with considerations how these perceptions and health behaviors can change.

Theories and concepts of aging. The dominant concepts of aging that contribute to health and aging research emphasize both the sociocultural and subjective nature of the aging process. These concepts are successful, healthy and active aging, subjective aging, and aging stereotypes.

Successful, healthy and active aging. Rowe and Kahn (1987) argued that research in aging overemphasized age-related losses and failed to consider the heterogeneous nature of the older adult population and experiences where effects of aging are exaggerated and modifying sociocultural aspects ignored. Rowe and Kahn (1997) developed the notion of *successful aging* that takes into account individual and social components to the aging experience. Successful aging can be considered the adoption of behaviors and the experiences of disease avoidance, maintenance of physical and cognitive function and engagement in productive social activities.

McKee and Schuz (2015) say healthy aging is an integrated model of aging where physical activity, social interactions and nutrition influence physical and mental health. In this model, the perceptions of control of physical activity, social interactions and health behaviors can determine how these two “healths” are experienced. The World Health Organization (2002, p. 12) defines active aging as “the process of optimizing opportunities for health, participation and security in order to enhance quality of life as people age.” For Walker and Matby (2012) active aging and healthy aging are concepts that can be used interchangeably. Though these various definitions provide good insight, Hung, Kempen, and De Vries (2010) lament the lack of a consensual definition of healthy aging where multiple terms are used within this concept of aging and health. Hung et al. (2010) admit that successful aging is the most commonly used term in regards to positive health and aging.

Subjective aging. Diehl, Wahl, Brother, and Miche (2015) summarize and explain the various concepts of aging and how these terms are used in research. They posit *subjective aging* as a lifespan process of development that entails bidirectional and

dynamic interactions between individual, social, and cultural components that influence an individual's understanding of what it means to age. *Self-perceptions of aging* are the multiple perspectives and experiences that shape an individual's subjective age experiences. Lastly, *attitudes toward aging* are the connections between social and individual attitudes such as cognitive and evaluative aspects of aging that influence perspectives and behavior (Diehl et al., 2015). Hess (2006) furthers the notion of attitudes toward aging as societal and individual attitudes, which include affective, cognitive, and evaluative aspects of behavior of and toward older adults as an age group as well as individual and personal aging experiences.

These various concepts demonstrate the relationship between social and cultural views and practices of what it means to age and how these concepts influence older adult perspectives and behaviors. To the same extent, these concepts influence other age groups in their evaluation of and behavior concerning the aging process, specifically what it means to be an older adult.

Concepts of subjective aging admit of the fluid and socially constructed nature of the aging process. Kornadt and Rothermund (2015) argue that perceptions on aging are domain specific and not so generalized to the entire aging process. Domain specific perspectives of aging mean that various perspectives on being older can vary within certain contexts of individuals and groups. For example, life domains of career and work, home life, and relationships have their own specific age-related construct that can be different from one another. The variance of life domains and aging perspectives demonstrate the more nuanced aspects of the aging process.

Aging stereotypes' impact on the aging process. Subjective aging demonstrates how socially learned ideas about aging impact an individual's experiences and perspectives on how one should age. Ageist messages and practices in society influence these perceptions and perpetuate aging as a negative experience of loss and deterioration. Some ageist stereotypes frame older adults as doddering, in poor health, lacking energy, unproductive, sexless, depressed, and unable to change (Thornton, 2002). As one ages, these stereotypes become internalized and impact older adult self-perceptions and health behaviors. One of the most influential and often cited concepts of aging that impacts older adult health is Stereotype Embodiment Theory (Levy, 2009). This theory argues that stereotypes become embodied in older adults through reinforcement of social and cultural practices and beliefs that lead older adults to define themselves through these imposed stereotypical categories and behaviors. This is how stereotypes become internalized and thus operate at an unconscious level. Stereotype embodiment occurs when older adults experience the social cues and practices that place them within this specific age category. Such social cues can range from patronizing messages or denial of certain activities simply due to age. This embodiment over time influences perceptions and experiences through three main processes: psychological (expectations of the older adult experience), behavioral (modified behavior and activities to conform to created expectations), and physiological (changed behaviors lead to physical changes of the body). Simply put, this theory argues that older adults' beliefs about their own behavior reflects societal and stereotypical beliefs about aging.

Hess (2006) sees stereotype embodiment as the process that demonstrates how negative attitudes toward older adults are pervasive and have a significant impact on older adults' beliefs about themselves and aging.

Impact of aging concepts on health. These concepts of aging, specifically those on subjective aging, have been shown to impact health perspectives and behaviors of older adults.

Kornadt and Rothermund (2011) found that age stereotypes and self-perceptions are predictive of various health and well-being outcomes such as life satisfaction, physical health, and physical ability and functioning. Kotter-Gruhn, Kornstadt, and Stephan (2016) see age related stereotypes as self-fulfilling prophecies that play an integral part in determining functional ability and overall health for older adults. Similarly, Levy, Ashman, and Slade (2009) found that older adults are likely to attribute health problems and loss of physical ability to the aging process rather than to more controllable aspects of declining health such as sedentary lifestyle behaviors, though these attributes are not inevitable when culture may influence countervailing forces.

Conversely, Bryant, Bei, Gilson, Komiti, Jackson, and Judd (2012) found that positive attitudes toward aging were associated with greater life satisfaction, more self-reports of physical activity, and mental health. Levy, Slade, Kunkel, and Kasl (2002) found that older adults that had positive self-perceptions of aging lived on average seven and a half years longer than individuals who possessed negative aging self-perceptions. Also, Lamont, Nelis, and Quinn (2017) found a positive association between satisfaction with social support and more positive attitudes toward aging. Though there is considerable research that demonstrates the connection between age perceptions and

health outcomes for older adults, Robertson (2016) points out that these concepts lack a consistent operationalization. More research on the psychosocial interventions is needed to address attitudes toward aging as a factor in health for older adults that develop more concise frameworks and definitions.

Impact of aging perceptions on older adult physical activity. Attitudes or perceptions about aging can have significant impacts on older adults' participation in physical activity behaviors. These relationships can be summarized by the following: positive perspectives on aging lead to greater physical activity health outcomes, negative perspectives on aging lead to negative physical activity health outcomes, and changes in attitudes to aging lead to changes in physical activity behaviors and health outcomes.

Kenter, Gebhardt, Lottman, van Rossum, Bekedam, and Crone (2015) explored how aging attitudes impact physical activity behaviors, specifically the connection between subjective aging, control beliefs, and the perceived need for physical activity. In 17 interviews, four patterns of responses emerged when older adult participants were asked how life events impacted physical activity behaviors. Responses ranged from physical activity increasing after the death of a partner, to ideas that physical activity was not that important at this stage of later life. Response patterns were dependent on physical activity in early life and present and future self-perceptions. This study demonstrated that older adult perceptions of physical activity were diverse and changed over the life span. These changes in perceptions of physical activity highlight the fluid nature of aging and physical activity perceptions.

Positive perspectives of aging and physical activity. There is a considerable amount of evidence to suggest that positive aspects toward aging and getting older can

have a positive impact on health beliefs and behaviors, particularly in regards to physical activity.

Levy and Myers (2004), as part of the Ohio Longitudinal Study of Aging and Retirement (OLSAR), investigated whether older adult beliefs about themselves and the aging process were related to preventive health behaviors of eating a balanced diet, exercising, and medication adherence. Individuals with more positive self-perceptions tended to practice more of these preventive health behaviors. In their investigation on poor aging expectations and physical activity experience, Andrews et al. (2017) found that over a two-year period, participants' higher expectations for aging were related to increased engagement in moderate to higher intensity physical activity. This study demonstrates the impact more positive perspectives of aging (high expectations) have on physical activity. Beyer, Wolff, Warner, Schuz, and Wurm (2015) researched the mechanisms that connect positive self-perceptions of aging with better health. This longitudinal study discovered that more positive self-perceptions of aging were related to better self-reports of physical activity participation. Specifically, more positive self-perceptions of aging are associated with higher levels of reported physical activity behaviors. This increase in physical activity can predict improved self-reports of health over a longer period of time. In a similar study with recent retirees, Perras, Strachan, and Fortier (2015) found that recent retirees who identify as physically active older adults participate in increased physical activity so as to maintain their identities. This perception of retirees identifying as physically active seems to challenge the predominant negative stereotypical attitudes held about aging that see getting older as slowing down (Levy, 2009). Also, Greenlees Webb, Hall, and Manley (2007) found that older adults who participated in physical activity are

perceived as more physically attractive. This suggests that there are self-presentational benefits with being more physically active as one ages.

Negative perspectives on aging and physical activity. Just as positive perspectives on aging are related to increased participation of physical activity, negative aging perspectives can have the inverse relationship. Negative aging perspectives can have negative psychological and physiological impacts on physical activity and observable ability.

Sarkisian, Prochaska, Wong Hirsch, and Maglione (2005) discovered that negative age perceptions were associated with less participation in preventive health behaviors and that low expectations in regards to age are independently associated with little participation in physical activity. Swift et al. (2017) identified negative aging attitudes and ageism as significant barriers to active aging and physical activity in later life. These authors developed the Risks of Aging Model (RAM) to show how attitudes toward aging can impact health determinants. In this model, stereotype embodiment (Levy, 2009), stereotype threat, and age discrimination all impact physical activity. Simply put, stereotype embodiment and stereotype threat are where older adults understand the negative assumptions society has for older adults (less active) and embody them as their experiences. Greenlees, Hall, Manly, and Thelwell (2011) found that non-exercising older adults are perceived less positively than exercising older adults. This shows that there are self-presentational costs of those older adults that are seen as less active. Interestingly, the reverse is not true and more active older adults do not have the self-presentational benefits of being exercisers.

Negative attitudes toward aging are also known to lead to negative physiological changes for older adults. Deshpande et al. (2008) investigated the connection between older adults' fear of falling and physiological ability around activities of daily living (ADL). Here, older adults' fear of falling made individuals limit their physical activities. This fear of falling was seen as a negative self-perception regarding one's age and ambulatory abilities. The fear created change in behavior, which led to accelerated decline in actual physical function over a three-year period. In a similar study, Warmouth, Tarrant, Abraham, and Lang (2017) researched the connection between perceptions of aging and various scores along an index of frailty. Frailty was measured by difficulty in daily activities, reported falls, etc. Older adults with more negative perspectives on aging had higher scores of frailty over a six-year period. Similarly, Sargent-Cox, Anstey, and Luszcz (2012) conducted a longitudinal study that investigated self-perceptions of aging as it relates to functional ability. Negative self-views of aging predicted greater functional decline after a five-year period, even after controlling for demographic characteristics and health status.

Changes in aging perceptions and changes in physical activity. Since the connection between perceptions of aging and physical activity has been demonstrated, there is also research that shows changes in older adults' views on aging may be able to change views and behaviors toward physical activity. Lineweaver, Kugler, Rabellino, and Stephan (2017) discovered that negative perceptions of aging are not generalized but rather differentiated and dependent on context and experience of older adults. This study found that some stereotypes that older adults hold about aging are related to physical activity. The differential ways in which stereotypes are held and the connection between

stereotypes and physical activity behaviors may be evidence to suggest changing older adult perceptions of normal physical activity for older adults may change older adult participation in physical activity. Another model that argues for the psychological and behavioral factors of perceptions on aging is the Functional Spiral Model. Whitehead (2017) tested this model, which posits that functional decline in older adults actually occurs prematurely. This study found that physical activity mediated the impact of negative attitudes toward aging on gait and balance. Also, gait and balance performance mediated the impact of physical activity function. These findings support the psychological and behavioral component to premature decline of functional ability. Wolff, Warner, Ziegelmann, and Wurm (2014) investigated three groups of older adults who were given three different treatments in regards to perspectives on aging components. One group was given negative stereotypes of older adults and directed to reframe these stereotypes positively. The group that had this aging stereotype reframe treatment was related to an increased sense of satisfaction in the aging process, or as Erikson (1982) called it, integrity. A change in integrity predicted a change in physical activity participation. This study demonstrates that a change in attitude may lead to a change in behavior. In a similar study, Levy, Pilver, Chung, and Slade (2014) found that an intervention that strengthened positive stereotypes of aging strengthened self-perceptions of aging which lead to an increase in physical activity. They also found that negative stereotypes about aging and negative self-perceptions of aging were also weakened.

This section discussed theories on aging, specifically how subjective aging and sociocultural assumptions of aging impact older adult participation in health behaviors. This section also discussed how the change from negative to positive attitudes toward

aging is related to the adoption of health behaviors. The next section specifically addresses behavior change theories and how they explain the adoption and maintenance of health behaviors.

Behavior Change Theory in Older Adult Physical Activity Programs

Behavior change theories and practices offer effective tools to improve older adult healthy behaviors. It is necessary to consider the importance of theory, different types of theory and how these theoretical perspectives can influence older adult health behaviors.

Importance of theory. It is generally recognized that theory based interventions are more successful and generate better results as compared to non-theory programs (Conn, Minor, Burks, Rantz & Pomeroy, 2003). Use of theory in health promotion is important and requires attention to many issues (Keller & Fleury, 2000). Physical activity is a complex behavior and necessitates explanation and facilitation with multiple models and theories (Markus, King, Bock, Borrelli & Clark, 1990). Since physical activity is a more complex behavior, it tends to take more time and effort than other preventive health measures while necessitating more theoretical support and structure (Dishman, Chubb, Bouchard, Shepard, Stephens, Sutton & McPherson, 1990). Initiating or changing a fitness activity may require the adoption or release of habits difficult to change (American Council on Exercise [ACE], 2014). Behavior change theories help health researchers and professionals understand how individuals behave and also recognize those patterns by which people change their health behaviors (ACE, 2014). Behavior change also addresses how individuals maintain adherence to physical activity over a sustained period of time.

Theory Types. There are many types of behavior change theories that address both individual and community resources and needs. Individual health models such as Transtheoretical Model (TTM), and Theory of Planned Behavior (TPB) focus on individual responsibility (Keller & Fleury, 2000). Though these models are beneficial, they neglect to consider the social and cultural aspects of older adult environments and contexts (Keller & Fleury, 2000). Community based approaches consider ways to develop supportive environments where health decisions and behaviors happen in social, cultural, political and institutional contexts.

Transtheoretical Model. Health promotions developed with the TTM demonstrate ability to promote stages of change improvement of physical activity in older adults (Clark et al., 2005; Greaney et al., 2008; Kirk, MacMillan, & Webster, 2010; Kirk, Mutrie, MacIntyre, & Fisher, 2004; Riebe et al., 2005; Spencer, Adams, Malone, Roy & Yost, 2006). The TTM or stages of change theory posits that an individual's readiness to engage in change can be organized into a continuum of thoughts and behaviors (Prochaska & DiClemente, 1983). This model is grounded in the concepts of stages of change, self-efficacy, and decisional balancing (Prochaska & Marcus, 1994). Stages of change are broken into five stages that reflect an individual's motivation and readiness to change; precontemplation, contemplation, preparation, action, and maintenance. Self-efficacy is a person's belief that one can perform a specific task (Bandura, 1997). Decisional balancing is a type of decision where cost and benefit of a specific action are identified.

Other important aspects of this theory are the cognitive processes (consciousness raising, self-reevaluation and social liberation) and behavioral processes (self-liberation

& helping relationships) people use to move through these stages. Self-reevaluation is where one tracks progress and identifies oneself with the new behavior (part of identity and self-image). Consciousness raising is where someone becomes more aware of the behavior through education/information, etc. Social liberation is the perception that social support exists and can assist one in the change. Self-liberation is the intent and the action to change. Helping relationships are those interactions and people that can offer social support and encouragement. Here is an example of these processes creating movement between stages. The perception of social support (social liberation) and actual support (helping relationships) may move one from action to maintenance as the support may keep the activity interesting and engaging.

One of the benefits of the TTM for older adult health behavior change is that it “acknowledges individual differences in readiness to exercise at any particular point in time” (ACE, 2014, p. 16). This individual stage construct allows programs to be modified and to fit the readiness of each individual (Markus & Forsyth, 2008). Kao et al. (2002) argue for the application of TTM constructs to assist those in the contemplation and preparation stages. Yang, Chen, Chen, Wu, Chang, Wang and Huang (2015) developed an exercise program for older adults who were in the contemplation and preparation stages of behavior change. The intervention elements of consciousness raising (explanation of exercises) self-liberation (client established goals), and self-reevaluation (post exercise reflections) were found to enhance confidence and motivation of these older adults. Litt, Kleppinger and Judge (2002) sought to predict if social learning constructs would predict long term adherence to exercise for older adults. Adoption of exercise was predicted by readiness to change, maintenance of physical activity behavior

was predicted by self-efficacy, and long-term exercise was predicted by social support for exercise. They found the social learning constructs of self-efficacy, readiness for change, and social support supported the stages of change model. Marcus, King, Bock, Borrelli and Clark (1998) and McAuley, Courneya, Rudolph and Lox (1994) also found self-efficacy to be predictive of adherence to exercise for older adults.

This model is beneficial because it offers stages that can be convenient to operationalize. Also, the consideration of readiness along these stages allows researchers to isolate and tailor an intervention for people at a unique spot in the process. The limitations of this model are that the stages can be arbitrary, and it assumes behavior occurs in a linear fashion for people, which may not always be the case.

Theory of Planned Behavior. The Theory of Planned Behavior (TPB) attempts to predict behavior by gauging one's intention to change (Ajzen, 1991). For TPB, behavioral intent (intention to perform the behavior) is what leads to behavior adoption. The intention to adopt the behavior (intent) is influenced by three factors; attitudes toward the behavior, subjective norms, and behavioral control. When all three factors are high, the intention to perform the behavior is high and will likely lead to behavior adoption/change. Attitudes toward the behavior are a person's overall judgment regarding whether the behavior is good or bad. Subjective norms are the ideas or perceptions regarding whether the behavior is appropriate and/or acceptable. Behavioral control is a person's perception about the controllability of the facilitators and barriers of the behavior. For this model, perceived behavioral control is a type of behavioral self-efficacy where one can feel that they can overcome barriers and perform the certain task.

Here, attitudes and knowledge shape this behavioral self-efficacy and intention (Ajzen, 1991; Fishbein & Ajzen, 2010).

These three elements are informed by more abstract beliefs. The main tenet of the theory is that if you want to have high behavioral intent (created by high levels of the three aforementioned components) you need to possibly change the following beliefs: behavioral beliefs, normative beliefs and control beliefs. Behavioral beliefs are the ideas that certain outcomes are possible with this behavior, which in turn influences attitudes. Normative beliefs are cultural and social pressures that determine the value of the behavior which influence the subjective norms. Control beliefs are ideas that certain barriers and facilitators exist for the behavior in question which influence behavioral control.

The Theory of Planned Behavior is an appropriate behavior change theory for older adult physical activity (Dogra, 2015). TPB supports the importance of behavioral self-efficacy for exercise and physical activity adherence (Ajzen & Fishbein, 1979; Fishbein & Ajzen, 2010) and considers self-efficacy integral to behavior change in general. Self-efficacy is an important behavior change construct for many populations, particularly for older adults (McAuley, Blissmer, Katula, Duncan & Mihalko, 2000; McAuley, Katula, Mihalko, Blissmer, Duncan, Pena & Dunn, 1999; McAuley, Morris, Motl, Hu, Konopack & Elavsky, 2007; Litt, Kleppinger & Judge, 2002) Also, Hausenblas, Carron, and Mack (1997) found that intention as a TPB construct has an important impact on behavior, and attitudes are more significant than subjective norms in determining physical activity behavior. Similarly, when older adult physical activity interventions utilized TPB constructs, attitude was found to be more important a

construct than subjective norms (Gretebeck et al., 2007, 2013). This demonstrates its appropriateness for physical activity type behavior change. Also, since the theory is significantly concerned with attitudes as well as normative and subjective beliefs, its use in this study on perceptions of physical activity and aging is appropriate.

The contribution of this theory is that it considers how normative beliefs and personal beliefs impact the likelihood a person can/will change a behavior. This is especially important to consider, since a physical activity promotion for older adults may challenge normative beliefs. This model demonstrates how beliefs impact behavior, which can then assist researchers to identify whether beliefs need to be changed and what beliefs can be changed. The limitations of this theory are that it focuses more on cognition and does not really consider actual behavior, just the beliefs and attitudes of behaviors.

Community empowerment. Individual behavior change interventions are important, but they may not address important social, cultural, and environmental factors not within the control of older adults (Keller & Fleury, 2000). Though older adult interventions utilize individual approaches to behavior change, advocates of community approaches argue for consideration of these social and community strategies (Keller & Fleury, 2000). Community strategies help promote environments where health decisions and actions are made (Green & Kreuter, 1990). Community empowerment can be an appropriate framework by which to develop physical activity programs for older adults, since many older adults experience silencing and marginalization through ageism and youth centrism. Community empowerment is when community members define, control and participate in developing their own health environment (Minkler & Wallerstein,

2005). Minkler and Wallerstein (2005) consider health improvement an effective tool for community engagement and empowerment. Since older adults experience multiple barriers to physical activity due to social positioning and the environment, community-based approaches address these barriers that are not within the control of these older adults.

Ecological approaches. Ecological approaches are effective community approaches to health behavior interventions as they consider personal, interpersonal, social and environmental factors that contribute to behaviors and attitudes. Carron, Hausenblas and Eastbrookes (2003) applied an ecological approach to better understand physical activity behavior change in middle-aged and older women. Barriers were found within the intrapersonal, social environment and the physical environment. Interestingly, personal perceptions were found to be stronger determinants of health behavior than environments. Since subjective evaluations of environments were sought for this study, it may be inferred that though personal attitudes were more prevalent, the influence of these environments may have factored into the personal perceptions.

To make the use of behavior change theory more appropriate within a specific intervention for older adults, it is necessary to consider how some of these behavior change concepts apply to older adult specifically.

Significant behavior change concepts for older adults. For older adults specifically, the motivational elements of social support, social networks and self-efficacy are significant for successful older adult physical activity interventions. Though these constructs are components of broader behavior change theories, the overwhelming

consideration of these as especially effective for older adults demands their separate consideration.

Social support and social networks. Social support and social networks positively influence healthy behaviors. Social networks are the structures and contexts that maintain social ties and interactions where social support is the function of that network (Cohen & Syme, 1985). Social support is a key element of best practices for beneficial physical activity programs for older adults (Cress, Buckner, Prochaska, Rimmer, Brown, Macera & Chodzko-Zaiko 2005) and the combination of social support with social networking is significantly beneficial for older adult adherence to physical activity (Cotter & Sherman, 2008). Social relationships positively influence health behaviors by mitigating the impact of stress of behavior maintenance (Cohen & Wills, 1985). Diet and physical activity behaviors are particularly influenced by the effects of social support and promote maintenance of exercise routines and healthy diets (Gallant, 2013; Potts, Hurwicz & Goldstein, 1992). Oka and King (1995) found social support from family and friends was related to long term adherence to exercise programs for older adults and that social support specific to exercise was a greater predictor of exercise adherence versus general social support. Also, social support is significant when an individual is contemplating initiating physical activity behaviors or when a person has been exercising for a longer period of time and is discouraged (Litt, Kleppinger & Judge, 2002).

In a similar vein, Lockenhoff and Carstensen (2004) found life goals and motivations for older adults change over time and become more about maximizing meaning and creating positive emotions and are less concerned with long term goals such as improving health. The importance of emotions and purpose may influence the

significance older adults place on social support and networks in physical activity in later life.

Social support and networks do have their limitations. It was found that for depressed older adults “more is not always better” and excessive support was associated with increased sedentary behavior in a walking for health intervention (Perrino, Brown, Huang, Brown, Gomez, Pantin & Szapocznik, 2011). Gallant, Spitze and Prochaska (2007) found receiving more help than desired negatively impacted older adults’ sense of autonomy and independence (self-efficacy). Similarly, social strain from social networks was associated with lower levels of perceived physical activity self-efficacy over an extended period of time (Cotter & Sherman, 2008). Social support with self-efficacy, encourage older adults in physical activity behaviors.

Self-efficacy. Self-efficacy is a behavior change construct defined as the belief in one’s ability to organize and execute methods of action needed to create an anticipated outcome (Bandura, 1997). Marcus, Shelby, Niaura and Rossi (1992) found self-efficacy equated with confidence in the ability to do exercise. Research has highlighted the relationship between self-efficacy of physical activity and actual levels of physical activity in older adults (McAuley, Morris, Motl, Hu, Konopack & Elavsky, 2007). Self-efficacy is one of the most widely studied and most influential predictors of initiation and maintenance of physical activity in older adults (Marcus et al., 1992; van Stralen, Vries, Mudde, Bolman & Lechner, 2009). For older adult physical activity programs, self-efficacy has been operationalized and defined in different ways. For the walking intervention of McAuley et al. (1994), self-efficacy was applied as mastery accomplishment (recognized mastery of an action), social modeling (observed and

imitated behaviors) and the learning of the physiology of the body (knowledge). Here self-efficacy was found to be predictive of long-term exercise adherence. Oka and King (1995) used health contracts and patient's ability to have choices to enhance self-efficacy. Health contracts are written agreements between the participant and health professional delineating expectations and realistic health goals (Haber & Looney, 2000). Active choices as part of a comprehensive behavior change strategy also allow programs to be modified and adapted to older adult needs and interests and facilitate greater initiation and maintenance of regular physical activity (Stewart, 2001). Self-efficacy is influential at all stages of an intervention but is the most significant determining factor in long-term activity adherence (Litt et al., 2002). Thinking post intervention, it is important older adults are provided the skills in these interventions so as to continue practicing self-efficacy and improving their health behaviors for long-term benefit after the completion of an intervention (Rejeski, Brawley & Jung, 2008).

Self-efficacy and age. Self-efficacy can be more strongly related to physical activity in older adults than younger age groups (Schwarzer & Renner, 2000). For older adults, the enjoyable and social attributes of physical activity increased their self-efficacy, where more regulatory practices (beneficial for younger groups) actually lowered self-efficacy for the older adults (French, Olander, Chrisholm & Mc Sherry, 2014). The self-regulatory methods of goal setting and action planning have been effective for general populations, but not for older adults. These differences may be due to reduced executive function, or the perception that such effort and organization are not necessary in an older adult lifestyle characterized by more available leisure time. French et al. (2014) also posit interventions need to focus more on the enjoyable and sociable

aspects of physical activity to keep older adults motivated and their self-efficacy up. This directly relates to the finding by Devereux-Fitzgerald, Powell, Dewhurst and French (2016) that emphasized the fun and enjoyment of social interaction as an important influence on physical fitness. Also, the maintenance of these social bonds could influence physical activity beyond a phased intervention. It was also found that doubts about capabilities or the necessity of physical activity were minimized through attention to short-term functional and psychosocial outcomes.

Due to its importance and influence in successful interventions, self-efficacy needs to be incorporated into any older adult physical activity intervention and should be addressed early on and assessed frequently throughout the duration of the program (McAuley et al., 2011).

These behavior change theory constructs and considerations are important factors that can greatly increase older adult physical activity behaviors.

Cultural Approach to Health

This section presents the meaning and importance of a cultural approach to health. Physical activity is shown to be a culturally specific topic and examples of diverse understandings of physical activity are provided. A cultural approach to health places significant importance on the concept of working *with*, not *for* community members.

A cultural approach to health can address the different perspectives that diverse populations have regarding physical activity. This diversity implies that physical activity is a complex and culturally determined concept (Henderson & Ainsworth, 2000).

Physical activity researchers should adopt a cultural approach to health to better address this complexity.

A cultural approach to health may allow for greater insight into health contexts. Airhihenbuwa (1995) defines culture as a people's shared language, history, psychology, and lineage where attention to these components of culture develops greater understanding of health contexts. He posits that the Western biomedical model "moralizes bodies," placing value on specific types of physical existence and does not consider the broader social arena where "health occurs." Airhihenbuwa (1999) urges health researchers and practitioners to "see the forest and not the trees" (p. 3). This emphasis on the forest considers the social relationships and social structures that impact health experiences and transcend the Western biomedical model from its emphasis on the individual responsibility for one's health. Simply put, look for the forest, look for the context where social relationships can empower and disempower people (individual trees) through the structures and social practices. Dutta (2008) created the culture-centered approach to health. Dutta sees culture as a force that both constrains and empowers behavior and that health researchers and practitioners need to be aware of their own cultural biases regarding health beliefs and practices. Dutta argues it is important to consider the cultural context of health to better recognize how the social structures of privilege and domination implicate health. Dutta posits that sensitivity to the cultural context also allows health researchers to connect with communities in more substantive ways. This entails connecting with communities through their values, beliefs and practices they find important.

The diverse perspectives on physical activity along with the sociocultural and socioeconomic implications of physical activity demand this cultural approach to this type of health behavior research.

Diverse perspectives on physical activity. Diverse perspectives on physical activity demand a cultural approach in this study. Physical activity can be understood in broad terms as any movement but where exercise is a more specific type of movement (Henderson & Ainsworth, 2001). Most research on physical activity considers it an activity of health done during recreation, leisure, or spare time (Henderson & Ainsworth, 2001). These concepts of leisure and free time alone alienate some people who do not have the privilege of such resources. The leisure and free time component compounds the privilege of physical activity and exercise. For example, in a series of interviews, women of color found the term leisure for physical activity problematic since they see their lives as too busy with family and work obligations to be included in any conversation about leisure time for health (Eyler et al., 1998). Many non-white US identities are alienated from physical participation through the leisure and free time framework. In one study, Henderson and Ainsworth (2000) found that minority women of color had a major responsibility in the raising of grandchildren as well as the normal duties of their own households, thus admitting to lacking the time for such leisurely pursuits. Caperchione, Kolt, Tennet and Mummery (2011) learned from refugee women from the Middle East that their family commitments as mother, wife, and therefore head of domestic duties barred them from free time physical activity, though they admitted of its mental and physical benefits.

Beyond race, categories such as age, class, employment status, employment type, and even geographical location can impact perceptions of physical activity availability. Lusmägi, Einasto and Roosmaa (2016) discovered employment, age, ethnicity and education level impacted participation in leisure time physical activity. Zimmermann,

Carnahan and Peacock (2016) found that rural women living in Illinois perceived many barriers to adopting physical activity, though perceptions of its benefits existed. For these rural communities, physical activity was deemed inaccessible due to the cost of gym and fitness club memberships and the distance these facilities are from home.

Diverse perspectives of physical activity applied. Different perspectives on physical activity allow interventions to be based on the perspectives of the communities in which they operate. Ramanathan and Crocker (2009) found that cultural patterns influence attitudes and practices around physical activity and that interventions need to address this cultural influence centrally to create empathic, influential, and appropriate interventions for a specific audience. An example of this is how religion and spirituality are important factors for Indian immigrants when it comes to physical activity (Ramanathan & Crocker, 2009). Interventions should incorporate these aspects to connect with the values of a specific population.

In Massachusetts, public health professionals found that physical activity is intertwined in daily lives and family activities of immigrant families without the constraints of regimented exercise (Cambridge Food and Fitness Policy Council, 2014). This information influenced the City of Cambridge's physical activity intervention. This program created messages that focus on how daily activities done with families are forms of physical activity. In another study, Mexican American males in El Paso, Texas, said physical activity included occupational and home activities, such as home repair, cleaning, and car repair (Mier et al., 2007). These participants still included the traditional aspect of fitness such as hiking, swimming, and running and they all admitted to walking as a common source of activity.

Tang, Community Wellness Program, and Jardine (2016) identified physical activity as a sense of cultural identity and pride for American Indian/Native American populations. Physical activity was defined as being a productive member of the community and balancing work duties with time in nature. These concepts broaden the scope of what it means to be fit and well, where activity is seen as a function of community as opposed to the individual care and inner competition of commercialized exercise (Sassatelli, 2014). Echoing the communal aspect of physical activity, Belza et al. (2004) found Pan Asian identities focus on social interactions as key to physical activity. Here, it was more important to be active with others and nurture relationships versus just doing an activity that is good for the physical body.

These examples demonstrate the complex role contexts play in defining and explaining physical activity. These diverse perspectives demonstrate that meaning is dependent on the context and therefore effective health researchers should address that

A cultural approach to health provides many opportunities to reach, connect, and collaborate with community members. Use of technology can be an effective means by which to reach and interact with these communities (WHO, 2011).

Older Adults and Mobile Technology

It is important for health communication research to consider older adult use of technology and how these technologies positively impact the older age digital divide (Levine et al., 2016; WHO, 2011). This section introduces the current state of older adult use of mobile technology and how older adults use technology for health purposes (eHealth and mHealth). Technology's contribution to healthy/active aging is also discussed. These are important topics to consider since they demonstrate the importance

technology holds for older adult quality of life and offer ways in which mobile technology can be utilized in older adult lives, health promotions and interventions. This study uses The Diffusion of Innovation Theory to better understand older adult adoption of and use of mobile technology.

Diffusion of Innovation Theory. There are different theories that are used to explain communication technology adoption and use. The Diffusion of Innovation Theory (Rogers, 2003) is one such theory. Diffusion of Innovation Theory (DOI) explains how people learn about and either adopt or reject new technologies (innovations). Rogers (2003) argues that diffusion is the way communication messages and practices spread ideas about an innovation among members of a social system. This theory considers how people make decisions about innovations (innovation decision process), the characteristics of different types of technology adopters (adopter categories), and characteristics of an innovation that can determine adoption (innovation characteristics).

Innovation decision process. DOI posits that people go through a series of stages to learn about an innovation and either adopt or reject that innovation. The first stage is *knowledge*. This is where information is gained about an innovation. *Persuasion* is step two when an individual or organization forms a positive or negative view of the innovation. It is at this stage the innovation characteristics are considered. Stage three is the *decision* phase when activities that encourage adoption or rejection begin. *Implementation* is stage four. This is when an innovation is put to use. This stage may involve *reinvention*, where the innovation is changed by the user in the adoption process. *Confirmation* is the last stage when the decision to adopt or reject the innovation is

reinforced. This stage may involve *dissonance*, where a user reverses an adoption decision. Along with decision stages, DOI also considers adopter categories.

Adopter categories. DOI considers how adopters differ by when they adopt technologies, the resources these adopters possess, and how the social position of an adopter can influence an adoption/rejection decision. According to the DOI model, the *innovator* is the first to adopt an innovation. This person is venturesome, has considerable resources, and holds an important position in a social system. The next adopter category is the *early adopter*. This adopter is highly respected in the social system and is an opinion leader among peers. *Early majority* is the third adopter category. According to DOI, a person in this category does not hold significant influence in the social system and are very deliberate in their adoption decision process. The *late majority* is the category of adopter that is heavily influenced by peer pressure and most likely has limited resources. The last adopter, the *laggard*, is traditional and has little to no opinion leadership. The laggard is suspicious of new technology.

Innovation characteristics. DOI posits that there are five characteristics of an innovation that determine innovation adoption: (1) *relative advantage*, the perception that an innovation is better than an earlier concept/innovation; (2) *compatibility*, the perception an innovation is consistent with the needs and experiences of a potential adopter; (3) *complexity*, how difficult or easy an innovation is to learn and use; (4) *trialability* – the extent a potential adopter can experiment with the innovation; and (5) *observability* – whether the results (benefits) of the innovation are visible by members of the social system.

If an innovation is perceived as a better option to earlier innovations, satisfies needs, is not too difficult to learn and use, able to be tested with little consequence, and has recognizably beneficial effects, the innovation is likely to be adopted. DOI has been used to explain older adult perceptions of technology (Heinz et al, 2013) how older adults adopt new technologies like social media (Kim, Lee & Contractor, 2019) as well as older adult use of smartphone devices (Choudrie, Pheeraphuttrangkoon & Davari, 2018).

Older adult use of mobile technology. Though mobile technology is predominantly designed and marketed to younger generations, older adults are increasingly adopting mobile technology (Berenguer, Goncalves, Hosio, Ferreira, Anagnostopoulos, & Kostakos, 2017). Using data from a large international survey of technology use, Berenguer et al. (2017) found that 29% of adults 65 years and older own smartphones; 21% of those 75-79 years of age own smartphones and only 5% of those 80 years and older own a smartphone. Some older adults own smartphones and use these devices for calls, texting, email and accessing the Internet (Zhou, Rau & Salvendy, 2014). Nimrod (2016) developed a model that represents this same hierarchy of smartphone function where personal and cultural variables influence adoption and use. Zhou, Rau and Salvendy (2012) found that many older adults adopt mobile technology due to social pressure, usefulness and support of daily functions and behaviors. Similarly, Werner and Werner (2012) found older adults had high acceptance and satisfaction rates for mobile tablets where the nontechnical look and feel of tablets, lack of cords and mouse device, and the presence of touch based navigation make tablets easier for older adults to use, learn, and access Internet type resources.

Older adult use of technology for health purposes. EHealth and mHealth are the use of technology for health purposes. A consideration of eHealth provides a foundation for the development and understanding of mHealth.

Older adult eHealth. EHealth is the use of technology for “searching for health information, participating in support groups, and consulting with healthcare professionals” (Czaja & Lee, 2012, p. 831). For older adults, eHealth development considers the increasing older adult population and sees formats like the Internet for information seeking and access to electronic medical records (EMR), beneficial for older adults (Czaja & Lee, 2012). Internet technologies provide significant benefits for older adults by providing the ability to link them to needed health information and connect them to family, friends, and social groups in order to stay connected and avoid isolation (Czaja & Lee, 2012). The DHHS (2012) report to the US Congress on aging services technology argues eHealth enables older adults to live better, healthier lives. The individual, societal and economic benefits of healthier and safer older adults speak to the importance of these technological capabilities. EHealth offers great potential in improving older adult care and reducing adverse health events through health information technologies (Demiris, Thompson, Reeder, Wilamowska & Zaslavsky, 2013).

Older adult mHealth. MHealth is the integration of mobile technology and healthcare, specifically in regards to smartphones, mobile phones, feature phones, and tablets (Abidi, 2015). MHealth solutions for older adults focus on wellness, safety, and social connectedness (Reginatto, 2015). MHealth categorizations focus on quality of life and improvement of healthcare such as education, remote data collection, monitoring, aid for health care workers, disease tracking, and diagnostics (Manfrinato, Shalfrooshan &

Dara, 2015; United Nations, 2009; WHO, 2011). Most health information for older adults is presented in TV, radio and print formats. MHealth allows information to be sent directly to older adult mobile devices through mobile health campaigns like entertainment education (games) and health information applications, and websites. Diagnostic and treatment support is an important focus for older adult mHealth where devices and applications give older adults tools to record and manage chronic conditions and help organize medication regimen adherence (Manfrinato, et al., 2015; Sanchez, Beato, Salvador, & Martin, 2011).

Older adult mHealth applied. MHealth applications for older adults vary, but primary foci are health information exchange and health and safety monitoring. MHealth applications based in behavior change theory are limited, but recent feasibility and prototype research demonstrates the impact behavior change can have on mHealth interventions for older adults.

Much of mHealth research for older adults consists of feasibility studies that focus on disease management for more common older adult comorbidities, such as heart disease, Alzheimer's disease, palliative care symptom management, diabetes, arthritis, and fall prevention (Joe & Demiris, 2013). Some older adult mHealth research focuses on smartphone and/or tablet applications to maintain average daily health behaviors for older adults, including prevention behaviors such as health information seeking and physical activity.

In a series of interviews, adults 62 years of age and older looked favorably on a mobile handheld wellness technology device if it were portable, intuitive and provided health information (Joe, Chauduri, Chung, Thompson & Demiris, 2016). Another

feasibility study investigated mobile and feature phone texting used to improve older adult physical activity behaviors. Participants would receive text message reminders to exercise and have fun, including messages that affirmed the positive benefits of physical activity. The text messages were successful in increasing older adult physical activity, though physical activity behaviors stopped after the intervention (Muller, Khoo & Morris, 2016). King et al. (2013) created and tested mobile phone applications to decrease sedentary behavior and increase physical activity in older adults. The older adult participants, who had no previous smartphone use, found the apps easy to use and motivating to decrease sedentary behavior through the use of goal setting, social support, and interactive avatars. Paul et al. (2017) developed a smartphone app intended to increase older adult physical activity through monitoring, feedback, and social support. Use of the app increased the overall steps taken in a day. The older adult participants found the app enjoyable and easy to use, which established the feasibility of mobile apps for older adult health promotion.

van het Reve, Silveira, Daniel, Casati, and de Bruin (2014) developed a computer-tablet and paper brochure based exercise program to increase older adult physical activity in the home. The mHealth tablet program was more successful than the brochure and tablet based health interventions were deemed effective to improve older adult mobility and exercise compliance. Dasgupta et al. (2016) reviewed smartphone applications that could contribute to successful aging for older adults and found apps to successfully promote medication/treatment management, treatment adherence, social networking, and physical activity tracking for older adults.

These feasibility studies on mHealth are grounded in the assumption that technology can positively contribute to successful aging for older adults.

Technology contributions to successful aging. Mobile technology can positively impact the quality of life of older adults (Abdulrajak, Malik, Arab, & Reid, 2013). Dasgupta et al. (2016) developed technology design principles that would allow technology devices, interfaces, and programs to contribute to successful aging of older adults by specifically addressing age specific stressors and challenges of older adult technology users. These authors argue for technology design that broadens awareness and perceptions of self, support perceptions of control, and provide tools and experiences that promote mental and physical health. Dasgupta et al. (2016) found that use of tablets and mobile phones contribute to successful aging by providing resources that support management of chronic ailments and conditions, physical activity adoption and adherence, physical and cognitive health, and social engagement.

This section discussed older adult use of mobile technology. Older adult technology uses for health purposes such as eHealth and mHealth were presented, and technology's contribution to healthy aging was discussed.

Summary

In this chapter, literature pertinent to this mixed methods study on technology use and physical activity for older adults was presented. The increase of the older adult population demands that health researchers investigate ways to improve older adult health behaviors that promote healthy aging. The theories and concepts of this review included concepts of older adult physical activity, theories of aging, behavior change theories, cultural approach to health, and older adult use of mobile technology.

This review began with an overview of the importance of physical activity for older adults. Physical activity is an important health prevention strategy for older adults, but many older adults do not have sufficient physical activity engagement to improve and maintain health. The physical health and mental health benefits of physical activity were discussed along with older adult physical activity considerations, including barriers and motivators.

The next section addressed the psychosocial barrier to older adult physical activity; namely, the influence of negative attitudes toward aging. This section illustrated how subjective aging explains how social practices and beliefs reinforce negative assumptions of aging which shape older adults' negative attitudes toward aging, which in turn negatively impact older adult health and discourage engagement in health behaviors like physical activity. This section also explained how changes in negative aging attitudes lead to health behavior changes.

The review also discussed behavior change theories and their application to older adult health promotion. The Transtheoretical Model, Theory of Planned Behavior and community empowerment were explained. These theories effectively address physical activity behaviors and may address older adult physical activity self-efficacy and the impact of negative attitudes toward aging for older adults. These behavior change constructs will be used to inform the data analysis of this study.

The next section presented a cultural approach to health as effective strategy to connect with communities. A cultural approach to health addresses the social and subjective ways in which health, specifically physical activity, is considered within diverse populations.

The last section of this review discussed older adult use of mobile technology. This section addressed older adult increased use of mobile technology and how older adults use technology for health purposes (mHealth). The technology adoption theory Diffusion of Innovation was also discussed. This section concluded by discussing how technology contributes to successful and healthy aging.

Research Questions

This literature review summarized pertinent research and information about the topics of this study; physical activity, attitudes toward aging, and technology use. There are two important gaps in the literature this current study addresses:

1. Though attitudes toward aging impact physical activity behaviors, the relationship of attitudes toward aging and older adult physical activity self-efficacy beliefs has yet to be investigated (Warner & French, 2018).
2. Though information communication technologies can positively impact healthy aging for older adults, there is no current literature that discusses the relationship between attitudes toward aging and technology use. Zambianchi and Carrelli (2018) found positive attitudes toward technology is related to an improved sense of well-being in older adults and advocate for more investigation into the psychosocial factors of modern technology use by older adults.

Attitudes toward aging are important psychosocial factors that impact older adult beliefs and behaviors and may impact communication technology use and older adult physical activity self-efficacy. The two gaps in the literature review discussed here and the need for community older adult perspectives on physical activity, aging, and technology use led to the following research questions:

(RQ1) How do participants perceive their aging experiences?

(RQ2) What are participant perspectives of communication technology use?

(RQ3) How do participants perceive the role of physical activity in their aging experiences?

Research questions 1-3 are answered in the qualitative arm of this study. Research questions 4-6 and their respective hypotheses are answered in the quantitative arm of this study.

(RQ4) What is the relationship between participants' perceptions of aging and perceptions of communication technology?

(RQ5) What is the relationship between participants' perceptions of aging and use of communication technology?

Positive attitudes toward aging and positive age stereotypes support health prevention behaviors (Levy & Myers, 2004). Since ICTs contribute to successful and healthy aging (Abdulrajak et al., 2013), they are considered a health prevention strategy (e.g., access to social support, social engagement, and health information) in this study. Therefore, positive attitudes toward aging and positive age stereotypes may influence perceptions and use of communication technology:

H1: Attitudes toward aging and age stereotypes will predict perceived value of communication technology devices.

H2_A: Attitudes toward aging, and age stereotypes will predict ownership of a smartphone.

H2_B: Attitudes toward aging and age stereotypes will predict ownership of a tablet device.

H2_C: Attitudes toward aging and age stereotypes will predict frequency of Internet use on a mobile device.

(RQ6) What is the relationship between participants' perceptions of aging and physical activity/exercise self-efficacy?

Positive attitudes toward aging and positive age stereotypes improve older adult health behaviors and beliefs (Kornadt & Rothermund, 2011). Attitudes toward aging and age stereotypes may impact older adult beliefs in their ability/inability to engage in physical activity:

H4: Attitudes toward aging and age stereotypes will predict a person's physical activity/exercise self-efficacy.

The next chapter presents the methodology and explicit method of this study used to answer these research questions. This mixed methods study is based in pragmatism, specifically the combination of qualitative and quantitative methods that best answer the research questions. The qualitative arm of the study used Constructivist Grounded Theory to guide the thematic analysis of interview and focus group transcripts to answer research questions 1-3. The quantitative arm of this study used hierarchical logistic and multiple regressions to test the hypotheses for research questions 4-6. Items from the survey instrument created variables for the quantitative analyses. The next chapter will also discuss the research protocol, data management and data analysis.

Chapter 3:

METHODOLOGY AND METHODS

To answer the proposed research questions about older adult physical activity, aging perceptions and technology use, a Mixed Methods Research (MMR) approach is needed. Henderson and Ainsworth (2003) previously noted that MMR is an appropriate method to investigate physical activity because physical activity involves complex human behavior and attitudes that require diverse ways of asking and answering questions. Specifically, physical activity involves subjective elements of individual perspectives and sociocultural attitudes as well as objective biomedical metrics of physiological health that frequently guide physical activity research. To better address the objective and subjective aspects of physical activity, MMR should be employed.

Methodology

MMR is a method and methodology of research that utilizes both qualitative and quantitative methods of design, sampling, and analysis (Tashakkori & Teddlie, 2008). The qualitative methods of focus groups and interviews are designed to answer research questions 1-3:

(RQ1) How do participants perceive their aging experiences?

(RQ2) What are participant perspectives of communication technology use?

(RQ3) How do participants perceive the role of physical activity in their aging experiences?

The quantitative method of a survey questionnaire was also designed to answer research questions 4-6:

(RQ4) What is the relationship between participants' perceptions of aging and perceptions of communication technology?

(RQ5) What is the relationship between participants' perceptions of aging and use of communication technology?

(RQ6) What is the relationship between participants' perceptions of aging and physical activity/exercise self-efficacy?

Before this method can be adequately explained, it is important to understand the theoretical background and assumptions of this method, which is reviewed in the following section.

Mixed Methods Research, Background, and Theoretical Assumptions

Mixed methods research not only utilizes qualitative and quantitative research methods, it also adopts a paradigm that is sensitive to the unique and often opposing ontologies and epistemologies of qualitative and quantitative methodologies.

Paradigms, ontology, and epistemology. A paradigm is a philosophy or approach to the world that reflects one's beliefs about the nature of reality and the nature and process of knowledge creation and formation (Kuhn, 1970; Tashakkori & Teddlie, 2008). Kuhn (1970) says that a paradigm is always present in research, whether implicitly or explicitly. To demonstrate how a paradigm works, it's important to show how paradigms influence research processes and philosophies, specifically ontology (the nature of reality) and epistemology (nature of knowledge).

Quantitative. Quantitative research is rooted in the post positivist paradigm that sees the world as objective and that generalizations can be inferred from that reality (Morgan, 2007). Post positivist research adopts an ontology of objective phenomena that

can be neutrally observed since post positivists' epistemological stance posits that knowledge and the researcher are completely separate or at least at a great distance from each other. The traditional experimental design is an excellent example of how this works. The researcher isolates a certain phenomenon (objective) and controls the environment so as to avoid influence from both the researcher and other variables. This implies that there can be a phenomenon that is not impacted by the researcher (epistemological). This type of research and paradigm utilizes deductive reasoning (top down approach) where *a priori* concepts are tested in specific situations (Morgan, 2007).

Qualitative. Qualitative research is rooted in a naturalist/ constructivist paradigm where reality is fluid and the researcher and knowledge are connected (Morgan, 2007). This paradigm sees the world as fluid and consists of multiple perspectives (subjective). This ontological subjective approach understands knowledge as never neutral and argues that the researcher and knowledge are inseparable or at least inextricably linked. The epistemological approach of this subjective perspective is that knowledge is always influenced by whoever "creates" or develops it. This paradigm utilizes more inductive reasoning (bottom up approach) where isolated details and phenomena are recognized, and patterns are used to infer broader understanding. For example, the ethnographer in the "field" goes to research a phenomenon, using inference to understand what is going on, looks at every detail to recognize patterns, etc., and tries to avoid bringing in *a priori* concepts so as to preserve the inductive approach (Morgan, 2007).

It is frequently argued that these two approaches are diametrically opposed (Morgan, 2007) in that objective understandings of the world cannot coalesce with subjective attitudes of behavior and perception. Also, since these ontologies impact the

epistemological approach, the same incompatibility applies to the different ways knowledge is conceived. These differences started and maintained the paradigm wars that pitted research approaches against each other. Morgan (2007) points out that these differences exist on the abstract level, and the battles of the paradigm war were fought on philosophical grounds where ideologies were more important than research operations. Creswell (2013) disagrees with the incompatibility of these approaches and sees them as simply different ways to answer different questions. Datta (1994) argues that the differences between qualitative and quantitative research are exaggerated and that their peaceful coexistence must be considered. Brewer and Hunter (1989) see these different research approaches as helping each other where they balance out each other's limitations and weaknesses. To further develop this compatibility of these research approaches, MMR developed a paradigm and theoretical approach of its own. The paradigmatic approach of MMR is a practical one that places more importance on the research than on the ideology/philosophy of the researcher.

Pragmatism of MMR. The MMR paradigm is known as the pragmatic approach (Morgan, 2007). Pragmatism as a research construct was coined by Howe (1988) to develop a "whatever works" approach. In pragmatism, the research method is chosen not because it is the preferred or "only" method a researcher uses, but rather because it is the one best suited to answer the research question at hand. Pragmatism is a both/and answer to address the either/or distinction of the opposing paradigms addressed above. This reflects what Green, Caracelli, and Graham (2008) called multiple ways of doing and multiple ways of seeing the world to create better understanding. Pragmatism also takes the researcher out of the bind of choosing a paradigm; attention is placed where it is most

needed, on the research question. This both/and approach is built upon an ideology that acknowledges subjective experiences and objective contingencies (Creswell, 2013; Tashakkori & Teddlie, 2008). Important aspects of this pragmatic approach of MMR are abductive reasoning and consideration of multiple audiences.

Abduction. Abductive reasoning is a form of logic that uses both inductive and deductive reasoning. Here, experiences and phenomena can be inductively analyzed and the themes and concepts from these experiences can be deductively evaluated (Morgan, 2007). This back and forth between deduction and induction admits of subjective phenomena existing in objective structures. MMR utilizes abduction to generate the richness of a subjective experience and deductively applies those experiences to other phenomena to better understand what these experiences are and how they connect to others.

Multiple audiences. MMR is concerned with the diverse audiences and approaches in regards to published research findings (Morgan, 2007). Because MMR uses different methods simultaneously, it might have audiences (e.g. academic researchers, funding agencies, government agencies, community partners) that approach research differently and thus MMR must use the research as an opportunity to build bridges or connections across diverse research conversations. This also entails addressing the needs of these diverse audiences. Health communication research is a great example of this need to attend to multiple and diverse audiences. For example, a researcher that primarily does qualitative research needs to address the needs of government and private funding entities that may want more quantitative methods and results so as to justify funding. Health communication research that uses MMR can address the needs of

biomedical research for more quantitative and generalizable data and still offer richness in detail to explain phenomena in greater depth. In the same vein, Evans, Coon, and Ume (2011) advocate MMR to adopt theoretical frameworks for their research so as to contribute to more academic conversations and fields as well as demonstrate credibility to fund granting agencies.

Research Method Design

The MMR design proposed to answer the research questions in the present study entails a one-strand two-arm study. The one strand will be formative research to ascertain older adults' perceptions and behaviors about aging, physical activity and technology use. The two arms of this strand entail one arm of qualitative interviews and focus groups with a simultaneous arm of a quantitative survey. This type of study is considered a QUAL + quant complementarity triangulation simultaneous design.

The use of qualitative methods simultaneously with quantitative methods to understand a phenomenon is a simultaneous method triangulation (Morse, 1991) that utilizes the strengths of each method. This method is also a concurrent triangulation design since it uses two different methods "in an attempt to confirm, cross-validate, or corroborate findings within a single study... and as a means to offset the weaknesses inherent within one method with the strengths of the other method" (Creswell, Plano-Clark, Gutman, 2007, p. 183). Greene et al. (2008) refers to this as design complementarity, as one method provides elaboration and clarification for the other method. There are important concerns that need to be addressed in regards to MMR methods design: priority of one method and integration of data (Creswell et al., 2007). For concurrent design, ideally, both methods have equal priority, but for pragmatic

reasons priority may be given to either method (Creswell et al., 2007). As to integration of data, for a concurrent triangulation design, integration happens at the analysis phase of research. For example, the quantitative results of the surveys can be elaborated upon with the rich detail of the qualitative research. Utilizing the typology of Morse (1991) where priority (all caps) and sequence (arrows or plus signs) are symbolized, the present study uses qualitative as the priority between qualitative and quantitative methods to explore a phenomenon through simultaneous research methods: QUAL + quant complementarity triangulation simultaneous design. Now that the research design is addressed, sampling techniques need to be discussed.

Sample and Setting

The research protocol, specifically recruitment of participants, data collection, management, and analyses processes obtained approval for research with human subjects from the Office of the Institutional Review Board at The University of New Mexico. This section presents the research protocol.

Inclusion criteria. The target population for this study is fifty years of age and older ($50 \geq$) adults that reside within the greater Albuquerque metropolitan area. These inclusion criteria are purposefully broad so as gain insight from older adults for a more general understanding of the perspectives and behaviors of older adults in the community. Also, Lacey et al. (2017), Mody et al. (2008), and Seppet, Pääsuke, Conte, Capri and Franceschi (2011) recommend that research with older adults keep exclusion criteria to a minimum. Specifically, inclusion criteria for the study was simply adults 50 years of age or older.

Fifty years is the age when Albuquerque community residents may become members of the local senior centers and participate in the physical activity resources provided by the Department of Senior Affairs. This age limit also includes the older adult age groups as defined by the World Health Organization (2010).

Sampling. Purposive sampling was used to recruit participants for this study. Purposive sampling is the process whereby research participants are purposefully selected because they are most relevant to the purpose of the study (Gatlin & Czaja, 2016). Gatlin and Czaja (2016) also advocate for the use of purposive sampling when access to all members of a target population is too difficult to achieve. This study investigated perceptions of physical activity, aging, and technology held by older adults living in this community. Thus, older adults were specifically recruited. One specific type of purposive sampling this study adopted was snowball sampling, where existing participants will suggest acquaintances that fall within the participation requirement criteria. Older adults from various community and organization settings were recruited because naturally occurring groups of older adults in their settings may successfully represent their broader populations (Chase, 2013).

Sample size. Teddlie and Yu (2007) recommend various sample sizes for mixed methods research in order to reach saturation for qualitative methods and representativeness for quantitative methods. This study exceeded their recommendations, with 53 participants for qualitative methods and 192 responses for quantitative methods. Thirty-seven face-to-face interviews were conducted along with 2 focus groups with 16 participants. This study had sufficient survey responses that provided 10 cases per each variable in the hierarchical logistic and multiple regressions. The needed sample size was

also computed with a power analysis on GPower 3.1 software (Faul, Erdfelder, Buchner, & Lang, 2009) that reported 78 cases needed to ensure sufficient power for potential significant findings in the quantitative analyses.

Recruitment process. Participants were recruited for this study via face-to-face interactions and short presentations at local senior centers. To compensate participants for their time and participation, participants who participated in an interview or focus group or take the survey were entered into a drawing for a chance to win an Amazon Fire 7, a mobile computer tablet device. Paper copies of promotional flyers and information sheets (Appendix, A) were also used at various locations identified in the following section. Copies of these promotional flyers were provided to the Department of Senior Affairs in order to insert them into senior center monthly newsletters. Digital and paper promotional materials are effective strategies to inform and recruit older adults in physical activity research (Hughes et al., 2009; Wojcicki et al., 2013). Face-to-face interactions included a brief introduction, an explanation of the current study, and a question about whether prospective respondents would like to participate in an interview or focus group and/or take the survey. The short presentations consisted of a brief introduction, an explanation of the current study, and the information needed to participate. Contact information was collected for those within the inclusion criteria that were interested (with their permission) to participate in the focus group or interview so as to contact the participant to schedule a meeting.

Promotional posters provided contact information to set up an appointment for a focus group or interview or to take the survey. Removable tabs were provided at the bottom of the poster with contact information to sign up for, or ask questions about the

study. This method of contact is convenient since these communication media are common with older adults (Mofatt, David, & Baecker, 2013). Digital copies of these posters were resized and shared on social media such as Facebook and Instagram (Appendix A).

Location. To gain greater access to community older adults for the study, the support and permission from the city's Department of Senior Affairs was obtained to place these posters and promotional material throughout the seven local senior centers and two local multigenerational centers within the city limits. Representatives from the Department of Senior Affairs also obtained support from the other city departments of Cultural Services, Family and Community Services and Parks and Recreation so participants could be recruited at city libraries, community centers and park and recreation facilities. Permission was also granted to visit these locations to recruit participants face to face, to perform the interviews and focus groups, and to distribute surveys at these locations. These recruitment methods also occurred at a local yoga studio where the researcher is an instructor. Permission was obtained from the owner before recruitment occurred at this facility.

Focus group and interview screening and enrollment process. Screening for the interviews and focus groups occurred during the recruitment process. If participants were recruited from face to face interactions, those who are interested were asked for their age. Participants were screened based on this sole category. If participants were recruited through the promotional material they were asked for their age. The contact information (names, telephone numbers and/or email addresses) were collected from participants to schedule interviews and focus groups. Participants also have the choice to

be contacted at a later date for follow up purposes. All but 2 interview and focus group participants completed a form where they provided contact information if they wish to be contacted for follow up purposes, want to learn more about the results of the study, want to enroll in the drawing for a chance to win a mobile computer tablet, and demographic information of age, gender, race, income and education level (Appendix B).

Survey screening and enrollment process. For the survey, if participants were recruited from a face-to-face interaction, they were asked these same questions and then provided with a paper survey they either took at that time or at a later date. If interested, participants were given a notecard with the address of a website they could visit in order to take the survey online instead of completing a paper version.

If participants were recruited through the promotional posters, they either scheduled a time to take the survey in person at one of the prior listed locations, or were given the website address of the online survey to complete a Survey Monkey survey online. The online survey was preceded by the screening question about age. Participant contact information such as name, phone number or email address were obtained at the time the survey was completed. They also specified whether they were willing to be contacted for follow up purposes, were interested in the results of the study or would like to enroll in the drawing for a chance to win a mobile computer tablet. This information was collected on the first sheet of the survey. This roster of contact information was recorded on a separate form not attached to any survey. Also, the first screen of the online survey asked for participant contact information such as name, phone number or email address if the participant was willing to be contacted for follow up purposes, interested in

the results of the study or wanted to enroll in the drawing for a chance to win a mobile computer tablet. This information was securely stored on the Survey Monkey server.

Instrumentation/Measures

The instruments used in this study consisted of interviews, focus groups and a survey.

Interviews and focus groups. Interviews and focus groups were used to answer research questions 1-3.

Interviews. Interviews with individual members of the research target population are a staple of qualitative research since they elicit in-depth perspectives from community members and provide the researcher with the language and ideas community members use about the phenomena being studied (Lindlof & Taylor, 2011). To support a successful one on one interview process, an interview schedule was created to guide the researcher to ask questions pertaining to the research questions (Appendix C). Questions about physical activity, aging, and technology are open-ended and allow opinions to emerge from participant dialogue. This schedule was meant to keep the general conversation semi structured, where slight digressions and tangents were allowed and even desired so as to let the concepts emerge within natural conversation. The interviews were relaxed and informal and also included self-disclosures from the interviewer to build rapport with and to encourage voluntary self-disclosure from the interviewees (Lindlof & Taylor, 2011).

Focus groups. To enrich data collection methods and provide insights into perceptions and experiences of older adults, focus groups were also performed. An important qualitative research method, focus groups are a type of interview with a group

of people that utilizes the interactions among participants as a part of the method (Kitzinger, 1995). Kitzinger (1995) argues that focus groups are excellent methods for qualitative health research to understand public understanding of health issues. The group processes of focus groups help people rethink and clarify ideas as well as offer different forms of communication such as joking and arguing that create a more conversational and interactional experience and may encourage participation from those that might be intimidated by one on one interviews (Kitzinger, 1995). As was the case with interviews, in focus groups the researcher worked to build rapport with participants to create a relaxed and informal setting. The focus groups were guided by the same interview schedule (Appendix C).

The questions for these focus groups and interviews were taken and modified from previous research instruments that investigated older adult perceptions of physical activity (Jancey, Clarke, Howat, Maycock, & Lee, 2009) and older adult perceptions of aging (Reichstadt, Depp, Palinkas, & Jeste, 2007). Questions were also developed for this study to uncover older adult perceptions of technology, if and how older adults in the community use various technology devices, and whether older adults think these devices could contribute to healthy aging and health promotion.

Survey. The survey for this mixed methods study was a compilation of previously developed questions and validated and reliable scales (Appendix D). The survey included demographic questions such as age, gender, race/ethnicity, household income, marital status, and education level. Eleven questions adapted from previous survey research on older adult use of technology (Anderson & Perrin, 2017) and older adult use of technology for health (Gordon & Hornbrook, 2016) were asked to understand what

computer technologies older adults use and whether they use texting, email, Internet browsing, and software application (apps) on mobile smartphones or tablets and/or laptop or desktop computers, and whether these functions are used for health purposes. The researcher developed questions about perceived usefulness of the communication technologies of desktop/laptop, smartphone, and tablet.

One question asked respondents to rate their health on a five-point scale from excellent to poor. This single self-rating question about health is one of the most used instruments in research of ratings of health (Fayers & Sprangers, 2002; Jylhä, 2009).

Five questions were used to measure older adult perspectives and expectations of the aging process. These questions were taken from the Attitudes Toward Own Aging (ATOA) subscale from the Philadelphia Geriatric Center Morale Scale (Lawton, 1975; Liang & Bollen, 1983). This subscale is the most often used scale to measure older adult self-perceptions of aging (Levy et al., 2002). Each question will be valued from 1 = totally disagree to 4 = totally agree. Respondents selected how much they agree or disagree with each statement (e.g., “I am as happy now as when I was younger”). Scores for the second and the third statements (negative framed questions) were reversed so higher scores indicated more positive self-perceptions of aging.

One question was asked to investigate participant Age stereotypes toward older people. Responses to this question make up The Images of Aging Scale (Levy, Kasl & Gill, 2004). This is an age stereotype scale that assesses the positive and negative assumptions individuals hold about older people. Respondents were given both positive and negative words where respondents rated each word between 0 and 6, where 0 means the word is furthest from their image of older people and 6 means the word is closest to

their image of older people. The total score for the positive and negative words respectively create a positive attribute score and a negative attribute score. The Images of Aging Scale demonstrated good test-retest reliability with different populations (α .92 for positive stereotypes and α .79 for negative stereotypes; α .84 for positive stereotypes and α .82 for negative stereotypes) (Levy et al., 2004). Validity was also demonstrated with hypothesis testing where exposure to media's negative images of older people was correlated to the negative images of aging scores and positive images of aging scores were correlated with positive open-ended measures of participants (Levy et al., 2004).

The second to the last section of the survey consisted of four questions about amount and type of physical activity respondents performed in the last seven days. These questions are modified from the International Physical Activity Questionnaire (IPAQ) specifically designed for older adults (Hurtig-Wennlöf, Hagströmer, & Olsson, 2010). The IPAQ is a validated scale that has effectively demonstrated reliable measurements of both regional and national physical activity (Craig et al., 2003). This specific IPAQ for the elderly scale seems appropriate for older adults and culturally diverse communities since it includes broad examples and aspects of movement and physical activity (e.g., gardening and cleaning). As per the request of an official from the city, dancing was included as a type of both moderate (dancing) and vigorous (fast dancing) physical activity since dance is a popular cultural activity within the Albuquerque senior centers. These questions were scored to evaluate both the type and amount of physical activity as a comparison to weekly physical activity recommendations identified by the World Health Organization (2010) of 150 minutes of moderate physical activity throughout the week, or at least 75 minutes of vigorous physical activity, or an equivalent combination

of moderate- and vigorous-intensity activity throughout the week. The WHO (2010) also recommends these activities be performed in periods of at least 10 minutes duration.

Participant responses received a continuous score for physical activity where the amount of days and time spent per day in the different activities were converted to a metabolic equivalent score as delineated in Craig et al. (2003).

The last section of the survey were items from The Exercise Self Efficacy-Scale for older adults developed by Neupert, Lachman and Whitbourne (2009). Questions ask participants about their efficacy in performing physical activity under different conditions. This is a nine-item scale where the mean score across the nine items is computed, where higher scores indicate greater exercise self-efficacy. Though titled exercise self-efficacy, exercise scales are frequently used to measure older adult physical activity self-efficacy (Warner & French, 2018).

Data Collection

Data was collected between July 2018 through November 2018. The location and process of data collection depended on the specific methods of focus groups, interviews, and surveys.

Location. Focus groups and interviews were performed in person at local senior centers. Interviews also took place at participants' homes, local coffee shops, and libraries. Survey data was collected at senior centers and at a local yoga studio. Online surveys were completed anywhere participants deemed convenient.

Process. The interviews and focus groups began with verbal informed consent guided by an informed consent information sheet that each participant received at the beginning of the interview or focus group (Appendix E). Participants were reminded

what the study is about, provided examples of questions that will be asked, and stated that the interview or focus group were audio recorded and that all identifiable information (e.g., names, locations, etc.) will be removed from the transcriptions of these recordings, and inform participants they can withdraw from the process at any time. After this introduction, participants were asked to provide their verbal consent to participate in the focus groups or interviews. Also, each interview and focus group participant completed a form on which they provided contact information if they wish to be contacted for follow up purposes, want to learn more about the results of the study and want to enroll in the drawing for a chance to win a mobile computer tablet (Appendix B). The focus groups and interviews used a tabletop standing microphone attached to a password protected iPad tablet device that recorded and stored the recorded interviews and focus groups. Interviews lasted between 45 minutes to 1 hour 30 minutes and focus groups lasted from 60 to 75 minutes.

For survey participants, an introduction sheet and review of consent form was provided with each survey for participants to keep (Appendix F). This sheet provided information on the study, included example questions from the survey and stated that no identifiable information will be collected in the survey. Data management was also described. Participants were reminded that they can refuse to answer any question and may stop the survey and cease participating at any time before submitting the completed survey. Participants were informed that completing the survey is a demonstration of consent to participate in the research. Also, each survey participant completed a form on which they provided contact information if they wished to be contacted for follow up

purposes, want to learn more about the results of the study, and wanted to enroll in the drawing for a chance to win a mobile computer tablet (Appendix D).

Survey participants were provided with a pen, writing surface or clipboard. Magnifying sheets were available for those participants with impaired vision. Surveys were printed in large 14-point serif font, as recommended for older adult readability and understanding (CDC, 2009). The researcher was also available to fill in participant survey responses if participants requested survey questions to be read in an interview style. The online version of the survey was identical to the print version and also included the introduction page explaining the study, the survey, privacy concerns, and data management.

Data management. The data management strategies of this study specifically addressed the security and privacy needs for each instrument.

Focus groups and interviews. The interview and focus group recordings were stored on the password protected iPad tablet. Audio recordings were transcribed with Temi, a digital voice recognition transcription service (Temi. 2019). After digital transcription, each transcript was verified with the audio recordings. Randomly assigned pseudonyms replaced participant names. Once the transcripts were completed and de-identified, audio recordings were deleted. Transcripts were stored on a password-protected computer. Also, contact information sheets were kept separate from transcripts.

Surveys. Paper copies of surveys and data from online and mobile surveys were transferred to a spreadsheet on a password-protected computer for coding and quantitative analysis. Completed paper surveys were stored in a locked office at the

university. These surveys will be destroyed after a three-year period. Also, contact information sheets were kept separate from transcripts.

Data Analysis

This mixed methods study entailed both qualitative and quantitative data analyses. The results of these diverse analyses will be combined in the discussion where the quantitative research will elaborate on the results of the qualitative data in order to elaborate on the findings of this study.

Qualitative analysis. The focus groups and interviews were designed to answer research questions 1-3:

(RQ1) How do participants perceive their aging experiences?

(RQ2) What are participant perspectives of communication technology use?

(RQ3) How do participants perceive the role of physical activity in their aging experiences?

To do this, a thematic analysis of the interview and focus group transcripts was conducted. The thematic analysis combined elements of Constructivist Grounded Theory (Charmaz, 2014) and Constant Comparative Analysis (Glaser & Strauss, 1967).

Constructivism recognizes that reality is multiple, processual and constructed (Charmaz, 2008) and is an effective approach to understand people's perspectives and attitudes (Charmaz, 2000). The pragmatic approach of this study (Morgan, 2007) supports the use of CGT elements. This study investigated older adult perceptions and Constructivist Grounded Theory is an effective approach to understand how people use their experiences to inform their perspectives (Charmaz, 2014). Constructivist Grounded Theory (CGT) is an approach to qualitative research that recognizes how the researcher

co-constructs meaning with participants, “Emphasis on constructivism loosens grounded theory from its objectivist foundations and brings the grounded theorist into the research situation and process of inquiry” (Charmaz, 2014, p. 321).

Past experiences with older adults impact the researcher’s perspectives on aging, and CGT characteristics help the researcher recognize this bias and let it contribute to the meaning making in the analysis. The iterative, comparative and abductive characteristics of CGT keep the researcher close to the data so to more accurately capture participant perspectives (Bryant & Charmaz, 2007). This study adopted the iterative, comparative and abductive elements of CGT to guide the thematic analysis. Elements of CGT can successfully be combined with thematic analysis (Charmaz, 2008). The most significant CGT element used in this analysis was constant comparative analysis (CCA). CCA is an iterative and inductive process that reduces and expands data through frequent recoding and comparison of incident to incident, concepts to incidents, and concepts to concepts. (Elliott & Jordan, 2010; Glaser & Strauss, 1967). Constant comparative analysis was founded from grounded theory (Charmaz, 2000). Multiple rounds of coding were used to find emergent themes from the data. These emergent themes were then analyzed and categorized into overarching themes for each research question.

The analysis of this study used coding strategies of CGT and CCA, specifically open, focused, axial, selective, and *in vivo* coding (Charmaz, 2014; Strauss & Corbin 1998). The first round of coding used open coding, where categories/themes were developed directly from the data (Charmaz, 2014). The second round of coding consisted of focused coding. Focus coding searches for the frequent and significant codes for “the most salient categories” (Charmaz, 2006, p. 57). Axial coding was also used. Axial

coding develops concepts from the open and focused coding rounds into broader constructs by relating categories to sub categories. Selective coding was also used. Here data was analyzed for specific themes, theories or constructs developed from previous rounds. The last type of coding used was *In vivo* coding. *In vivo* coding requires that the researcher's codes resemble or even adopt the language and terminology of the data (Charmaz, 2006).

The purpose of these iterative coding rounds was to frequently compare themes to understand the relationships of research concepts and identify emergent and overarching themes for each research question. Tesch (1990) argues comparison is the primary tool in research where categories, construct relationships, and patterns are identified.

Analytical memo writing was also used to complement this analysis. Analytical memos are notes by the researcher to "reflect and expound on the data" (Saldana, 2013, p. 42). The coding and memo writing processes were managed within NVivo (2019) a CAQDAS (computer assisted qualitative data analysis) research software specifically designed for mixed methods research. The researcher performed the coding.

Quantitative analysis. The survey questionnaire was designed to answer research questions 4-6 and their respective hypotheses. Research questions four and five are concerned with the relationship between perceptions of aging and communication technology:

(RQ4) What is the relationship between participants' perceptions of aging and perceptions of communication technology?

(RQ5) What is the relationship between participants' perceptions of aging and use of communication technology?

Positive attitudes toward aging and positive age stereotypes support health prevention behaviors (Levy & Myers, 2004). Since ICTs contribute to successful and healthy aging (Abdulrajak et al., 2013), they are considered a health prevention strategy (e.g., access to social support, social engagement, and health information) in this study. Therefore, it is predicted that positive attitudes toward aging and positive age stereotypes influence perceptions and use of communication technology:

H1: Attitudes toward aging and age stereotypes will predict perceived value of communication technology devices.

H2_A: Attitudes toward aging, and age stereotypes will predict ownership of a smartphone.

H2_B: Attitudes toward aging and age stereotypes will predict ownership of a tablet device.

H2_C: Attitudes toward aging and age stereotypes will predict frequency of Internet use on a mobile device.

Research question six is concerned with the relationship between participant perceptions of aging and their physical activity self-efficacy:

(RQ6) What is the relationship between participants' perceptions of aging and physical activity/exercise self-efficacy?

Positive attitudes toward aging and positive age stereotypes improve older adult health behaviors and beliefs (Kornadt & Rothermund, 2011). Therefore, this study predicts attitudes toward aging and age stereotypes impact older adult beliefs in their ability/inability to engage in physical activity:

H3: Attitudes toward aging and age stereotypes will predict a person's physical activity/exercise self-efficacy.

These hypotheses will be tested with hierarchical logistic and multiple regression analyses.

The use of interviews and focus groups will richly detail community member perspectives on aging, physical activity and health. The quantitative data from the survey should demonstrate the impact these concepts have on the lives of older adults in this community and give broader context to the rich detail of the qualitative data results. Also, since technology has been shown to be an important tool for successful aging as well as functional for health purposes, it is important to discover whether ICTs are utilized in the lives of older adults and whether they would be an effective component in older adult health aging.

Ethical Considerations

Research with older adults has several ethical considerations that need to be addressed. Older adults are an underrepresented population in health research (Mody et al., 2008). There exist multiple barriers that prevent older adult recruitment in health research, such as poor health, frailty, cognitive decline, lack of access to research facilities, and even ability to understand research protocol (Witham & McMurdo, 2007). This underrepresentation of older adults in research leads to inaccurate statistics of population health concerns and leads to limited evidence base for prevention and interventions for older adult populations (Cherubini & Gasperini, 2017).

Health research with older adults should address these considerations and demonstrate methods to minimize those barriers and increase older adult participation.

This project practices many older adult friendly strategies. Participant exclusion criteria should be at a minimum to increase participation and garner greater insight into the heterogeneous aspect of the older adult population (Seppet et al., 2011). Face to face recruitment is also very effective for older adult research recruitment since it offers greater opportunity to clarify research purpose and protocol (Chase, 2013). Also, for survey questionnaires, Lacey, Wilkie, Wynne-Jones, Jordan, Wersocki, and McBeth (2017) recommend hand delivery. These strategies enable more opportunity for potential older adult participants to better understand the research protocol, make more comfortable and informed decisions, and consent to participate in research.

Summary

This chapter presented a general background of mixed methods research methodology and methods. Presented were the pragmatic paradigm of mixed methods research and the ways it addresses the needs and functions of both qualitative and quantitative research methods. The appropriateness of mixed methods research for physical activity research was also discussed, followed by specific methods protocol, recruitment and screening processes, data collection, and data analysis for this specific study. The research instruments of interviews, focus groups, and a survey were explained and justified, followed by ways in which the qualitative and quantitative data analyses would be used to answer the research questions. This section closed with ethical implications and importance of conducting health research with older adults.

The next chapter will provide the results of the data analysis, including emergent themes from the qualitative analysis as well as the results from the hierarchical logistic and multiple regressions.

Chapter 4:

RESULTS

This section provides the results of this study. First, the findings from the qualitative data are described to answer the first three research questions using a qualitative research approach. Second, the data used to answer the last three research questions and the hypotheses for the quantitative arm are offered.

Qualitative Results

Three research questions directed the qualitative arm of this study; (RQ1) *How do participants perceive their aging experiences?* (RQ2), *What are participant perspectives on communication technology use?* and (RQ3) *How do participants perceive the role of physical activity in their aging experiences?* Results from the qualitative data of interviews and focus groups are discussed in this section.

From the qualitative data of interview and focus group conversations, several themes emerged in answer to the first three research questions. Emergent themes about aging identified how older adults in this study discussed aging as a time of change that necessitates mental and physical strategies to maintain a sense of control and agency in their aging experiences. Participants discussed declines in health status, diminished social circles, the importance of accepting these losses, and making appropriate adjustments to accept what is out of their control and focus on what can be controlled. Staying challenged and finding a sense of purpose also emerged from the conversations with participants. Being challenged and working toward one's life purpose supported older adults' sense of accomplishment and fulfillment in their aging experiences. Participants

also commented on the ways aging is a sociocultural experience where they learned what it means to age from the examples of others.

Emergent themes from the conversations about communication technology explored the harms and benefits of technology and how participants balance between avoidance of harms and effective use of these technologies. Participants were concerned about the negative impact communication technology has on society. Participants referenced the history of past technologies to justify a pragmatic contextualization of the normal concerns of technology development, or a cautionary view of the detriments of technology. Older adults here approached these technologies with a purposeful resistance and a mindful balance. This approach encouraged participants to use communication technology as a tool. One of the ways older adults in this study used these technologies was for online health information seeking.

For participants' views on physical activity, the emergent themes discovered that older adults here believed physical activity to be an integral part of their aging experiences. Participants used diverse conceptualizations of physical activity to support various notions of what it means to be an able older adult. Physical Activity was also found to be an essential health strategy in participants' aging experiences. These themes are further developed with sub themes.

First, demographic information for the participants of the qualitative arm of this study is described. Second, themes for each of the research questions are presented.

Participant Demographics for Qualitative Interviews and Focus Groups

Fifty-three participants participated in the qualitative arm of this study. Sixteen participated in a total of 2 focus groups, and 37 were one on one interviews. Focus groups

took place at local senior centers and the interviews took place at local senior centers, coffee shops, and participants' homes. Two participants declined the interview/focus group demographic survey. A summary of participant demographics is presented in Table 4.1. Though Albuquerque is a minority majority city, more than half of the focus group and interview participants were White. Also, education levels for this sample were high and the majority was female. The average age of participants was 72, and ages ranged from 54 – 90. Thirty-eight were female (76%) and one declined to answer. Thirty-one participants identified as White (63%) and 18.4% ($n=9$) identified as Hispanic/Latino. Twenty-six percent were divorced ($n=13$) and 9 (18%) were widowed. Most participants reported some levels of college education (87.4%) and about 10% ($n=5$) reported High School or GED as their highest education level achieved. Eight participants (16%) declined to provide income. The highest reported income level for participants was \$100,000 to \$109,000, and the average income level reported was \$50,000 to \$59,000.

RQ1: How Do Participants Perceive Their Aging Experiences?

This section investigates how participants perceive their aging experiences. One overarching theme emerged from the interview and focus group data. Aging is a time of change that necessitates mental and physical strategies to maintain a sense of control and agency in participants' aging experiences. Three major themes emerged that explained the processes how these strategies for control and agency developed and supported positive aging. First, acceptance of and adjustments to aging changes created agency and control. Second, participants created a sense of self-worth and achievement through strategies of growth, and finally, participants used the examples and experiences of others to actively develop their aging attitudes and strategies. Each of these themes and the

Variable	N	%	Variable	N	%
Age	51		Income	50	
65-79	35	56.6	rather not say	8	16.0
50-64	7	13.7	\$30,000 to \$39,000	7	14.0
80- older	9	17.6	\$10,000 to \$19,000	7	14.0
			\$50,000 to \$59,000	6	12.0
Gender	50		\$60,000 to \$69,000	5	10.0
Female	38	76	less than \$10,000	5	10.0
Male	12	24	\$40,000 to \$49,000	4	8.0
			\$20,000 to \$29,000	3	6.0
			\$100,000 to	3	6.0
			\$109,000		
Race	49		\$80,000 to \$89,000	2	4.0
White/Caucasian	31	63.3	Marital status	50	
Hispanic/Latino	9	18.4	Divorced	13	26.0
Native American	3	6.1	Married	12	24.0
Asian/Asian American	2	4.1	Single, never	10	20.0
Other	2	4.1	married		
			Widowed	9	18.0
Black/African	2	4.1			
American			Separated	4	8.0
			Domestic partnership	2	4.0
Education	49				
Graduate degree	17	34.7			
Bachelor's degree	13	26.5			
Associate's or some	13	26.5			
college					
High School or GED	5	10.2			

categories supporting them will be described in the following section and are listed in Table 4.2. Table 4.3 identifies which themes are supported by previous research. Table 4.4 presents the theme that is a new finding in this study.

Table 4.2	
<i>Themes from RQ1</i>	
<u>Overarching Theme</u>	
Aging is a time of change that necessitates mental and physical strategies to maintain a sense of control and agency in participants' aging experiences	
<u>Major Themes</u>	<u>Sub Themes</u>
Acceptance of and adjustments to the changes associated with aging support older adults' agency and control in their aging process	Decline and Loss Living life despite decline Acceptance Acceptance of decline and loss Acceptance of death/making arrangements Adjustments Physical adjustments due to aging Mental adjustments due to aging
Staying challenged and finding a sense of purpose support participants' sense of accomplishment and fulfillment in their aging experiences	Aging is a Time to be Challenged Benefits of physical challenges Benefits of cognitive challenges Aging is a Time for Purpose Finding a sense of purpose Involvement
Aging is a sociocultural experience understood and learned through the examples of others	References to Others Experiences with Aging Parents Aging Role Models Changing the Concept of Aging

Table 4.3	
<i>Summary of Findings Supported by Previous Research on Aging</i>	
RQ1: How do participants perceive their aging experiences?	
<u>Theme</u>	<u>Previous Research or New Finding</u>
Aging as a time of decline and loss	de Medeiros, 2017; Ferraro, 2018; Katz, 2006
Acceptance in aging experiences	Baltes & Baltes, 1990; Clarke & Warren, 2007
Adjustments in aging experiences	Baltes & Baltes, 1990; Ferraro, 2018; Kobasa, Maddi & Kahn, 1982
Sense of purpose and involvement in aging experiences	Bennet, 2002; Cole, 1997; Erikson & Erikson, 1995; Hollis, 2014; Krause, 2012; Martins, Goldberg, & Greenberg, 2005; Nimmer, 2018; Tang, 2016
Social comparison in aging experiences	Coleman & O'Hanlon, 2017
Aging role models	Horton, Baker, Côté, & Deakin, 2008; Jopp, Jung, Damarin, Mirpuri, & Spini, 2016
The concept of aging as changing	Moody, 2009; Tulle, 2008

Table 4.4	
<i>New Finding in View of Previous Research on Aging</i>	
RQ1: How do participants perceive their aging experiences?	
<u>Theme</u>	
Aging is a time to be challenged	

Acceptance of and adjustments to the changes associated with aging support older adult agency and control in their aging process. Older adults identified aging as a time of decline and loss. It was important for participants to accept the decline and loss associated with aging. This acceptance makes it easier for older adults to adjust to these declines and losses. Participants juxtaposed their discussion of decline with adjustment strategies that maintain a sense of ability and control. This juxtaposition transforms their

experience of aging as decline to aging as change. These adjustments supported by acceptance allowed older adults to have agency and control despite decline and loss.

Decline and loss associated with aging. Aging emerged as a time of change marked by physical decline, disease, pain, illness and other losses. Participants discussed physical conditions like arthritis, joint pain, limitations due to joint surgery/replacement, cardiovascular diseases including hypertension, pulmonary diseases, a general decline in energy, and chronic back pain. Barbara, 69 years old said:

Aging for me means physical deterioration. People reach their prime somewhere between 36 and 42 years old and from that point on, no matter how you look at it, there is a gradual deterioration of the body over time. There is a decline in a person's physical health that is system wide, from your kidneys and your liver to your lungs and even your heart capacity.

Jason, 89, spoke of age-related physical decline as a "loss of energy" where "you get less energy, and you have more and more health problems. You are not able to do the things you ordinarily would do." Myrtle, 78, when asked what it means to age responded, "It's restriction, it's physically restricting. With the arthritis, I just can't do some things, but it's manageable." Physical decline was restricting and prevented many of these older adults to maintain previously held activities. This sense of decline was compounded, where decline in health status led to declines in ability.

Participants related other types of decline or losses associated with aging. Social circles diminished, and family and friends pass away. Children and grandchildren move away. Isolation and loneliness may result from diminished family and friend networks. As Norah, 75 stated, "I live alone. I've got no more family here and it's kind of scary."

Loss of independence was a significant change. Though none of the participants in this study talked about the loss of their own independence, it was discussed as a serious issue for their acquaintances and friends. Several participants mentioned the loss of words, where the vocabulary is not what it was, or it takes longer to find the right words. Though acknowledgement of these declines was important, participants seemed to avoid complaining or overemphasizing the impact these declines and losses have on their lives.

Living life despite decline. Declines and losses accompanied the aging experience but didn't necessarily define it for participants. As Amber, a 68-year-old woman said, "pain and disease are a part of my life, they don't define my life." Two participants explicitly stated that once you are "sick" you are old, equating aging with illness. But for the rest of participants, disease and pain were concepts that must be acknowledged but not allowed to define the entire aging experience. Alice, 87 years old remarked:

I mean, I'm aging well. I'm surprised, though, since I have several fatal diseases. I've been in kidney failure for some time now, but I'm as happy as I was when I was 16. And I'm so surprised that having serious diseases doesn't necessarily mean dilapidation.

For Alice, the presence of multiple diseases did not define her as aging poorly.

Though participants discussed these losses as expected, they do not mean older adults should overly dwell on these losses. Alice continued:

Aging is about losing. You lose so many people and you lose part of your health. You lose this and you lose that. But some people emphasize the losses and they are miserable and other people are just so grateful for what they have. And that makes a difference.

Alice used her positive yet practical outlook to her age-related losses. She cannot control the losses but can control how she looks at them. Roberta, 73, expressed the same sentiment about the normalcy of loss in older age:

On the negative side, aging means losing stuff, losing mentally, physically. As you get older, you've lived long enough, and you've lost people your age and you've seen people that are older than you or your age where everybody's got something wrong with them.

These statements were shared to express an honest perspective on what Bill, 60, called the "realities of aging." For most participants, the declines of aging were inevitable. Carol, 68 said "Well, I think the biggest one that we all fight is arthritis and that is pretty much inevitable."

Facing the declines of their aging experiences offered these older adults an opportunity to acknowledge their limitations. This acknowledgment allowed them to accept the things they cannot change to better identify the things that can be changed.

Acceptance. Acceptance of decline, loss, and the inevitability of death were important strategies older adults utilized to avoid the distraction and worry of things that are out of their control so they could spend more thought and energy on those aspects of aging they can control. Acknowledgement of decline and loss was different to acceptance of these declines and losses. Acknowledgement was simply knowing these things are. Acceptance was being mentally and physically alright with the decline/loss.

Acceptance of decline and loss. For most participants, acceptance of the declines of aging was an important step in the aging process. It gave older adults awareness of the reality of their experiences. Amber commented, "Age means being willing to put up with.

You are going to lose weight, are not as flexible as you were when you were seven.”

Audrey, 76, discussed her experience of “no longer being attractive as a straight woman, if you are no longer attractive to men, you lose value in culture. And that’s a reality.” Bill stated:

It’s just the realities of aging. You’re heading toward senescence. Every year that goes by, I’m not as strong. My muscles and cardiovascular system deteriorate. No matter what training I do, no matter what sort of exercise plan I’m on, it’s just the reality. Your veins and arteries get harder. For me, the idea of aging is the physical body ages, just like everything else in this world ages, just as machines age. It’s just part of the deal.

These declines were as Myrtle remarked, “just aging,” something to keep in mind so one can remain patient during the challenges of this stage in life. Paige, 77, remarked, “I have osteoarthritis, which hurts, but that is to be expected. I’ve heard that I might forget where I put things. I don’t have dementia. I just have a problem remembering things.” Eunice, 85, in response to what she needed to age well, said:

It’s accepting yourself. You know, you fight it in your forties with the moisturizers and creams. You get to the point where it didn’t help a whole lot. So, you just have to accept yourself and embrace yourself. I try to. My body works.

It’s not the prettiest one out there, but my legs work.

One married couple, Lucy and Dudley, both 78 years old, commented on the challenge of giving up a treasured hobby. Dudley said, “I don’t think it’s been so bad because we accept it. We feel like we’re just proof of what we did.” For Theresa, 57, the changes of aging:

are just happening. You just have to be a little more careful. I can have one glass of wine, but I can't have three. You need to think of the consequences of what you can do... it just has to happen, has to happen.

Part of the acceptance of these changes was recognizing it is all just a "natural process." Jacob, 75, in response to the natural order of the deterioration of the aging body stated:

Eventually gravity takes over, gravity wins, and your mind and body connection and everything sense that, it's almost intuitively... because gravity is all over the place all the time for everybody. Look at these massive fields and mountains here; gravity! And as we talk about black holes and stuff like that. The center of most major galaxies, these super massive black holes, it's gravity, sucking everything in.

Jacob contextualized his physical decline within the greater cycle of the cosmos. Here the impact that age and "gravity" have had on his body, the joint pain and decreased energy is just part of a larger natural cycle. He saw himself confined by the same laws of nature that determine the universe and physical environment. This acceptance was not discussed in terms of capitulation, but rather as a deeper awareness of what one cannot and what one can do. As Dudley stated, "Accept yourself, what you can and can't do, and emphasize what you can do." Jason said of the losses of aging, "You just have to accept, and the more you are exposed to different things, you learn different ways to do." The acceptance discussed here demonstrates a pragmatic approach that enables most of these older adult participants to make responsible decisions on what one needs to do to stay active, alive and engaged. Most participants in this study engage in behaviors that enable

active aging. Two participants admitted they do not currently engage in healthy aging strategies, but, as Tilly, 75 remarked, “know what I need to do” to get healthier and more involved.

Acceptance of death/making arrangements. Most participants discussed death as a “life event” that needed consideration. Discussion of death seemed more about being prepared for how one will live the last stages of life as opposed to dwelling too much on the end-of-life. Lucy, 78, admitted:

You have to look at the fact that the light is at the end of the tunnel and you can't turn away. You got to think about it. You have got to plan, not overly, don't let it consume you, but think how are you going to live in your house? Who is going to help you, how will you manage?

Lucy admitted that she received considerable disapproval from her children when she broached the subject of her end-of-life care. Her husband believed their own children's fear of death is what made the conversation difficult. Patricia, 69, from the same focus group lamented the disapproval Lucy and Dudley received from their children. She related to this challenge of talking about final arrangements with family and the danger of other people's fear of death. She discussed how important it was for family to understand one's last wishes. It is also an opportunity for them to “accept you for who you are and what you want.” For many participants preparing family and friends for the “inevitable” was an important motivator to make end-of-life arrangements. Myrtle told her own story of planning with her children after her second cancer diagnosis:

I called a meeting with my children. I said, *I've taught you my whole life that I can take care of myself. We are at that point now with this cancer, when I need*

you to be there for me... I don't want them to have to make decisions because I had to in the past and they were not happy. And if I can alleviate that burden, that's what I want. None of my friends have talked to their children about that. I can't get to be my age and not think about things like that.

Not only was she motivated to prepare her children for the end of her life, note her surprise that her friends do not have such conversations. For many participants, the fear of death and avoidance of the inevitable was problematic. Alice noted:

You're going to be dead sometime and why not just take that. When I retired it was another part of my life I was going to make the most of, the same as I did in other times of my life. I think it's sad if people try to deny it and don't want to face it because they have such a negative view on aging.

For Alice, avoidance of death and end-of-life considerations was seen as a negative perspective on the aging process, or as she phrased it, "thinking of aging as a dirty word."

Acceptance of death as another part of the life cycle was an opportunity for one to appreciate "life in the moment," or simply an opportunity for one to have control over the business and logistical aspects of one's own death. For many, facing and accepting mortality was an important transition to live the last stage of life in peace of mind. As Jacob stated:

Aging means you are getting closer to death, and psychologically you need to deal with that issue in your mind. Then your body tells you, yeah, that feels right, you're slowing down, feeling your aches and pains a little more and you're not playing [sports] anymore.

The older adults in this study used acceptance to gain agency and a sense of control. This agency and control also influenced ways the participants discussed their adjustment strategies to compensate for the loss and decline associated with aging.

Adjustments. Many of the participants in the study discussed aging as a time of adjustment. Adjustment strategies respect limitations associated with age while simultaneously maintaining some form of effort. Acceptance encouraged these adjustments and created a sense of agency where one is still doing physical and mental activities. The link between acceptance and adjustment transformed the notion of aging as decline into an awareness of aging as a time of change. Adjustments neutralized the notion of loss since adjust implies there is still some effort and activity. These changes of aging required modification in activity and thought. Adjustment did not mean giving up. Adjustment is about maintaining effort where these older adults learn to work within their limits. Adjustment enables these older adults to stay engaged in pursuits with an awareness of one's limitations. The two main adjustments these participants discussed were physical and mental/cognitive adjustments.

Physical adjustments due to aging. In most of the narratives that were shared, accepting physical decline was necessary for people to make the proper adjustments to their new limits. Physical adjustment to age related declines included cutting out certain activities or substituting one activity for another that was more comfortable but still challenging. Doing the same activities at a slower pace were perhaps the most commonly shared adjustment strategy, as evident in Jacob's words, where he talked about the learning curve in getting older: "You just learn, wow, the mind thinks you can do it but

the body, well, it's all about making adjustments, making modifications, you know, trial and error." Making adjustments can be very challenging, as Lucy noted:

It's very hard sometimes to make a decision of what you're still able to do and what you have to realize, you have to give up. And you don't want to throw in the towel, but you do want to be realistic so it's not an easy thing.

Some participants mentioned they substitute one activity for an activity they had to give up. Jason shared how he used to play tennis but had to give it up because of vision problems due to macular degeneration. He took up table tennis after his eyesight was corrected so he could have an activity that provided a similar experience, but not as intense.

Participants discussed these adjustments as ways to respect their limitations while keeping activity an important part of their lives. It is important to note that adjustments did not mean that these older adults limit themselves. As Dierdre, 64, admitted, "Your body changes but it's not keeping me from doing new things. I'm just probably going to do them at a softer pace, maybe not charge in like a bull."

Like physical adjustments, mental adjustments helped these participants work within their limits.

Mental adjustments due to aging. Mental adjustments were those strategies participants used to stay motivated in their physical pursuits. These were discussed as being conscious of behavior and doing things with more awareness. Mental adjustments also included changes in thought or perspective about their aging experiences more generally.

Many participants commented on the consciousness and awareness activities required at this stage in life. As Dierdre pointed out:

We are conscious of being careful a lot. We have a Harley, and we used to enjoy rides a lot, but now we're more conscious of who is on the road. We have scaled back a little bit. We still ride, were just more conscious of it.

This consciousness applied to many activities, such as planned exercise, and recreational activities like riding a motorcycle. Consciousness and awareness were mindsets that help participants stay motivated and prevent frustration with the limits associated with getting older. This attentive mindset acknowledged limits but maintained ability. As Theresa commented, "it's about more caution, less ego, more practicality." Shirley, 67, provided a good example how consciousness helped her navigate between limits and abilities. She suffers from avascular necrosis, a rare disease that causes bone decay from insufficient blood supply and poor circulation. She has had double hip replacement surgery twice, does suffer from atrophied muscles and was bound to a wheelchair for several months. She is approaching the time where she might need another hip replacement but stays active so she can maintain her health and abilities. She uses awareness to keep her activity within her limits:

When I get an ache or a pain it's reminding me that, okay, I better not today. If I can't do a deadlift today, the next time I go I will try again. And most of the time, oh okay, today's a better day, but when I run into something and it's pinging and hurting, I know that means okay, not today, we'll try it again another day.

Her awareness respects her limits but also enables her to keep trying. Her activity is managed through respect for these physical boundaries. If she respects these boundaries,

she will be able to adjust to them for more of her life. Her practical and even optimistic mentality supports her physical adjustments as well.

Participants also talked about the broader mental adjustments, not just reframing their physical pursuits. These broader mental adjustments were a change in views toward life and how they saw themselves. Chuck, 72, said aging “is a shifting of values, things that weren’t important are now important. It’s a shifting of values, a shifting of interests, along those lines.” Jacon argued the lessons learned in older age made him a better person when he stated, “As a matter of fact, the secret of life is, as you get older, you learn to accept yourself as a slower person, as a waiting and more patient person.” Myrtle admitted that she needed to make significant adjustments to her perspectives on mortality and life after her latest cancer diagnosis:

So, I have to come to terms with this. Now I am a part of this group that must live with this. I don’t like it, but I will live as long as it lets me. But I had to do some real adjustment to that.

When asked how she was able to make these adjustments after a cancer diagnosis, Myrtle replied:

I don't know. Stubbornness I guess, but I think one thing that bothers me is I don't like to feel bad. And like after my knee surgery... I was moping around the house and about four weeks after surgery I woke up one morning and I thought “I am tired of being sick and tired” and I got in the shower, changed clothes, and I called my brother and I said, come over and take me out in the car and see if I can drive. We drove around the block. That was the last part. I can't stand being laid low, let's put it that way, and with the cancer. When you think about when you've done

everything. I knew that the arthritis was just a health thing, but the cancer was such a surprise and I wasn't prepared for it. I mean it was like being hit in the stomach with a hammer or something. Oh, it's horrible. And I had to adjust to that because you don't get well from metastatic breast cancer. It's here forever. I can't be down forever, you know, I have to live my life. So, whatever happens, you know, I've made adjustments in that direction. That changed my way of thinking about my lifestyle. I was thinking of what I want to do with the rest of my life. So, to me that, you know, you just have to take these things and make the changes and adjustments as you go along. You only get one chance.

Though she is explicitly discussing her knee surgery and cancer diagnosis, these conditions were a significant part of her aging experience and demonstrated her approach to life and mortality. Her “tired of being sick and tired” created enough frustration to get her to change her thoughts about what it means to be sick. She believed she can't change the course of the cancer but decided to change her thought process, make those adjustments and focus on how she wants to live her life, not as a sick person, but as a living person who has cancer. Her repeated use of the term “adjustment” reflected the resilience many participants have regarding the ailments and declines of aging. The term adjustment does not discredit or ignore the real implications of physical ailment, but gives participants a sense of agency in managing ailment or disease. Myrtle's example showed that adjustments take effort. Instead of moping and being sick and tired, she went out to see what she can do, not dwell on what she can't. Others spoke of old age as a time to be grateful for what one has as opposed to being disappointed about what has been lost. Viola, 76, echoed this sentiment:

I think positiveness is important. Positiveness. Trying to be happy and a lot of times happy is hard because life gets in the way of happiness because we get sick, we lose a family member. Um, I think that's the hardest is losing a family member and it's hard to be happy sometimes, but if we could figure out a way to just be happy.

The effort older adults put into their adjustments cannot be overstated. Whether it was giving up a favored activity like running or trying to find happiness in a time of loss and sorrow, adjustment to aging decline and loss required motivation to maintain control of life as best as one can. Though adjustments entailed modifications of certain activities, and a more patient outlook for some, most participants stressed the importance of staying challenged to maintain ability in older age.

The next section discusses the second major theme of participants perceptions of their aging experiences.

Staying challenged and finding a sense of purpose support participants' sense of accomplishment and fulfillment in their aging experiences. Older adults used the benefits of being challenged and the search for meaning to support a sense of self-worth and an opportunity for improvement and growth. Acceptance and adjustment seemed more about balance and maintenance. The opportunities of a challenge and connecting life to a higher sense of purpose emphasized potential and development.

Aging is a time to be challenged. Most participants discussed the benefit of staying challenged. Participants admitted challenging oneself both physically and cognitively were essential to maintain functional ability and keep the physical body and

the mind healthy. Challenging oneself physically transcended maintenance and made these strategies about achievement, goal setting, and personal growth.

Yasmin, 66, saw the challenges of goal setting a means of being happier, even when she cannot reach every goal she sets:

I understand why I reach out again for these goals. I mean to challenge myself and feel more attune to my abilities. I think that is what makes us happier.... You got to give yourself some challenges, that is important when you feel you are getting older. You will see you can still reach a goal. It may feel like you are old, and say, I cannot do this, I cannot do that. That is not how it is.

Challenging oneself maintains a sense of ability and even happiness for these older adults. The idea of “use it or lose it” was frequently referenced which demonstrated a sense of control participants utilized through their aging experiences.

Benefits of physical challenges. Amber, discussing why she walks everyday said, “If I’m not challenging myself, my limits dry up.” Challenge helped these older adults grow in skills, achieve goals, and just maintain a sense of pride in ability. Challenge even helped older adults get better physically. Liam, 65, recently retired and is an avid cyclist. He frequently tries new and longer routes for his rides to “find my limit... so I can say I did it. You know, the challenge of it.” Dierdre also admitted the challenge of learning new activities is what motivated her:

That’s what I need. Challenge and variety... I like to challenge myself. I know I’m not gonna be where I was at 27, but I like the challenge of trying to do more and get better. So, the challenge in itself is good. Keeps me motivated, even do something different.

Dierdre's words expressed a juxtaposition of acceptance of limitation while at the same time attempting to grow within those limitations. She admitted she will not be at the physical level of her younger self, but she still can stay challenged and be motivated. Roberta found her strength and flexibility diminishing as she aged and pushed herself to take on more types of activity, to see if she could improve. "I didn't want to lose it [physical ability] in any portion. I shouldn't say I can't do more because maybe I can." Participants utilized both physical and mental challenges to maintain health.

Benefits of cognitive challenges. Along with challenges for physical benefit, participants also discussed the mental and cognitive benefits of challenge. Where the benefits of physical challenges supported growth, cognitive challenges were also about maintaining mental capacities and cognitive function. Most participants discussed concerns over cognitive decline and disease, including dementia and Alzheimer's Disease. Though some acknowledged these cognitive issues may be hereditary, most saw serious cognitive decline as the result of lifestyle choices and more specifically, the disuse of cognitive faculties in older age. Ruby, 73, discussed the concern of cognitive decline as a motivator to "keep trying to do as much as you can and I think a lot of older people, including myself, are all afraid of losing our memory, becoming senile." To address this concern, most participants believed challenging their cognitive faculties maintains the health of the brain. Participants admitted of more control of cognitive decline than physical decline. As Barbara admitted:

There is a gradual deterioration of the body that goes on over time. That doesn't necessarily mean that the brain has to deteriorate along with it... The body is aging, and the brain needs to be stimulated. I try to work my neuropathways.

Barbara's words echoed the sentiment of many, with a sense of control over the mind despite physical deterioration. As Henry, 91, stated, "Use it or lose it, that's the truth." This was a salient concept in participants' words about what one can do to prevent mental decline. Yuri, 67, said "it's important for seniors to stimulate the brain... If we don't use it, it will decay." Paige, when asked why she tolerates the stress of learning new things, she admitted how it challenges her brain and "makes her think." Paige is right handed but practices writing with her left hand to stimulate her brain. She admitted it is illegible, but she keeps up this practice to keep the brain challenged. Many participants shared their methods used to stay cognitively challenged, from socializing to playing cards, as Carol said: "If you don't use your brain, it will degrade faster. I play Mahjong, try to engage in conversations with people. I think that is really helpful to use your brain for stuff. It's challenging."

Being challenged was an important strategy for participants to stay active and alive as one ages. Another important piece of aging was living for a purpose and having an impact on the lives of others.

Aging is a time for purpose. Aging-related experiences were not limited to concrete behaviors, such as adjustments and physical activities. Many participants expressed the importance of knowing or seeking one's life purpose, including having a positive impact on the lives of others through involvement and even volunteering. Having a sense of purpose and doing good for others were important components of wellbeing in the later stages of life. Participants found importance in their lives through a sense of purpose and being involved. A sense of purpose motivated activity and "doing," which in turn supported control and agency. Participants' need for purpose and involvement

provided opportunities for fulfillment and a chance to give back to society. Helping others became an important aspect of their aging experiences.

Finding a sense of purpose. The theme of purpose is the reason for living and having your life matter. For some, spirituality influenced their sense of purpose. When asked what people need to age well, Ed, 76, said “a sense of purpose.” Now this sense of purpose does not have to be completely clear, but one must work to find it. As Yuri stated:

You must ask, what’s your purpose in life? You must work on your purpose, you know, you are not always one hundred percent on your purpose, but if you focus on it and do the important things you feel you have achieved something.

Molly, 65, discussed her sense of purpose at length when talking of the death of her father. Molly was the primary caregiver to her father for almost twenty years. While her father was dying in the hospital, Molly suffered a heart attack and a pulmonary embolism. It was at this time Molly admitted:

Um, to tell the truth after my dad passed and after having these issues, the thought came to my mind, why am I going to continue living? You know, I wasn't suicidal, but I was like, what now? But then I got it. I have somewhat of a faith and, he, she, or whatever is out there in the universe must still have some reason for me to continue to live, so I think, there must be something out there I still have to do and I don't know what that may be, and may not even get it done because, you know, God doesn't put it down in front of you. I'm not sure if I am doing what I'm supposed to be doing if I'm still supposed to be here for some purpose, but I

try to keep on living for whatever reason to effect whatever people around me that maybe need my help, some interaction with me for some reason.

Molly discussed a belief or faith in a higher power that may play a role in her search for a purpose. For many participants, religiosity or spirituality were effective in helping others define a purpose. Participants referenced religious practices to keep one focused on the meaning of life, where going to a place of worship was an important social function. As Viola, remarked, “You need spirituality. You need to believe in something.” For those who discussed spirituality, it was that support that enabled one to “have faith” and stay motivated to keep trying.

For most participants, life’s purpose was about being there for others. An altruistic mindset and its accompanying behaviors gave older adults a deep sense of worth and a motivation. Older adults’ involvement with the community was another important aspect of living for a purpose.

Involvement. Being involved with communities was an important activity for older adults in this study. Many participants were involved in volunteerism such as building homes with Habitat for Humanity, education services through The American Association of Retired People (AARP), civic engagement and lobbying, and tutoring and mentorship for children and young adults. Involvement was discussed as an activity that had physical and mental benefits for older adults. As Viola pointed out, “you feel good when you do it, whether you do it for yourself or for somebody else.” Viola volunteers at a food pantry and is a companion to other seniors who live alone or need help with transportation, and just getting out of the house. For Barbara, volunteering for the New Mexico Senior Olympics gave her a sense of pride for being part of an organization that

gives older adults a platform to “excel” and an opportunity to “prove themselves” to address ageism and the social prejudice against older adults. Even those who do not volunteer presently admitted the benefits, as Tilly commented, “You know, you’re not involved, and you need to get involved. I don’t know if I’m like other seniors, because I don’t and that a bad thing for me not to be involved.”

Though involvement made many older adults feel good about themselves, another reason to get involved was the impact it had on others. Bob, 70, teaches high school teenagers robotics. His main motivation was knowing that his skills could really change the lives of these teenagers, preparing them for employment. “It’s the best thing I’ve done.” He admitted that the classes he teaches change people’s lives for the better. He said it was about giving back, knowing that others helped him when he was younger. It was just “the right thing to do.” Carol teaches older adults how to use smartphones and computers. She also teaches older adults how to play various card games. She notes how happy it makes others feel when you give back, though it took some effort to find ways for her to give back, “I think volunteering is huge. Well, it’s hard to find the right fit, but I haven’t stopped trying.”

Some participants were still employed or working in retirement. Jude, 71, a retired lawyer, was heavily involved with his son’s music band, where he has taken on a managerial role, performing legal tasks, merchandising, and obtaining venues for the band.

Involvement offered older adults opportunities to be useful, give back, and have a positive impact on the lives of others. Involvement and purpose motivated older adults to

maintain their efforts in their aging experience, thus supporting a sense of satisfaction in the later part of their lives.

Aging is a sociocultural experience understood and learned through the examples of others. The third major theme that emerged from participants' perceptions of their aging experiences involved how participants used the examples and experiences of and with others to shape their attitudes toward aging. Though aging is understood as a biological process of physical decline, and a psychological experience of acceptance and shift in mindset, participants also discussed aging as a sociocultural event where the experiences of other older adults were used to understand aging. Participants made frequent references to others, specifically how others age and how the examples of others operated as metrics for what is possible as one ages. These social comparisons to other older adults were also demonstrative of "aging well" and "aging poorly." The experiences many participants had with aging parents also influenced their perceptions of aging and shaped their aging strategies. Participants discussed aging role models that inspire active aging and reflect what is possible, even in the later years of life. These examples also showed how participants are changing what it means to age, or just recognizing this shift in what it means to get older. This social comparison of older adults and the ways in which the concept of aging has changed over time, showed that aging is not only a biological and psychological experience, but also a sociocultural concept that is learned.

The need for participants to refer to others to understand their aging experiences may arise from society's avoidance of discussions about aging. Carol made her ignorance of aging expectations a social issue, where "there is no preparation in the American

lifestyle, at least from my generation [baby boomers], that prepares one for aging.”

Myrtle remarked, “I’ve never been here before, so how am I supposed to know?” And

Viola quipped:

You know, to tell you the honest truth, I can’t tell you what it means to age because how am I supposed to feel? Am I supposed to feel a certain way at this age or am I supposed to dress a certain way at this age? Am I? Who's to say, they hadn't told me.

The stories and examples of other older adults seem to help participants construct their understanding of aging, both individually and socially.

References to others. Most participants in the study referred to other older adults to better understand their own aging experiences. Older adults used examples of others to make their own decisions about how they can and should age. These examples also operated to support participants’ attitudes toward aging. As Viola stated:

When I dress, I put on a skirt and it's over the knee, and I see some that are my age or older that are lower, you know, that they look old, you know, but some are not. Some look really, really nice and I always give them credit for that. You know, why not look really nice? Especially these ladies you see here at the dance. They look really nice.

Viola looked to others to better understand how she should and can dress as a 76-year-old woman. Here, she argued that women can wear clothing that may seem age-inappropriate. She believed the effort one places in taking care of oneself is important and used the example of these other women to substantiate that point. The example of

other women motivated her to embrace her clothing choices that challenge age appropriate dress codes.

Similarly, Jason looked to other older adults to support his view on the importance of diet and activity to age well. He knows many older adults who are active and work at aging well. He also lamented the lack of effort from others:

Usually the ones who are on medication and everything, they don't exercise at all.

I don't think, they don't do anything... I'm around older people most of the time.

And you can tell pretty much the ones that don't exercise or don't eat right. They age more rapidly than others.

Jason believed being active was an important way to avoid medication. He believed the use of multiple medications was problematic for older adults and used the examples or appearances of others to substantiate his perspective. Though some older adults used the examples of others to support their views, other participants referred to others to gauge their own limits and goals. Liam pointed out:

All I can do is look at other people that I know are now where I will be soon, and I ask, when I'm there, am I going to be worse than they? I mean even though I'm trying to keep up with exercising, like this guy I know. He has a stiff neck, he used to walk and do a lot of things. Now he can't do a lot of this stuff anymore since he's had a hip replacement. And then there's a friend of ours, I think she's 10 years older than me. She broke her hip. She had a replacement and she recovered really fast. I'm like, wow, you know, and that's kind of where I'm thinking from my exercise, it's what keeps me going.

Liam used the stories of his two friends as two extreme examples of what his outcome might be when he reaches their age. He expressed a little surprise at how different these friends' experiences are, but translated this discrepancy as what might be possible, which motivated him to be active.

Other references to older adults commented on their activity, positive outlook, independence, and bravery. These references seem important strategies to support values and attitudes toward aging and effective means to explain personal and individual aging potential. The experience older adults had with aging and/or ill parents also influenced perceptions of aging.

Experiences with aging parents. Participants used their experiences with aging and/or ill parents as motivators to age well. Negative experiences with ill parents motivated participants to age better than their parents, where more positive experiences with aging parents functioned as positive reinforcement to aging well. These participants did not see their parents' aging experiences as the inevitable, but rather experiences participants could actively avoid for themselves.

Mark, 71, used the experience of his dying father to inform his approach to his own aging years: "I saw my father getting sick and, uh, not able to do, to function.... my son maybe sees me as trying to take care of my health and that I'm not going to be the same kind of burden." Mark had fears of loss of function and being a burden, and the experience with his father taught him this is not an experience he wants for himself or his son.

Molly's experience as her father's caretaker also influenced her own strategy to manage illness and aging:

Well, after having taken care of my father for nearly 20 years, and he lived to be 95, um, I saw through his, slow decline that it's not fun to be bed bound, or to be unable to do certain things because of physical reasons and mental reasons. So, um, I'm trying my best. I'm far better at keeping to a good diet and exercise, but I mean I, I will do what I can to keep myself healthy and force myself to do water aerobics.

In both Mark's and Molly's experiences, the work of being caretaker was not the concern, but rather the empathic and emotional experience of witnessing someone's lack of independence. Similarly, Shirley's experience with her dying father expressed this same emotion:

I watched my father die of something called Lewy body disease... Not pretty nice. He was locked inside himself. Um, aspects of Parkinson's and Alzheimer's. To me that's, I think some of it was definitely lifestyle. At least I'd like to think that, since I don't want to have that happen, I want to live a different lifestyle. My dad was very much the couch potato. He worked hard. He ran his own corporation and was very successful. But on the weekends his favorite thing to do was watch football and I'm like *really pop?* I want to live a different lifestyle than that.

Shirley's sadness over her father's illness, but more specifically, his lifestyle choices which she believed partially caused his disease, motivates her to live a different lifestyle. She was unsure whether his disease was actually caused by lifestyle but wanted to believe that since it means she has a chance of preventing it for herself.

Experiences with aging parents influenced not only lifestyle choices, but also one's approach to death and end-of-life arrangements. When explaining why she made her end-of-life arrangements while still active and independent, Myrtle said:

I buried my mother, my father, my husband. I don't want them [children] to be surprised. I don't want them to be stuck with something. I don't want them to make any decisions because I had to make those, and they were not happy.

The significant lessons learned from parents' aging experiences were not all examples of what not to do. Some participants discussed their parents' aging experiences a positive influence on how to age well. Gene, 74, discussed her approach to aging as shaped by the example of her mother:

How I faced being old was that I took care of my mother who lived to 98. And she was one of these people that she didn't have time to get sick, so when she died, she just left. She said, I'm outta here, but her whole attitude about age, I think that's what transferred to me.

Norah expressed similar sentiment toward her mother. She also used her mother's example to explain how she approached aging:

I think it means different things to different people. My mother passed away at 100 last year and um, she lived alone until she was 95. She didn't start to use a walker until she was 96 and she never really complained. If she couldn't do something, she'd laugh about it. That's just part of life. What are you going to do? And that's a good way to do it.

Nora's and Gene's stories were a strong influence on their own aging expectations and provide motivation, not only for what one should do, but also the mindset that they want

to adopt as the declines of aging increase. Nora and Gene had role models for parents. Many participants used other types of role models as motivation to “keep trying” in older age.

Aging role models. Many participants used the examples of role models to influence their perceptions of aging. Role models included parents, friends, colleagues, senior athletes, celebrities, or just people they see at senior centers putting effort into their aging experiences. These role models exemplified diverse strategies to aging well. Examples included physical activity behaviors, positive mindset, social engagement, involvement, and effort and work to age well. Lucy referenced her parents and family members:

I did have some good examples in my family. My mother, she was constantly learning and doing things. She went to elder hostels and stuff like that. Even after she was widowed, my grandfather celebrated the Sabbath and all the holidays, no matter what, and there were people in my family I just admired.

These role models stayed mentally active and kept up religious traditions and embodied effort many participants found essential to aging well. Paige greatly appreciated the lessons she learned from the older adults she volunteered for over the last thirty years, “I credit all of them. People I've been with since I moved here in 1984.” These older adults used their own experiences of memory issues to teach Paige to expect to forget things once and a while, but not to overreact and, just maintain some amount of effort to age well.

Not all role models were family, friends or acquaintances. Participants discussed the stories and examples of celebrities positively influencing their own aging experiences.

Barbara shared a story of a famous older female artist, exemplifying positive aging:

I recall a story... when Georgia O'Keeffe was still alive, and she came to the Art Institute of Chicago to do a workshop. My ex-husband met her and talked to her like an old lady because she was old at the time... as he was talking to her, she dropped her vision to his waist, looked at his very unusual buckle that was made of bullet casings, stared at his crotch, and said, that's a very interesting belt buckle you have. He completely stepped back and realized that he actually wasn't talking to an old lady at all.

For Barbara, this story exemplified this woman's ability to challenge younger people's perceptions of older adults. It also inspired her to never lose her "spirit, mind, and personality" in spite of an "old body." For her, this story challenged the concept of an elderly body and mind and this stayed with her as a reminder of her own potential and ability to maintain intellectual pursuits in her older age.

Role models showed participants what is possible in the later part of life. These examples from role models and aging parents instilled in older adults they can actively change aspects of their aging experiences for the better, and change what it means to get older.

Changing the concept of aging. This last subtheme shows how participants used the examples and experiences of other older adults to shape their own views of aging. Many participants referenced others to mark how aging has changed over the last few generations. Examples of what people looked like generations ago, or what older people

did in the past were mostly discussed as a comparison to measure how the concept of aging is currently changing. As Bob remarked:

It used to be old people sat down, but now, people are more active, like a bunch of people in their sixties through eighties playing ping pong. One of the gals we play with, she's a senior athlete. She's amazing, but we've seen that when I was working, jogging, running was more unusual and now we're running all the time. It's changed a lot.

Nathan, 68, made the same argument when he discussed what people at his current age looked like when he was a child:

When I was growing up, my parents and my grandparents, they looked as old as the hills at 50. I mean they looked like they couldn't even walk up a flight of stairs. I have pictures of my great, great grandfather at this age. At the age we are now, they will look like they were one step out of the grave. Now you look at people that are at our age now, they look younger. They don't have as much white hair, you know, it's day and night.

These examples show that the appearance and behavior of older adults have changed dramatically over the last few generations. As Carol stated, "40 years ago we'd be considered really old, I don't think of us as really old...I remember growing up 50 was really old." These comparisons demonstrate older adults' awareness that the concept of aging is changing, for themselves individually and collectively as a society.

It was important for some participants to discuss the negative impact "youth culture" has on social attitudes toward aging and how that influences individuals' aging experiences. The emergence of the baby boomers into older adulthood was the catalyst to

get older adults to challenge what one participant called the “youth bias” in society and actively change what it means to age. As Barbara argued:

The social outlook that prevails in the United States shows seniors really and truly are at the bottom of the pile. So it's up to people like me to stand up and show where we're coming from because we're a rapidly aging population and the fact that people would reach the centenarian category is more likely now than ever before... the media really pounds the youth culture into the general population again and again and again. It's not surprising that people have somewhat of a distorted view of what older adults are capable of.

Not only was the increase of the older adult population an important concern for many older adults, this increase should also reflect the importance this growing age demographic can have on society. As Darlene, 52, commented, “We have to change the dialogue about what 50 looks like, what 60 looks like, what old looks like so that you don't go into 50 thinking *why bother, there's nothing forward of 50.*”

Discussion of the sociocultural aspects of aging reflected ways in which the concept of aging is changing for participants. Participants used their experiences with and perceptions of other older adults to better understand what it means to age. References to other older adults seemed to help participants develop their own expectations for the aging process and even be motivated to take on behaviors and characteristics of others to age well and even change what it means to be old.

Summary. This section presented the emergent themes from participants' perceptions of aging. The overarching theme that emerged from research question one about participants' perceptions of their aging experiences was how aging is a time of

change that necessitates mental and physical strategies to maintain a sense of control and agency in participants' aging experiences. Three major themes also emerged in support of this overarching theme. Acceptance of and adjustments to the changes associated with aging create agency and control in their aging process. Participants discussed how staying challenged and finding a sense of purpose support their sense of accomplishment and fulfillment. This section also showed how participants used the examples and experiences of others to actively develop their aging attitudes and strategies.

The next section will present the results for the second research question about participants' perspectives on technology.

RQ2: What Are Participant Perspectives on Communication Technology Use?

This section presents the findings about older adults' perspectives on communication technologies. Overall, participants had a holistic and pragmatic approach to these technologies. They expressed concern about the social implications of communication technologies and these implications influenced their communication technology use. This holistic and pragmatic approach provided participants a balance between the problems of technology as they perceived them, and the opportunities these technologies provide. Four major themes emerged from the data that support and explain participants' approach to these technologies and their use. The first major theme related to the disadvantages of communication technology and to older adults' concerns about the negative impact communication technology has on society. Participants' holistic approach to communication technology was characterized by concern with individual and social harms, while admitting of certain benefits these technologies offer. Participants discussed the ways these technologies damage human communication, promote

unhealthy behaviors, and exploit users. The second theme shows how participants consider communication technology within an historical context where they reference the history of past technologies to justify a pragmatic contextualization of the normal concerns of technology development, or a cautionary view of the detriments of technology.

Awareness of the social impact and historical context of communication technology influenced participant perspectives on how these technologies should be used. The third major theme that emerged from the data shows how participants conceptualized the role communication technology plays in their lives. Here the purposeful resistance and mindful balance participants had toward communication technology encouraged a technology as tool approach. Participants balanced their concern over the dangers of communication technology with the advantages these technologies offer. The frames of purposeful resistance, mindful balance and technology as tool demonstrated the various ways participants attempt to avoid the dangers technology and still utilize them for benefit.

Though weary of the dangers of communication technology, participants used these technologies if they proved useful or contributed to their lives in meaningful ways. One significant use many participants had for communication technology was accessing health information. The fourth major theme discusses the importance of health information for older adult participants' and how online health information contributed to their lives in positive ways. In the interview and focus group conversations participants discussed their utilization of the Internet for health information to improve their aging experiences

These four themes link participants' conceptualizations of communication technology to how these older adults use them. These major themes are organized along sub themes to demonstrate how technology perspectives impact daily technology behaviors. Table 4.5 presents the theme structure that explains participant perspectives on communication technology use. Table 4.6 identifies which themes are supported by previous research. Table 4.7 presents the themes that are new findings in this study.

The next section presents the first major theme about the negative impact of technology.

Participants are concerned about the negative impact communication technology has on society. Many participants argued technology negatively impacts society on individual and social levels. The pervasiveness of smartphones in daily lives was a distraction to in-person human communication. Participants discussed how devices like smartphones took precedence over human beings. These technologies were discussed as distractions, damaging to communication, particularly for younger people. The older adults in this study also commented on how computer technology encourages lazy and sedentary behavior. Participants discussed their concern with the mercenary nature of the technology industry and how the business of technology exploits users and exposes them to scams and threats to privacy.

Damages human communication. Many participants provided examples how communication technologies, particularly dependence on smartphones, damages human communication.

Technology dependence. Many participants provided examples how technology dependence weakens communication skills and negatively impacts human behavior.

Table 4.5	
<i>Themes from RQ2</i>	
<u>Overarching Theme</u>	
Older adult participants have a holistic and pragmatic approach to communication technology	
<u>Major Themes</u>	<u>Sub Themes</u>
Participants are concerned about the negative impact communication technology has on society.	Damages human communication Dependence Distracts and hinders connection Impact on communication of youth Technology encourages laziness Technology is mercenary and exploitive Privacy issues and financial scams
Participants reference the history of past technologies to justify a pragmatic contextualization of the normal concerns of technology development or a cautionary view of the detriments of technology.	The past contextualizes development The past contextualizes harms
The Purposeful Resistance and Mindful Balance Participants have toward Communication Technology Encourages a Technology as Tool Approach	Purposeful resistance to technology Mindful balance of technology Family communication as motivator. Technology as a tool
Participants Utilize the Internet for Health Information to Improve Their Aging Experiences	For disease management and prevention Supports role in healthcare interactions Evaluation and navigation of the Internet Evaluation strategies Knowledge of Internet navigation

Table 4.6	
<i>Summary of Findings Supported by Previous Technology and Aging Research</i>	
RQ2: What are participant perspectives on communication technology use?	
<u>Theme</u>	<u>Previous Research</u>
Technology as damaging and distracting to human communication	AARP, 2001; Lehtinen, Nasanen, & Sarvas, 2009; Rogers, 2009
Older adult resistance to technology	Hakkarainen, 2012; Melenhorst, Rogers, & Bouwhuis, 2006
Communication with family as motivating technology use	Bosch & Currin, 2015; Harley, Howland, & Harris, 2016
Older adult perceptions of technology as a tool	Rogers, 2009; White & Weatherall, 2000
Older adult use of online health information	Medlock, Eslami, Askari, Arts, Sent, de Rooij, et al., 2015
Older adult problems with internet navigation	Adams, Stubbs, & Woods, 2005; Dickinson, Smith, Arnott, Newell, & Hill, 2007; Morrison, 2015

Table 4.7	
<i>Summary of New Findings in View of Previous Research on Technology and Aging</i>	
RQ2: What are participant perspectives on communication technology use?	
<u>Theme</u>	
Examples of past technology contextualize technological growing pains	
Examples of past technology contextualize harms of communication technology	

Audrey bemoaned how dependence on technology like smartphones erodes expression of thought and agentic behavior:

I think that it [texting] cuts people off on personal expression and I think more and more people don't learn how to express themselves, their thoughts, their feelings, their ideas effectively. And I think technology is part of that. I mean, don't send me a fucking smiley face emoji, right?! Say what you think. I don't want your “mojis.”

For her, texting emojis instead of words cheats people of deeper, more meaningful expression. This use of technology damages vocabularies and thought development. Justin, 68, had similar concerns that smartphone dependency hinders communication, prevents critical thinking, and impairs judgment:

I think people are now overly dependent on them. I think it's dumbing people down... people depend on them more than they should, more than they need to...Because of their smartphones I've heard people in stores unable to make a decision and call someone to say, *Oh dear, that milk that was on sale is out. What do you want me to do?*

In these examples, the smartphone impairs communication skills and cognitive ability of their users. Jude, also discussed dependency on these devices, where one can distract oneself to “avoid dealing with people.” Technology dependence deprives people of basic human skills of expressions, thought, and interaction.

Technology distracts and hinders connection. For many participants, the prevalence and pervasiveness of communication technologies detract from and devalue human interactions. Even though they can be convenient tools, as Eunice stated, “It depersonalizes” and we “lose some kind of connection.” Justin said he gets “irritated” at how easily people answer phone calls or respond to a text in the middle of a face-to-face

interaction. The swiftness by which people are distracted by technology pervades daily interactions. Justin continued:

I was at Walgreens a while back waiting in line at the pharmacy when a car rolls up to the window. The pharmacist left us at the line and to service the car, even though we had been waiting! *Oh, hold it everybody who's been waiting, while I service this car first in the drive-up window.* So, I don't to like go to Walgreens anymore. It's the same thing with technology.

Justin disliked the priority the pharmacist placed on the car over those waiting in person. He equates the preference for the customer in the car versus the in-person customer with those who so easily disregard in-person interactions for the mediated interaction on a device. The role technology played here reflects a broader social problem of devalued human interaction. Other participants discussed this same social problem. Bianca, 62, noted how “nobody talks to you” at the airport anymore because people are all “looking down at their phones now.” Theresa noted the lack of interaction in public places. She lamented the constant distractions of our “screen dominated existence”:

These things are everywhere. It's everywhere. You're looking at a screen in the airport, you're watching TV in the airport, there's a screen in your car, you know the kids are in the car, not even looking at the window at what's going by. They're looking at a movie in the back of the car for God's sake. So, this screen-dominated existence. Everything is a screen that we're constantly looking at.

Theresa argued the screen dominated existence is detrimental not only to social interaction, but also diminishes our awareness of the world around us. This example also

shows how the prevalence of screens in daily interactions and the distractions they create were seen to be a considerable issue for young people.

Impact on communication of youth. The distractions of technology for young people was a significant concern and a topic of criticism for many participants. Dierdre remarked how her daughter “has a real problem with technology in the sense that she really limits her boys tv time and screen time because it takes away from either being physically active or people time.” Some even positioned technology issues as “youth problems.” Pam sees the problem the youth of today have regarding using technology “well” or “not overusing it.” Many participants saw technology as having an unnecessary control on the lives of younger people. Audrey expressed concern about overuse of technology by youth: “I’m very concerned about the use of phones by teenagers and they’re constantly texting and spend way too much time doing that. Games like that... Well, the more they’re texting back and forth, the less they’re communicating in person.” Many examples like this show the value participants placed on face to face interactions. Participants believed these technologies are creating a problem for youth especially with the widespread adoption of these devices and their bad habit-forming capabilities. Roberta considered this “youth problem” a significant factor in technology’s impact on society:

It's like nobody cares about the social side of things until they have the impact. Ten years later...what about all the young people? Are they careful or do they think about how these things [smartphones] will impact their life? No. They are jumping in doing everything like everybody else.

Roberta referred to this youth problem when complaining about the ways older adults use these technologies badly:

I have friends my age who are totally opposite of me, so I am not the standard.

Okay. They are as bad as young people. You know, you're with somebody and the stupid thing rings and they answer, when you're supposed to be spending time together.

Roberta was surprised at how easily friends her age act like the young people who are distracted by these devices. Pam, positioned this distraction or “hypnotism” of technology a distinct problem for youth:

Those things are hypnotizing, that screen is hypnotic, I swear looking at that light is like the moth flying around the candle... I'm not anti-technology, but I, it's hard to use well, I think. and I'm talking about the kids with their phones all the time... it's hard not to overuse it.

Technology encourages laziness. Some participants thought communication technologies encourage lazy and sedentary behaviors. Roberta remarked, “What's with what's her name? *Siri*, *turn on the television Siri*. *Siri*, *call so and so...* Can't you use your own hands and mind to do it yourself? What are we doing to ourselves?” She later equated this use of technology to the laziness of the humans portrayed in the Disney Pixar movie *Wall-E*. in this movie, the overreliance of humans on technology disabled them to the extent they “had no muscle mass and were just blobs.” Theresa considered communication technology device use a sedentary behavior that discourages movement and creates unhealthy attitudes:

Because we are glued to a screen. You really have to be sitting on your butt in a chair... You're sitting there, you're not moving, you're stationary, you're looking at a screen... I mean it could be the most physically engaging thing in the world, but you are still sitting there on your butts because it makes you passive.

Henry simply discussed how the distraction of these devices threatens physical safety where people looking down at their phones, “walk out into the road... I see stupid things.”

Beyond the dangers of these devices and the behaviors they encourage, some participants showed concern over the technology industry as a whole and the ways in which they exploit users, particularly older adults.

Technology is mercenary and exploitive. Many participants expressed concern over the cost of communication technology devices. Shirley commented technology devices were “very expensive” and “buying them is an issue,” especially for older adults. Some participants thought the cost of devices like smartphones and tablets was too exorbitant and unnecessary. The greater concern for many, however, was the mercenary nature of the technology industry and how these technology companies “exploit” users where profit is more important than offering safe and effective tools for users. For Audrey, the environment of the Apple Store reflected neglect for user needs:

I found that dealing with tech people, like going to the Apple store is like stepping into hell. Everybody is shouting. There's no privacy to discuss your issue. It's just ridiculous. For Apple having more money than God, I thought they could at least have a place where you could discuss your issues without all the ruckus.

Audrey felt that the chaos of the Apple store and her inability to discuss her device issues in private demonstrated how technology companies are more concerned with profit than with considering the needs of their customers, especially older adult customers.

Many older adults discussed how the technology industry exploits users. Roberta, admitted:

Technology helped us go a lot further, a lot of ways, but I think it's excessive and it's money making, money driven and also addictive. I heard that when Facebook was first developed, they knew it would be addictive like cigarettes... Yeah. So, money driven...

Roberta expressed considerable distrust toward technology companies. She believed they are so mercenary and “money driven” that they disregarded certain dangers, like technology addiction, just to make a profit. Jacob also distrusts technology companies. In response to the frequency of new phones coming out “every week” he said, “It’s like life becomes centered around technology. Your life is not your life. It’s technology’s life, and technology wants money from you.”

Privacy issues and the potential for financial scams. Barbara described her selective use of the Internet because she is concerned about her privacy and the protection of important information:

I'm very limited in mobile banking and I don't do auto bill pay or anything like that. That's why I don't have Facebook. I personally wish to be very hard to find when the information super highway hits the deck [laughter].

Barbara uses humor to justify what may seem to be extreme caution toward commonplace technology capabilities like online banking and social media. She was

concerned with the amount of personal information stored online with little knowledge or even concern over the potential for that information to be stolen and used by another.

Participants also expressed concern for the potential for scamming through technology. Many are weary of websites and emails that make “fantastic” claims. Tilly commented how seniors “should be concerned” when anyone tries to sell them things. Henry also discussed the dangers of telemarketers who use deceptive tactics and even scare people into giving away private information. Jacob recounted his own experience with a scammer to exemplify his opinion of communication technology:

I received a phone call and the person said *we have four offenses you've committed, and the police are coming for you., but if you pay this amount to us right now...* I called my lawyer friend and he said it's just a scam artist. He gets it all that time, too.

This story summed up his attitude toward communication technology: “So technology for me, I don't give a shit about it. I have a master's degree in electrical engineering. This is not electrical engineering, this is business. This is scamming.”

The negative implications of communication technology on the communication skills, behaviors, and safety concerns for society influenced the attitudes participants have toward these technologies. Along with the social implications of technology, the second theme discusses how participants considered the historical context of technology to influence their perceptions and use of communication technology.

Participants reference the history of past technologies to justify a pragmatic contextualization of the normal concerns of technology development or a cautionary view of the detriments of technology. The holistic approach older adults in the study

took toward communication technology conflated broad concepts of technology with communication technologies, specifically. Participants referenced non-communication examples, including robotics used to help paralyzed individuals walk, space exploration equipment, advancements in medical research, and even microwave ovens when discussing the benefits and harms of communication technology. Participants consider the negative impact of technology on society and reference technology from the past to explain pragmatic or cautionary views toward technology.

Many participants referenced technologies of the past to explain their opinions of communication technology. These references were either a pragmatic contextualization of the normal concerns of technology development or a cautionary view of the detriments of technology.

Past technology contextualizes technological development. Many participants referenced technologies from the past to explain the normal progression of technology development and dispel the unfounded fears new technologies can instill.

Dierdre recalled the various types of communication technologies she has experienced over her lifetime:

Oh yeah. MS DOS to floppies to CDs to jump drives to that whole progression.

Even from eight-tracks. I mean seriously. We went from vinyls to eight-tracks and then from eight-tracks to tapes and then CDs. So, I've seen the progression. Just all part of being involved and aware.

Dierdre was one of the few participants that explicitly “loved” technology, though she framed her use as an awareness and involvement with technological advancement. Her

comfort with and appreciation for technology stems from her long history of technology adaptation.

Other participants referenced older technology from a pragmatic perspective. When discussing the value of modern communication technology, Barbara compared the arrival of computers and smartphones to the introduction of automobiles and telephones as mere tools satisfying a need of the time. Technologies of today are just the modern-day examples of the innovation of the telephone or automobile from the past. The progression of modern technology is the same progression of technology from over one hundred years ago.

Some participants discussed the challenges that accompany technological advancements. Bill considered the shift “from analog to digital” when the arrival of computer aided design (CAD) technology impacted his career skills:

In college I learned to draw with magic markers, pencils, paper and erasers and my mind was set up to do design in that manner and then I had to shift to CAD. My first design with the CAD program took me a freaking week! I could've gone to the drafting board and finished in a couple of hours, but I knew it was important that I made that shift. It was very difficult, but I think, I think that's good technology for people.

Bill admitted the shift to new technology can be difficult. He had to learn new ways to perform his tasks but his view that this technology was “good for people” and contributed to work skills motivated him to get over the “learning curve.”

Bill offered another example to demonstrate not all technology was experienced as “good” or beneficial at first. Sometimes technology just needs to “find its place in society” as was the case with the microwave oven:

Cookbooks were coming out for how to bake a cake in it, which is clearly not a good use for your microwave oven. But after the technology was around 10 years, people found it to be really good for heating up leftovers or a frozen meal and I think we're at that same point right now with technology like the iPhone. It's like we're foolishly trying to do everything on it, but I think that'll shake out with time.

Bill discussed some of the negative impacts of smartphone technology on society. For him, the analogy between the iPhone and the microwave oven articulated the errors and “growing pains” that come with technological advancement. His reference to past technology assuaged fears and concerns of the harms of technology. He believed these problems will be solved in time.

Older technology examples helped participants put the technological revolution in perspective. Gene humorously recalled the invention of the fax machine: “And all of us will remember this one... The day we were told about the fax machines and that the US Postal Service was going out of business because all our letters were coming through this telephone wire.” In hindsight, the fears that accompanied the arrival of the fax machine were unfounded. As Gene admitted, now the fax machine is replaced, and postal service is still in operation. Her example showed current fears and claims of technology can be unfounded.

Amber had a career in computer programming. She shared examples of the first computers as monolithic machines, very different from the handheld devices of today, “In

1968, computers were still mystical things in air-conditioned rooms where people with white jackets, just like medical personnel, were the only ones allowed with the computer.” Amber presented the reverential attitude toward early computers and the privileged nature of access as mythic, drastically different from the ubiquity and pervasiveness of devices today. Amber used this example to dispel the thought that computers are dangerous devices that can control us. She commented that “computers are stupid” and are only capable of the skills humans provide them. This example points out how not long ago, only educated and highly skilled people were allowed around computers. Now, small children play with them daily. Social practices and attitudes toward technology change as these devices and their functions become more integrated into daily living. Many participants used examples like this to keep these advancements in perspective and not place too much emphasis on the importance of technology.

Pam recalled her surprise when she considered how her grandchildren “don’t remember the world before the computer” and is shocked at the “huge gulf” between their experiences with technology. She contextualized this difference and remembered when she was young, she “used to think about people before telephones or the television. *How could they possibly not have a telephone or television?* I remember the huge impact of the first television.” Pam noted the difference between herself and her grandchildren was the same between her younger self and the generations of people before her who had no access to the revolutionary technologies (television) of her youth, technologies that are ubiquitous and commonplace today. For these participants, technology was merely a process of change and challenges. Each generation has their unique revolutionary technology that defines that generation.

Not all references to past technology were positive or balanced. These other references equated the detriment of older technologies with the dangers of current smartphones and other mobile devices.

Past technology contextualizes harms of technology. Some participants referenced past technologies to explain the detrimental impact of smartphones and social media. These old and new technologies make us “dumber,” control our lives and have no regard for the impact on society. Justin argued “I think it's dumbing people down, like television.” Audrey admitted that technology is all about “Use and misuse, right? They said the same about television and it's still an ongoing argument.” These two examples recalled classic criticisms that television made people stupid, lazy and passive. Justin recognized that his belief current technologies erode human connection and prevent interaction were the same arguments made about television when he was growing up as a baby boomer in the “television era.” Similarly, Ed lamented how computers changed how we are entertained or informed, saying “Before the computer. We read books and at home and read a book for an hour or two, a really good book, read it for three or four hours.” Ed values the computer screen and the pages of a book differently. For him, a screen is effortless, where a book requires time and effort.

Jacob believed mobile phones are “an intrusion. Every time this damn thing rings, ugh, you’ve gotta scramble to find it and make it stop, if you're on a bus, or in a class or you're in church. It's an intrusion.” He recalled the “rotary phone, plugged in the wall” from his childhood prevented this distraction because the phone was in one place. The mobility of the devices now create life “centered around technology” where people appear helpless to the allure and demand of these devices.

Other references of past technology exemplified the dangers of technology as a negative force in society. These discussed the complete disregard technology has to its inherent dangers and negative impacts on the safety and health of people.

Roberta frequently referenced how evolutions of technology fail to consider possible negative impact:

Nobody cares about the social side of things until they have the impact ten years later... we invent things and then we deal with the issues after and that has been the pattern. We make pollution after we do outer space and now there's junk in outer space. Why didn't we think about how to bring it back before we made a mess of the universe?

Mark also discussed the lack of foresight as an issue in technology:

I think about Steve Jobs and people like that, how could they have possibly foreseen what computers do now? Even as brilliant as people as they were. Uh, I don't see how they could positively foresee how computers are being used for research, for tracking people for defense purposes, medical research. Texting, you know, I mean, that's just a very recent thing. I don't think it's healthy... We don't take a lot of precautions when it comes to the preventive measures to eliminate future problems.

Mark admitted that even intelligent inventors could not have foreseen how technology would change and threaten our health and safety. Mark considered the negative impacts of texting and held negative opinions for militaristic and surveillance uses of technology. He was concerned how these developments like texting are adopted and used without consideration to broader implications of health and privacy.

These references showed how many older adults in this study see technology as a force in society. This force impacts people in nuanced ways. These participants approached technology from an evolutionary and philosophical perspective that has defined past and current human experiences. This perspective leads many participants to resist technology in thoughtful ways, use technology mindfully and see it as a tool.

The Purposeful resistance and mindful balance participants have toward communication technology encourages a technology as tool approach. The negative impact of technology on society and the historical context of technological development compelled participants to approach communication technology with a purposeful resistance to their misuse and harmful effects. Participants also had a mindful balance between this resistance and pragmatic adoption of these technologies. This resistance and balance lead participants to approach communication technology as a tool to emphasize effective and conscientious use. The overlap between the subthemes from the previous section and the ways that participants use these technologies shows the link between the holistic view of these technologies and how this view impacts participant use of communication technology.

Purposeful resistance to technology. Some participants discussed their purposeful resistance to technology to both protest to the negative aspects of communication technology and diminish the negative influence these technologies could have. Participants resisted technology because of their inherent distractions. Some older adults took pride in their resistance and had negative attitudes to others' use of these devices. For these participants, purposeful resistance meant they only used technology that satisfied specific needs. Participants avoided gratuitous use of technology and even

adopted devices like smartphones, flip phone or computers if they perceived a need for these devices.

Jude believed society is “overly dependent on technology” where young people are “hooked to an iPhone, tablet and computer.” To avoid this overdependence for himself, he stated:

I resist purposely trying to be attached to something all the time. Many times, I won't have my phone on me and uh, people complain, *you never answer your phone*. I said, well, I usually check it every morning and every afternoon... To me it's just a very unpleasant thing that interferes with your being able to focus, be mindful.

He admitted that this resistance may be “age-related.” Perhaps because from a generational perspective, he sees his ability to not partake in this dependence and technology addiction where so many young people are “hooked on” these devices. Jude does own an iPhone and limits his use to mornings and afternoons. He does not like to check his email on the iPhone but will do so on his desktop. Jude uses multiple devices, but he sees his monitored use as resisting the negative impact it could have on his ability to focus. Roberta has the same resistance and intentional use for her devices as well:

I don't, I don't like, I don't like it. I'm sorry. I'm not going to be technologically with it. I do not think because I don't want to go there... I don't have a smartphone. I have a flip phone and that's very intentional. I have it for emergencies in my car and when I travel people can reach me, but I don't have it on all the time, and I don't like being beeped every three seconds that I have a text.

Roberta uses her devices with intention and explicitly makes her resistance not about fear of technology, but about taking an active stance against “technology culture.”

Jacob only uses a flip phone and accesses the Internet at the library because, “shit, it's just too much of an interference... an intrusion.” Similarly, Justin, solely uses his “old clam shell kind of a thing” and “leers at people who look at their smartphones all the time.” These older adults admitted their pride for their devices. Though they admitted this is to protect them from the negative effects, there is also this resistance to the culture of “technology centered existence.”

Though participants discussed their resistance to technology, they also spoke of their ability to acquire devices and services they found to be essential. Roberta said, “When I stopped working, it took me six months to buy my own computer. I never had a computer at home, and I didn't want to get one, but I realized I needed it. So, when I got it, I got a good one.” Her resistance did not affect her ability to adopt and use the computer for email and searching for information online. She just balanced her concern of technology with its practical use in her life.

Though these participants marked their modified use of technology as resistance, participants also discussed their use as a mindful balance of using it for its benefits but also with an awareness to not using it “badly.”

Mindful balance of technology. Participants discussed a both/and approach where their technology use was balanced between the positive benefits and an awareness of its misuse.

As Audrey argued, technology use was “about choice, right? It's about how one uses technology.” She admitted to the distractions and loss of communication skills on one

hand, but also discussed the great benefits for “home-bound seniors” who use technology to keep connected. Dierdre similarly remarked:

For me, there's an awareness, I love technology, but there's an awareness that if someone's having a conversation with me, it's impolite to look at the phone and start texting. And it really interrupts communication. Like if my daughter is having a dialogue with me, I need to be present and listen. And sometimes people don't do that.

Dierdre “loved technology” but also understood how it could distract from human interaction. She maintains awareness over her technology to prevent her from using it badly. Similarly, Pam “loves the information” she finds with her devices. But she also recognized, “I have mixed feelings about it. I'm not anti-technology, but it's hard to use well, I think.”

As Bill stated when discussing the positive and negative aspects of technology, “You just have to find your own balance... It's like when new things come out, people tend to use it for everything... then we figure out what the technology is really good for.” A significant motivator for participants to balance resistance with practical use was communication with family.

Family communication as a motivation to use communication technologies.

Older adults frequently stated communication with family members was a significant motivator to “give in” and adopt new communication technologies. Participants explained that it was the need for family communication that made them change their communication technology behaviors. Audrey was very resistant to smartphones because of the deficiencies she saw in texting. She adopted it, though, to communicate with her

grandchildren. Alice “finally broke down” and bought her new Air Mac laptop for the same purpose, even though she did not own or want a computer since her retirement over twenty years ago. Alice described her experience:

When I retired 22 years ago, I had three computers and they all broke down.

[laughter]. Yeah. I haven't missed it one second. But for the sake of the kids... I'd much rather hear a human voice than type something into a computer or receive an email or whatever. But I finally broke down and got an Apple Air Mac.

Alice had a purposeful resistance toward technology, but in order to stay in close contact with family she succumbed and gave up her computer free life. She admitted her communication preferences have not changed. She preferred to hear a “human voice” and she implied communications mediated through the computer or email lack that personal “human” element. Alice admitted to her resistance where she had to “break down” her defenses and buy the laptop that would enable communication with her children. Though Alice previously owned a computer for work, she had no purpose for it in retirement. Alice was resistant to these technologies that contributed little to her aging experiences. Her need and desire to stay connected with her children encouraged her to mindfully balance her concerns of technology with its ability to keep connected with her family.

For these participants, they could not change the ways in which their family communicated, so many adapted to the communication modes that would make interaction with family more likely. For some, the adoption of technology meant they overcame some technology resistance. Participants’ ability to adjust enabled this technology adoption.

Grandparents seem to have a unique motivation to engage in new communication technology. Since youth and younger adults are frequent technology users, older adult grandparents use these new communication technologies to stay active and present in grandchildren's lives. Carol, who teaches older adults how to use smartphones and computers stated, "Probably the only senior adults I know who are pretty good with their phones have grandchildren and their grandchildren don't make phone calls anymore. They do these texts and so forth." Echoing Alice's technology resistance, Audrey admitted:

I don't have a need for technology. This is what I do, Facebook email and photos... and communicating with my kids, with my grandkids, texting with my grandkids. I resisted that. Oh, I didn't want to text. It was those little things and everybody's doing it. Oh, I thought it was just so annoying. But the kids love it and it's a way for me to communicate with them and stay in touch with them frequently. A phone call they don't always answer, but if I text, it only takes a second and they get back to me. So that's been really great. My daughter talked me into that... So those features are really good for me.

Though she didn't want to adopt texting, her ability to stay so well connected to her grandchildren allowed her to not only adjust and adapt to this new technology habit, but enjoy it. Ruth, 76, spoke of this same enjoyment:

But you know, can I add one thing about the iPhone, or computers? The things I love about it is that I had my daughter put me on Facebook because all my grandkids are there. That's how you see pictures of your grandkids today. Moms don't send you pictures anymore. And I love that. My grandson went to Europe

this summer and he sent me pictures from there and I could see him while that was happening, or pretty close to when that happened. I think that's awesome.

Ruth purposefully adopted social media just so she could stay connected with her grandchildren. Again, not only is the ability to be connected to grandkids enjoyable, these technologies provide older adults a swift and almost instantaneous response, increasing the sense of connection to their grandchildren.

Participants adopted communication technologies like computers, smartphones and even social media to maintain active roles in their family. The motivation to be present in the lives of their families was important enough for many participants to overcome their technology resistance. This change in participants' communication technology behaviors demonstrates participants' need for involvement. Participants admitted that texting, Facebook and other channels were the primary communication modes of the younger generations. Participants could not change the ways in which their grandchildren communicated with them, but they could change how they engage with their grandchildren. This beneficial use led many participants to frame communication technology as a tool.

Technology as a tool. Participants discussed communication technology as a tool. Communication technologies were talked about as useful tools for efficient communication and necessary for participation in this modern world. Barbara argued:

I think they're a necessary part of our times and if we think back on the times when I was a very young child party lines were still what some people used and not everyone had an individual telephone line... Nowadays, uh, we've been gifted with these tools. I would just see these as a part of the world today.

Communication technologies revolutionized human interaction and simplified the exchange of information. The tool analogy for technology also showed participants believe communication technologies have specific purposes that determine proper use.

Amber stated:

Computers are tools. Like a good hammer. I may need a unique hammer when I need to hit something specific. It is just something to keep in the closet or the tool set. It's not something I would use everywhere or all the time... Now there are so many different hammers because there are so many different types of tasks. You just need to find the right hammer for the right task.

Since tools have a proper function, this also implies that they can have an improper function or be used ineffectively. Participants admitted communication technologies can be abused or used in ways contrary to their intended use. Communication technologies should be used with awareness and attention to specific purpose and proper function. As

Dierdre pointed out:

People say texting is really impersonal, but it's not. It's fast and easy. I don't see it as impersonal, but I do understand how sometimes you can misread messages and get the wrong interpretation. For my volunteer work, I'll send an email out to the board saying there's a meeting. But if it's gonna be a bit more where I need to get some information out, I'm very careful about how I word it and what I say. So, people don't misread it. You know, I just want to make sure that it's got all the information.

Dierdre viewed communication technologies as practical and useful for her business communications. She recognized how miscommunication can occur and is sure to adjust

her style to accommodate the purpose of the exchange. She further commented how text and email are great for work communication and “easier to get business done. You can send a pdf of a document to someone instead of having to mail it or run to the office. It’s very efficient.” She also said that she uses these same channels with her children but knows when to “stop texting and just call” when messages get confusing or she recognizes she or her children “just need to talk.” Awareness to the proper function allowed participants to adjust their communication technology use.

The tool analogy was also used to support simple use and prevent older adults from getting “too attached” to their devices. As Maude said, “I use my cell phone, it is always in my purse, but I don't always carry my purse everywhere, so I don't really use my cellphone a lot, just in case of emergency.” Myrtle had a similar use for her flip phone. She had a smartphone for a time, but did not find any benefit in keeping it, noting “I have a Consumer Cellular flip phone... It's not that I'm against technology or anything like that, but it's just that I don't see any particular need other than what I'm doing right now.”

Most participants use technology as a tool when the functions support specific needs in their aging experiences. Participants discussed varied perspectives on technology, and some had different types of technology use. Most participants avoided gratuitous technology use. Purposeful resistance, mindful balance, and technology as a tool were approaches participants articulated to explain their technology use. These approaches were influenced by the impact of technology on society and perceptions of past technology development.

Participants kept the use of their computers, laptops, smartphones, cellphones, and tablets to two dominant functions: communication with family and friends and information seeking.

Participants utilize the Internet for health information to improve their aging experiences. One significant use participants had for communication technology was access to information. The most important information older adults accessed related to health. Participants access to online health information provides useful resources to help them understand and adjust to the physical changes associated with aging. Using diverse online sources, they accessed different types of health information for themselves and others. Topics researched included information on medications and drug interactions, disease symptoms, disease management, nutrition, and exercise. Participants also sought information to verify or even challenge advice from their medical providers or investigate health insurance. Some participants stated that searching for health information was the primary reason they used their computers. Though the Internet was useful to many participants, some expressed concern over the credibility of online information and others had vague understandings of how to navigate the Internet.

Health was an important topic for all the participants. Jason had a saying that encapsulated his opinion that health is one of the most important aspects of life in older age, “*We squander health in search of wealth. We scheme and toil and save, we squander health in search of wealth and all we get is the grave. That's about the truth.*” The physical changes and declines that occur in older age made most older adults concerned about their health status. Many used online information to manage these physical

changes, prevent disease/illness, or decrease the impact certain health issues have on their lives.

Health information for disease and illness management and prevention.

Dierdre, like many participants, frequently needed information on medication, disease processes, and disease symptom management. Dierdre was the primary caregiver to her mother with dementia. She wanted to learn more about the disease, particularly the genetic aspects and how she might prevent it for herself. She admitted she was not an avid browser of the Internet, but if she needed an answer to a specific question, she looked for the answer online:

If I need to know something about an illness or the effects of a drug or whatever, it helps me learn and become more aware of signs or symptoms. I'll look it up. If it's crazy, I'll seek medical advice.

Participants also discussed disease and pain management. Bianca remarked, "I've got arthritis really bad in my hips. So, I got on this little phone and I go *what's good for arthritis?* And it said *Black Cherries*, and it works."

Some participants found personal accounts/testimonials of people with the same or similar disease very informative. Others found comfort in accounts of negative patient-provider interactions, almost seeking confirmation of one's own experience of dismissal from a doctor. As Audrey remarked after finding accounts online that echoed her own experiences: "I felt much less alone. And then there are forums in which people talk about their symptoms, what they do, about their symptoms. There were problems with their doctors and so on. And that's been helpful too." These personal accounts were empowering to some participants who found themselves misunderstood, ignored or even

dismissed by their doctors. Participants believe they can impact their health. They seek this information to have a better understanding of their health situations and to develop strategies to improve their health or at least manage their diseases more effectively.

Other participants used their access to online health information to take an active role in their health care interactions and resist a mindless compliance to medical advice from health providers.

Health information seeking supports active role in healthcare interactions.

Some participants used online health information as a strategy to be better informed in healthcare interactions. They admitted to distrusting medical providers and going to online sources to seek other opinions to resist mindless compliance with medical professionals. As Molly stated:

Due to some problems I had with taking care of my father and even some of my own health problems, I have learned that doctors are not gods, they like to think they are, but they do make mistakes too. So, I verify, check things out on the Internet. There're too many senior citizens if their doctor told them to go stand in the corner on their heads for half an hour a day, they would say yes sir and do it.

Myrtle also looks for online health information to verify what she hears from a health provider. She frequently Googled health issues she or a family member were having to find out what "was really going on." She commented, "I know doctors hate me because I'll say I saw it on the computer, but I don't care." Similarly, Darlene searches for information online to be more engaged in conversations with her doctor. She is also weary of some of the medical advice she receives from providers and believes doctors should not discourage older adults from this type of active involvement in their own

healthcare, “You have to be proactive. Doctors need to understand from your side, too. It’s great to get the medical side of it, but there has to be this sense that I’m on this as a team, too.” For these participants, the information was empowering. It was important for many participants to be sure to find information that was useful and credible.

Evaluation strategies and navigating the Internet. Participants discussed their skills and knowledge of the Internet regarding health information-seeking online. They referenced concerns over the credibility of online information and how they evaluate the websites and information they find. Though participants were concerned about the quality and validity of this information, few discussed specific evaluation strategies and some lacked understanding of the structure of online information and how Internet searches work.

Evaluation strategies. Participants were concerned that much of the information they could access on the Internet was not reliable. Tilly’s remarks reflect the general opinion of many: “I think the big concern with seniors is being able to trust information. As Bob humorously remarked: “Oh yeah. Online, you can find out if you have ‘Gonzo’s’ disease.” The vast amount of “incredible information” one can find on the Internet worried many participants. As Shirley expressed, “you gotta look at your data and be concerned about where it comes from.” She said her doctor encourages her to research health topics online and share her findings with him. She recognized, however:

I don't know who put this here and it better come from a reliable source because there can be garbage, there can be complete lies. So, beware of where you're getting the data from and look at the source. I do that probably more than anybody.

Barbara discussed her need to always find the “root source” of the information to determine its credibility. Carol talked about her use of the Mayo Clinic Website and how they provide access to research journals from the National Institute of Health and other credible sources. Web MD was often mentioned, and participants assumed its credibility because the name suggests doctors write information on the website, though no participant was sure this was the case. Though participants discussed the importance of finding good information, many participants discussed vague strategies to judge the value of the information they find. Jason analyzes online information as it relates to what he already knows:

I think a lot of it is bogus. I'd take it, analyze it and say this makes sense to me.

And if it does, I accept it, if not, I reject it... I see if it fits in with my thoughts on how things should be. Some things are really way out. Stuff on the Internet sometimes, I just don't accept.

Jason is cautious of online information and uses his common sense to judge whether he accepts or rejects that information. Other participants discussed even more vague evaluation strategies such as “being careful” and “just think twice” about the information they find online.

Knowledge of Internet navigation. Many participants who used the Internet were unsure of where they find health information. Most participants could not recall names of websites they visit and simply stated they “Google” topics or “just find their information on Google.” In one focus group, when asked what specific websites participants visit to access health information, responses were “Google,” “Wikipedia,” “Bing,” “Chrome,” and “the search bar.” The range of examples in this response shows how these

participants cannot specifically identify the health information websites and confuse things like browsers (Chrome), search engines (Google/Bing) and websites (Wikipedia). Other participants had similar statements that lacked awareness of where information was coming from and how they find their information beyond “just searching online.”

Summary. This section presented the themes that emerged in response to the second research question about participants’ perceptions of communication technology. Participants were concerned over the negative impacts of communication technology on society. They referenced past technologies to explain their holistic view of technology and balance using technology as a tool with a purposeful resistance to the harms of communication technology use. Participants’ primary uses for communication technology were communication with family and friends and online health information seeking.

The next section will present the findings for research question three on participants’ beliefs about physical activity.

RQ3: How Do Participants Perceive the Role of Physical Activity in Their Aging Experiences?

Older adults in this study believed physical activity to be an integral part of their aging experiences. Two major themes emerged from the data in support of this overarching theme. Every participant in this study expressed the benefits of physical activity. Participants seemed very concerned about identifying as physically active. Participants use their conceptualizations of physical activity to support notions of ability in older age. Older adults in this study discussed diverse definitions and conceptualizations of physical activity. These diverse concepts ranged from general

examples of activity like “just moving” to more structured and regimented fitness examples like “lifting weights.” More older adults can be considered physically active when their current activity levels fit somewhere within this range. The second major theme that emerged from participant conversations about physical activity explains how participants use physical activity to improve their aging experiences. Physical activity is an essential health strategy in participants’ aging experiences. Participants engaged in physical activity to maintain physical and cognitive health and functional ability. Participants understood physical activity an excellent way to prevent disease and illness associated with aging or to manage these age-related ailments. Physical activity adjustments to accommodate the declines of aging was an important strategy participants discussed to keep them engaged in life and demonstrate their abilities, within the confines of this decline. Participants believe they can control their health through physical activity behaviors. These two major themes are explained further with sub themes. The hierarchy of themes for research question three are presented in Table 4.8. Table 4.9 lists which themes are supported by previous research.

Participants use their conceptualizations of physical activity to support notions of ability. Participants shared diverse concepts of physical activity that reflected their attitudes and assumptions of what it meant to be physically active as an older adult. Some of these examples were vague such as “moving around” and others discussed activities of daily living like housework. Others offered explicit examples of leisure time physical activity like hiking and “going to the gym.” Other participants discussed examples that transcended conventional assumptions of physical activity. Many participants conflated general activity with physical activity, including social activities

like “getting involved in the community” and joining card clubs for games like mahjong and bridge.

Table 4.8	
<i>Themes from RQ3</i>	
<u>Overarching Theme</u>	
Older adults in this study believed physical activity to be an integral part of their aging experiences	
<u>Major Themes</u>	<u>Sub Themes</u>
Participants use their conceptualizations of physical activity to support notions of ability in older age	<ul style="list-style-type: none"> General notions of physical activity Social engagement as activity Regimented body movement and energy expenditure as physical activity Physical activity requires work/effort
Physical activity is an essential health strategy in participants' aging experiences	<ul style="list-style-type: none"> Physical and cognitive benefits of physical activity <ul style="list-style-type: none"> Functional capacity maintenance Disease prevention and management Medication/medical intervention prevention Alzheimer's Disease and dementia prevention Physical activity adjustments in older age Older adult physical activity role models

Table 4.9	
<i>Summary of Findings Supported by Previous Older Adult Physical Activity Research</i>	
RQ3: How do participants perceive the role of physical activity in their aging experiences?	
<u>Theme</u>	<u>Previous Research</u>
Diverse definitions of physical activity	Caperchione, Kolt, Tennet, & Mummery, 2011; Henderson & Ainsworth, 2001; Lusmägi, Einasto, & Roosmaa, 2016
Physical and cognitive benefits of physical activity	Blumenthal & Gullette, 2001; Macera et al., 2017; Northey, Cherbuin, Pumpa, Smee, & Rattray, 2017; Norton, Matthews, Barnes, Yaffe, & Brayne, 2014; Panza, Taylor, MacDonald, Johnson, Zaleski, Livingston et al., 2018
Physical activity adjustments in older age	Baltes, Baltes, 1990; Ferraro, 2018
Older adult physical activity role models	Bandura, 1997; Resnick, Orwig, Magaziner, & Wynne, 2002

For very active older adults in this study, physical activity examples were about specific physiological functions like “the time I am using my muscles.” The wide range of examples here show older adult participants’ eagerness to identify as active. The sub-themes of general notions of physical activity, social engagement as activity, regimented movement and energy expenditure as physical activity, and physical activity requires work/effort explain how participants use various physical activity concepts to support a sense of ability.

General notions of physical activity. Some participants provided somewhat vague and broad definitions of physical activities. For example, in one focus group at a local senior center, six out of nine participants discussed physical activity as mere movement “getting out of a chair is physical activity.” One such participant, Patricia argued the

specificity implied by the terms *physical activity* and *exercise* discriminate against older adults who are unable or unmotivated to exercise:

My concern was physical activity always seems to be you must exercise, meaning that you must do bodybuilding. You must go for so many minutes of walking. You must do all these things that are classified as exercises and not all of us can or are willing to.

Patricia resisted this definition and believed terms like *physical activity* and *exercise* have too much control over what activity means and prevent those who are unable or even unwilling from identifying as or being active. Bianca responded, “I take it on a broader level... getting outside is activity.” Patricia agreed and continued, “if you can't walk for more than 10 minutes because of physical disability, how can you really be classified as somebody who does physical exercises?” Patricia believed participants should be able to feel active and is concerned these rigid constructs bar disabled older adults from the notion they can be active. In this conversation, most focus group members discussed other seniors at the center. They expressed concern over fears of isolation and neglect but also lauded these seniors’ presence at the center. Eunice even said, “Just being here is an activity, you know, roaming the halls like they do.” It was important for participants here to see these other seniors “roaming the halls” and “just being” at the senior center as active people.

These participants believed being active is important and argue for “broader standards” so more older adults, both the physically disabled and unwilling can be “active.” Ed remarked that physical activity should provide physical benefits, “blood flow and oxygen to the body.” For Patricia and others in this focus group, the

physiological benefits of physical activity, supported by specific routines for determined time allotments, is not as important as the ability for someone to be considered physically active.

Social engagement as activity. Some participants discussed their social activities as beneficial for their health just like physical activity. During some interviews and focus groups, participants discussed activities that were not physical. Even after the conversation was directed back to physical activity specifically, participants would return to these examples to stress the importance of other types of activity for their health. Carol discussed some of her hobbies as activities, “Although it’s not a physical thing, you really have to use your brain to play mahjong.” She remarked on the challenges of the game and how it “keeps her mind active.” She admitted it is not physical but discussed it in response to questions about her physical activity engagement. Other than walking her dog five days a week, Carol does not see herself as being as physically active as she would like. She believed physical activity was important, “but important enough for me to do it? Nope.” Though not as physically active as she would like, Carol considered her social activities an important contribution to her health and enable her to expand her sense of what it means to be active.

Dierdre, who does engage in physical activity like yoga and heavy gardening, is also on the New Mexico Senior Olympics shuffleboard team. She plays because “it’s fun and it’s more of a social kind of thing.” She admits it is not that physical but included it in her conversation of physical activity to equate the health benefits of social interaction to those benefits of yoga and heavy gardening. These notions of activity demonstrated the importance older adults place on being active in older age, regardless of the physicality of

the activity. These participants are eager to point out the health benefits of these activities that lack the physicality of conventional physical activity.

Regimented body movement and energy expenditure as physical activity. Some older adults were very specific about physical activity requirements. Those older adults who discussed more regimented and specific physical activity examples addressed the specific need to maintain functional capacity. These references to physical activity entailed challenge to the physical body for maintenance and even growth. As Barbara stated, “I mean, I’m not interested, for example, in too many kinds of exercise that won’t sustain my training heart rate for 30 minutes.” Barbara attends cardio style workouts at the gym because she “has a family history of cardiovascular disease” and works out to elevate the heart rate to “keep it working.” She believes physical activity should challenge the body for benefit, as measured by her elevated heart rate. Roberta had the same motivation for staying active, “For me, it’s not enough to just be moving throughout the day. I have to be doing something specifically targeted to feel like building my muscle strength and maintaining stuff. I don’t want to get atrophied. I’m not about losing.” She works out regularly, rides her bike and does yoga to “use her muscles” to reduce the amount of age-related muscle atrophy. Amber, an avid cyclist and walker, said of physical activity, “It’s something that makes my heart go harder, makes me breathe harder.”

For these participants, the challenge of physical activity was so important, they did not feel active if the physical body was not taxed. They were motivated by the challenge. The specific notion of physical activity here gave these participants the sense they put enough effort into the activity. Interestingly, regardless of the type of activity

participants use to support the notion of their physical activity, most participants agreed adoption and maintenance of physical activity behaviors takes effort and work.

Physical activity requires work/effort. Many participants emphasized the amount of effort and work it takes to be physically active. Justin stated that he was not necessarily motivated to be active for health reasons but, rather, is “compelled to move” because “that’s just who I am.” But the majority of participants discussed the amount of effort and work it takes to be physically active. Participants stated they remained active, even when the desire for physical activity was low. Bill discussed how the habit of activity is more important than the actual activity since the habit can almost guarantee activity. Carol admitted that for her to be active she had to “really... push myself.” Molly, who engages in regular water aerobics classes at a local senior center talked about her efforts to remain active despite her disdain for physical activity:

Yuck. I just say, Yuck. I'm not loving activity. I'm a couch potato. I gotta admit it. I force myself to do physical activity just for health reasons. I would like to live to hopefully a ripe old age. And uh, I um, I know that being physically active and healthy is the only way to do it.

Molly’s words reflected the belief many had concerning the role physical activity plays in older adults healthy aging experiences. The benefits of physical activity motivated these older adults to be physically active.

Physical activity is an essential health strategy in participants’ aging experiences. Most of the participants discussed the physiological and cognitive benefits of physical activity. They referenced their ability to make age-appropriate adjustments to their activity behaviors to maintain activity levels, in spite of physical limitations due to

aging. The older adults in this study also discussed how age role models motivated their physical activity pursuits. The physical and cognitive benefits of physical activity, physical activity adjustments in older age and older adult physical activity role models encouraged older adults in this study to be physically active.

Physical and cognitive benefits of physical activity. Most participants discussed the positive impact physical activity has on general health. Health benefits of physical activity were discussed as common knowledge. In response to why he is physically active, Bob replied, “I just really think it helps you keep healthy. I never get sick.” Jude expressed a similar sentiment, “I’ve always enjoyed physical activity and still do. So, I think it makes a big difference in terms of your overall health.” Ruth said physical activity makes her “feel better.” Benefits specific to their aging experiences were discussed in more detail: functional capacity maintenance, disease symptom management, disease prevention, cognitive health, and medication/medical intervention prevention. Participants believed they can control their physical health outcomes in older age through physical activity.

Functional capacity maintenance. For many participants, physical activity helps them maintain functional capacity where, as Alice commented, “the more you do it, the longer you’re gonna be able to do it.” Jude, discussing the benefits of his yoga class stated, “It teaches me things that will make it easier for me to continue to do anything for a longer period of time.” Pam also discussed the benefits of the yoga class she streams at home: “I do all my own housework. I’m flexible, I can get down on my hands and knees and crawl under the bed practically.” Most participants spoke to the importance of moving: “The body is meant to be used,” said one, and physical activity just “keeps the

body moving,” commented another. Though some participants described their functional capacity as important for independence, most participants did not explicitly discuss independence or a concern about dependence. The majority of participants emphasized the sense of satisfaction they get when they can perform physical activity and activities of daily life.

Disease prevention and management. The health benefits of physical activity enabled many participants to use their physical activity as a disease prevention and management strategy. Liam was highly motivated to be physically active to lose weight and control his blood sugar so he could prevent the onset of diabetes. When asked why he rides his bike, he said:

Well yeah, I think because of health-wise, because I'm kind of like borderline diabetic... When I go see the doctor, I do have the blood test done twice a year. So, he can monitor my sugar. I think it used to be, I want to say about 177 and it dropped down to I think 130 or something like that... So that's why I exercise.

Similarly, Barbara stays physically active to prevent heart disease. She has a family history of heart disease and does not want to suffer from cardiovascular complications like her family members. In regard to physical activity benefits, she stated, “A lot of it has to do with circulation. Although I'm a healthy person, I admit that my circulation is not the best, so it's important to be active and get off the duff.” These two examples reflect the sentiment of many participants that some diseases are preventable through physical activity behaviors.

Participants also engaged in physical activity to manage the symptoms of various health conditions, including arthritis, multiple sclerosis, ventricular necrosis and heart

disease. Jill, 76, who has had multiple sclerosis (MS) for over 40 years, discussed how physical activity helps her manage the decline that result from her disease. Her view of physical activity for her condition has changed over the years:

When I was diagnosed, I went to the library and looked it up and saw it was a fatal disease... Here's the thing. When people got MS, you would be put to bed and stay in bed rest. As my doctor said, if you do that, that is where you will stay. Now it's different. My doctor told me to understand that I am a swimmer and a dancer and that I need to keep trying... I did fall and break my hip and so I can't dance anymore, but I can sort of... but I do exercise three times a week and I think that is the big difference.

Jill acknowledged her disease was considered fatal when she was diagnosed and attributed her successful management of the disease to regular physical activity. Even with her disease, with the help of her doctor, she sees herself as an active person, and able to dance “sort of” even after breaking her hip. Bill used physical activity to manage his back and joint pain. He elaborated on what happens to his body when he gives up on his physical activity: “My back pain will get severe and my right knee will get really bad to the point where I can barely walk. That is why I keep going... I'm a complete disaster without it.” Like Bill, many participants managed their health with physical activity.

Two specific sub-themes emerged in regards to how and why participants used physical activity to prevent and/or manage diseases. Many participants were motivated to be physically active to prevent the need for medications and medical interventions like surgery. They were also very concerned about dementia and Alzheimer's Disease. Most of the older adults in this study were active to avoid these cognitive diseases.

Medication/medical intervention prevention. Many participants used physical activity to decrease the need for medications and medical intervention such as surgery. In the previous example, Liam discussed how physical activity helps him prevent diabetes. One of the main reasons he uses physical activity for disease prevention is because his “doctor is trying to put me on some pills for my heart and blood sugar and I’m watching my weight.” Liam is very concerned about the side effects of multiple medications for older adults and is highly motivated to avoid pills and manage his health with physical activity and diet. Bianca was able to get off her medication after she lost over fifty pounds through an exercise class at the senior center and a change in her diet: “I’m off the medication. My cholesterol is almost normal... I didn’t exercise because I didn’t care, but now I care.” Jason stated his friends and acquaintances who don’t exercise “are in terrible shape... going to the hospital all the time... and those are the ones on medication and everything. They don’t exercise, they don’t do anything. I exercise regularly and I take no medication.” For these participants medication was not doing enough. As Theresa noted:

I mean, what is taking a pain pill? It's not even a Band-Aid. Band-Aids help heal a cut and the cut is gone, right? But taking the pain pills, not even, it's just, well it's not even a band aid. Band-Aids work. No cut, you are healed. Healing Yourself. That's it. I look at exercise as healing yourself. You can heal yourself, you know... It is incredible how much you can do for yourself.

For some, their desire to avoid surgery motivated their physical activity behaviors. Jude saw his routine yoga practice a better option to surgery for his back problems:

I looked into yoga and, and it was hard at first, a couple times I was about ready to quit... once I made it past the first month I felt better and then I started going more. And actually, my back problem hasn't resolved, I mean, it's still there, but I feel so much better, and yoga enables me to do so many kinds of physical activity. I mean I mow the lawn and do little things. I go for long walks with the dogs and go hiking and go to yoga class. So, the other alternative was, you know, the doctor wanted me to have a fusion. You've got spondylolisthesis and a ruptured disc and some, some other thing. And he said, I could give you shots or do something else, but you just need to have fusion and the surgery. So that time I just, you know, decided I didn't want to do that just because being older and the time it takes for recuperation. And what I heard from other people about, you know, I had back surgery, very few of them are happy. So, I decided not to do that. Then I really believe any kind of activity I'm involved in now when I'm 71 1/2 is good. The more activity I get involved in, I think the better I feel.

Though his back issues were not completely eradicated with yoga, Jude believed it was his best option considering his age and the advice he got from friends. In his opinion, Jude was able to be more active in the long term by avoiding surgery and he felt better about his decision.

Another important physical activity benefit that motivated participants was the ability to prevent dementia and/or Alzheimer's Disease.

Alzheimer's Disease and dementia prevention. Most participants expressed concern over cognitive decline and spoke of physical activity as an effective means by which to prevent Alzheimer's Disease and dementia. Statements about the cognitive

benefits of physical activity included how it “helps with mental acuity,” “keeps your mental activity going,” and just “helps with your mind,” “improves cognition.” Some participants made explicit reference to physical activity’s ability to prevent or at least defer Alzheimer’s Disease and dementia. Amber stated, “I don’t know the statistics, but I’ve strongly believed that physical activity defers dementia.” Jill was also concerned about Alzheimer’s Disease and saw exercise and diet as ways to prevent the disease:

That's a fear of having Alzheimer's probably. Some days I get in the car. Where was I going? Do I have Alzheimer's, no I don't. But I do have a fear of that... I would like to know is there anything I can do to avoid that? I don't think we'll have a cure for Alzheimer's anytime soon. They are working on a way and a great amount of money's going into research for that. I like that. Anything we can do, diet, exercise.

Many older adults admitted the primary benefit to physical activity was Alzheimer’s prevention. Though the genetic aspect of these conditions was understood by most participants, the ability of participants to prevent this was important and enough of a motivator for older adults to be physically active. As Shirley admitted: “I don’t know if Alzheimer’s Disease and Parkinson’s haven’t been linked to lifestyle choices as far as I know. I’ll go with that for now because it is something I have control over.”

Though most participants discussed general health benefits to physical activity behaviors, these more-specific benefits show participants in this study use physical activity as a strategy to maintain and improve their health in older age. Another means by which participants maintained a sense of agency in their physical activity pursuits was how they addressed physical activity accommodations.

Physical activity adjustments in older age. As in other domains in their lives, older adults shared their need to adjust physical activity in terms of type and intensity, in view of physical limitations due to injury or illness. They shared specific limitations including joint pain, arthritis, joint replacements, back problems, chronic pain, weight issues, and even decreased energy. Participants mentioned specific diseases, like multiple sclerosis, cancer, ventricular necrosis, spinal stenosis and post-polio syndrome. The presence of these issues and concerns forced participants to adjust their physical activity behaviors but not abandon physical activity all together.

Participants adjusted their behaviors to accommodate new limitations associated with aging. The main adjustments participants discussed were cutting out certain activities, substituting one activity for another or just performing their physical activity at a different pace. In reference to cutting out activities, Jacob stopped playing soccer 13 years ago, at age 62. Soccer was his life's passion, but he gave it up because it was not worth the risk of hurting someone else or getting hurt himself. Some participants gave up sports such as snowboarding and skiing. Ruby had to give up hiking due to an injury to her ankle: "I can't hike for six or seven miles anymore, which is too bad because I liked it." Though these participants were compelled to eliminate these activities from their lives, they were able to maintain levels of physical activity through other pursuits, such as walking, fitness classes, and gardening.

Other participants discussed substituting one physical activity for another more appropriate for their specific limitation. Jude said that physical activity in his youth consisted of sports like volleyball. Now that he is older, physical activity is more long walks, hikes, and yoga. But these substitutions could be a challenging shift. Justin said

that when he had to give up running due to a hip injury, “It was hard, and it still is hard because I miss it.” He ran to reduce stress and as an opportunity to think about things “running through my mind.” Though challenging, for these participants, “giving up” physical activity altogether was not an option, especially when the benefits of physical activity were so well understood and discussed.

Adjustment also meant doing the same activities, just doing them at a different pace or with some type of modification. Jude commented, “I played volleyball and I love still to play volleyball and can, as long as I don't jump.” Bill stated:

I used to work around the house all day long. I have learned to break it up into little pieces which is difficult because I'm someone who likes to take a project and get it done. Now that I'm older, I've learned to pace myself to just a couple hours per day. I used to work twenty hours in one weekend and now the same project will take me ten days at two hours a day instead of a weekend.

Jacob, who gave up soccer, now takes a regular exercise class for older adults. As opposed to how he moved on the field as a soccer player, he has learned to “take my time and really think about how I move. She [fitness instructor] always reminds us, make sure you lift your thighs, which is really important now.” Soccer was a hobby and passion for Jacob. This hobby provided physical benefits he did not explicitly consider when he was younger. Now he is in his seventies, and his fitness class has taught him the importance of good form in daily activities where he explicitly considers the health benefits.

For most participants, these limitations required accommodations to routines or changes in activity types. As Amber stated, these age-related declines meant “a forced reduction in activity... but if I don't do as much as I am currently doing, I won't be able

to do that much.” Again, the benefit of maintaining functional capacity is enough to adjust, not eliminate physical activity. Even with the “forced reduction of activity” most participants expressed desire to keep going and trying. The dangers of sitting or “just not doing” were important enough for these participants to adjust and maintain their physical activity behaviors.

Even participants with physical limitations acknowledged their need to be motivated or find physical activity alternatives to accommodate their condition. Carol discussed challenges to her being active after an injury: “I used to bike ride, I used to ski, and I can’t anymore, so there are real physical limitations and it has been hard for me to accept I really can’t do them anymore.” Though it is often difficult to do so, she admitted, she tries to find the right activities that respect her injuries while being an active older adult:

Now, as I age, there are limitations and I have to honestly respect that because I think that it is a good thing to be active at a level that is appropriate for what you can and can’t do. So that is where I’m at.

Though the search for the right activities is challenging, Carol maintains her efficacy and describes herself as being in the process of finding the right activity to maintain her activity.

None of the physically active participants in this study spoke of giving up physical activity. They discussed challenges to maintaining physical activity behaviors despite physical limitations. The adoption of new physical activities, or the modification of current activities, allowed participants to stay active within their means and maintain a

sense of ability in times of physical limitation and decline. One important motivator for participants to keep up physical activity was physical activity role models.

Older adult physical activity role models. Many participants referenced physically active older adults as a motivation to staying active. Roberta discussed the “chain reaction” of active older adults motivating other older adults:

One of my friends who swims in the senior Olympics, she's 80. She is always challenging herself competitively. I'm not personally competitive with other people. I've been competitive with myself, but she's inspired by this 92-year-old lady who plays golf, so I think in general... when they see someone who's an active older person, it gives them faith that, you know, life isn't over at, 50, you can still be vibrant.

Though she does not see herself as competitive in the same manner as her friend, she admitted being motivated by “older adults inspiring older adults.” Some of these role models were older adults who engage in competitive athletic sports such as cycling, swimming, and running. Other role models referenced were not athletic, but active older adults who displayed “energy” and “effort” in their physical pursuits in things such as hiking, walking, and fitness classes. Yuri discussed the influence of older adults from his youth and how they shaped his current values toward physical activity in older age:

When I was younger, I would look at somebody who is older but noticed they were active. That was a good example for me to see, you know, to have a healthier life in retirement. If them, why not me?

These physically active older adults inspired participants to maintain their efforts in their physical activity pursuits. Due to the importance participants placed on physical activity

in their aging experiences, there emerged some overlap between themes from this section and the section regarding participants' perceptions of physical activity.

Summary. This section discussed participant perceptions of their physical activity. The overarching theme that emerged in answer to the third research question was how older adults in this study believed physical activity to be an integral part of their aging experiences. Two major themes emerged from this data in support of this overarching where participants use their conceptualizations of physical activity to support notions of ability in older age, and that physical activity is an essential health strategy in participants' aging experiences. Physical activity is important for participants to maintain their health and a sense of control in older age. Even for non-active individuals, participants admitted physical activity takes on a significant importance in older age.

Qualitative Arm Summary

Several themes emerged in answer to the first three research questions about participants' perceptions of aging, communication technology, and physical activity. Emergent themes from participant conversations about their aging experiences revealed how older adults in this study perceived aging as a time of change in which mental and physical strategies are used to maintain a sense of control and agency in the aging process. Two of these strategies were acceptance of and adjustments to these changes associated with aging. These strategies supported their sense of control despite age related losses like declining health status and diminished social circles. Emergent themes also showed how these older adults seek out physical and mental challenges to support a sense of gain and growth despite aging declines. Participants also acknowledged their need for purpose and admitted that helping others created a sense of accomplishment and

fulfillment in their aging experiences. The last theme that emerged from the conversations about aging was about how participants used experiences and examples of other older adults to understand what it means to age.

Emergent themes from the conversations on communication technology presented the harms and benefits of technology and how participants balance avoidance of harms from and effective uses of these technologies. Older adults in this study were concerned about the negative implications of these communication technologies on society. They referenced the history of past technologies to justify normal concerns of technology development or a cautionary view of the harms of communication technology. Purposeful resistance and mindful balance emerged as important approaches participants took toward these technologies which encouraged a pragmatic approach toward communication technologies as tools. Online health information seeking was one of these pragmatic uses.

For participants' views on physical activity, the emergent themes were that older adults here understood physical activity to be an integral part of their aging experiences. Participants had diverse concepts of what constitutes physical activity and they used physical activity as a foundational strategy to support healthy aging experiences.

This section concludes the results from the qualitative arm of this study. The next section will present the results from the quantitative arm of this study, specifically research questions four through six and their corresponding hypotheses.

Quantitative Analysis Results

Three research questions directed the quantitative arm of this study:

(RQ4) What is the relationship between participants' perceptions of aging and perceptions of communication technology?

(RQ5) What is the relationship between participants' perceptions of aging and use of communication technology?

(RQ6) What is the relationship between participants' perceptions of aging and physical activity/exercise self-efficacy? Results from the quantitative data of survey items and variables are discussed in this section. Descriptive statistical analysis was conducted on all items from the survey instrument.

Survey Item Descriptive Statistics

Demographics. Demographic items are presented in table 4.10. Survey responses totaled one hundred ninety-two. One hundred nine paper surveys were completed and eighty-three were completed online. Respondents were mostly female, (80%) White (67%) and 59% were between the ages of 65-79 ($M = 69.2$, $min = 50$, $max = 93$, $SD = 8.15$). Participants were predominantly widowed (37%) with 20% married and 2% in a domestic partnership. The most often reported income level was between \$40,000-\$49,000 (10%). Income ranged from less than \$10,000 (6%) to \$120,000 or more (10%), but a significant number of participants declined to report income (19%). A majority of participants reported college degrees as their highest attained education, including graduate degrees (47%), bachelor's degrees (17%) and some college or associate degrees (17%). Four respondents reported never completing high school (2%).

Technology use. For technology use, more than half (58%) of respondents reported ownership of or access to a desktop computer and 65% reported access to a laptop computer. Eighty seven percent said they used the Internet and 86% reported email use on either of these computer devices.

<u>Variable</u>	<u>N</u>	<u>%</u>	<u>Variable</u>	<u>N</u>	<u>%</u>
Age	189		Income	187	
65-79	114	59.4	rather not say	35	18.7
50-64	54	28.1	\$30,000-\$39,000	20	10.7
80- older	22	11.6	\$40,000-\$49,000	19	10.2
			\$120,000-more	18	9.6
Gender	191		\$10,000-\$19,000	14	7.5
Female	145	75.9	less than \$10,000	12	6.4
Male	45	23.6	\$20,000-\$29,000	12	6.4
other	1	.5	\$50,000-\$59,000	12	6.4
			\$60,000-\$69,000	12	6.4
Race	188		\$80,000-\$89,000	12	6.4
White/Caucasian	125	66.5	\$100,000-\$109,000	11	5.9
Hispanic/Latino	39	20.7	\$90,000-\$99,000	4	2.1
other	8	4.3	\$70,000-\$79,000	3	1.6
Asian/Asian American	7	3.7	\$110,000-\$119,000	3	1.6
Native American	5	2.7			
Black/African			Education	184	
American	4	2.1	Graduate degree	86	46.7
Marital status	191		Associate's or some		
Widowed	72	37.2	college	32	17.4
Married	39	20.4	Bachelor's degree	32	17.4
Divorced	33	17.3	High School or GED	20	10.9
Single, never married	26	13.6	Vocational degree	10	5.4
Separated	17	8.9	Did not finish high		
Domestic partnership	4	2.1	school	4	2.2

Most participants said they use these computers at home ($n= 162$, 85%) some at senior centers ($n= 24$, 12.5%) and 26 specified they use these devices at their place of work.

Most respondents reported accessing health information on these devices ($n= 164$, 86%) and for those who use these devices, Internet and email use ranged from several times a day (67%) to about once a week (7%). Desktop and laptop items are summarized in table 4.11.

<u>Survey items</u>	<u>n</u>	<u>%</u>	<u>N</u>
Desktop ownership	111	57.8	192
Laptop ownership	124	64.6	192
Internet use on computer	166	86.9	191
Email use on computer	164	85.9	191
Location of use			191
Home	162	84.8	
Library	26	13.5	
Family, neighbor house	10	5.2	
Senior center	24	12.5	
other	26	13.5	
Use Internet for health information	164	85.9	191
Frequency of Internet/email use on desktop/laptop			191
Several times a day	128	67.0	
About once a day	20	10.5	
Don't use the Internet	15	7.9	
About once a week	14	7.3	
Several times a week	14	7.3	

Mobile technology use. Summaries of mobile technology use are presented in table 4.12. Less than half of participants owned a tablet device (n=42). Almost all of participants own and use a cellphone (92%). Eighty percent said their cellphone was a smartphone device but 2 participants did not know whether their cellphone was a smartphone (1%). One participant was unsure if they used the Internet or email on their mobile device, but most participants access the Internet or email on these mobile devices (75%) and frequency of Internet and email use on mobile devices ranged from several times a day (60%) to about once a week (7%) for those that owned mobile devices.

Table 4.12			
<i>Mobile Technology Survey Items</i>			
<u>Survey item</u>	<u>n</u>	<u>%</u>	<u>N</u>
Tablet ownership	81	42.4	191
Cellphone ownership	175	91.6	191
If no mobile device, desire to learn			192
yes	33	25.2	
don't know	5	3.8	
Use text message on mobile device			190
yes	159	83.7	
don't know	1	.5	
Smartphone ownership			189
yes	152	80.4	
don't know	2	1.1	
Access Internet, email on mobile device			190
yes	142	74.7	
don't know	1	.5	
Frequency of Internet/email use on mobile device			185
Several times a day	111	60.0	
Don't use the Internet	36	19.5	
About once a day	14	7.6	
About once a week	12	6.5	
Several times a week	12	6.5	

Technology use for health. Most participants that owned a smartphone or tablet use apps (73%) less than half use health related apps ($n= 84, 45\%$) and one respondent did not know if they use health apps ($n= 1, .5\%$).

Overall, 76% said they use any technology for health purposes, those purposes ranging from accessing health information (72%) to using technology to stop a habit like smoking (1.6%). Many participants use online EMR health portals to check medical records (46%) and 21% chat with medical providers. Summary of these items are presented in table 4.13.

<i>Mobile Technology and Technology for Health Survey Items</i>			
<u>Survey item</u>	<u>n</u>	<u>%</u>	<u>N</u>
Use of apps on mobile device	137	72.9	188
Use of health apps			188
Yes	84	44.7	
don't know	1	.5	
Use of any technology for health			189
Yes	144	76.2	
don't know	5	2.6	
Types of technology health uses			190
Access health information	136	72.3	
Learn about or track activity/exercise	78	41.1	
Track my diet/ what I eat	33	17.4	
Track a health measure like blood pressure, blood sugar, etc.	26	13.7	
Check my medical records	87	45.8	
Keep a diary or log of my symptoms	17	8.9	
Help me stop a habit, like quitting smoking	3	1.6	
Chat with my doctor/s or another health professional	40	21.1	
Remind me to take my medication	9	4.7	
Other	14	7.4	

Scale items descriptive statistics. Scale items from survey questions are summarized in tables. These items were combined to create the variable scales used for hypotheses testing.

Perceptions of technology. Perceptions of technology results are presented in table 4.14. Perceived usefulness of technology was a scale created from questions from the survey section of opinions about technology. The vast majority of participants, 79 percent of respondents “totally agree” with the statement that a desktop or laptop computer was useful, and only 2% selected “totally disagree” with that statement. Fifty-eight percent said a tablet device would be useful with 58% in “total” agreeance and 30%

just agreeance. Participants rated a smartphone useful, where 71% selected “totally agree” to the statement a smartphone with apps would be useful to me, and only 11% disagreed with that statement. Respondents reported they had someone who could help them if they had trouble with technology (77%), and about 68% said they had someone who could help them look for health information with technology.

<u>Survey item</u>	<u>N</u>	<u>Totally disagree</u>	<u>Disagree</u>	<u>Agree</u>	<u>Totally Agree</u>
Perceived usefulness of desktop laptop computer	191	1.6	2.6	16.8	79.1
Perceived usefulness of tablet device	188	3.2	8.5	30.3	58
Perceived usefulness of smartphone with apps	187	3.7	7	18.2	71.1
Someone to help with technology	189	5.8	16.9	41.3	36
Some to help looking for health information with technology	186	10.8	20.4	38.2	30.6

Note: Percentages reported in columns 3-6

The variable perceived usefulness of technology scale was developed from the three survey items on the usefulness of computer/laptop, tablet, and smartphone with apps. Responses were coded as *totally disagree* = 1 to *totally agree* = 4. Participants’ score for each item was averaged to create a composite score for perceived usefulness of technology. An internal consistency reliability test found this scale to have a Cronbach’s Alpha of .74. Descriptive statistics on this scale is presented in Table 4.15.

<i>Variables of Survey Items</i>							
<u>Variable</u>	<u>N</u>	<u>Mean</u>	<u>Median</u>	<u>Min</u>	<u>Max</u>	<u>Range</u>	<u>SD</u>
Age	189	69.20	69.20	50	93	43	8.58
ATOA	182	2.862	2.8	1.2	4	2.8	.57
<i>Cronbach's Alpha .94</i>							
Usefulness of communication technology	189	3.5777	3.6667	1	4	3	.59
<i>Cronbach's Alpha .74</i>							
EXSE	180	2.921	3	1	4	3	.86
<i>Cronbach's Alpha .77</i>							
Health Status	190	3.64	4	1	4	4	.91
MET Score	177	5112.21	3906	0	25704	25705	4688.53
Note: ATOA = Attitudes Toward Aging Scale; EXSE = Exercise Self Efficacy Scale							

Attitudes toward aging. Items for the Attitudes Toward Own Aging Scale (ATOA) are presented in table 4.16. The five items of this scale were scored between 1 and 4, where totally disagree =1 and totally agree = 4. The second and third items on the scale were reverse coded. Seventy-seven percent of participants agreed with the statement they “are as happy now as when I was younger,” and about 19% agreed with the statement “as I get older, I am less useful.” Computed ATOA score was the average of each item. The average ATOA score was 2.87 and ranged between 1.2 and 4. Reliability tests for this scale was run on the current data and computed a Cronbach’s Alpha of .94. Descriptive statistics on this scale are presented in Table 4.15.

Images of aging scale. Almost one fifth of participants completely skipped or did not complete the scoring of the eighteen Images of Aging Scale survey item (19%).

<u>Survey item</u>	<u>N</u>	<u>Totally disagree</u>	<u>Disagree</u>	<u>Agree</u>	<u>Totally Agree</u>
"I have as much pep as last year"	187	4.3	29.9	43.3	22.5
"Things keep getting worse as I get older" (R)	184	14.7	41.3	40.8	3.3
"As I get older, I am less useful" (R)	188	38.3	42.6	17.5	1.6
"As I get older, things are better than I thought they would be"	189	4.8	30.7	53.0	11.6
"I am as happy now as when I was younger"	189	6.9	19.6	47.0	30.0

Note: Percentages reported in columns 3-6
R item is reverse coded

Several participants wrote messages to the researcher in the margins with concerns they had about this item. Participants stated the terms were "too broad," and said the research "should not generalize about older people." Three participants specifically circled one of the items of *dying* and wrote messages like, "well, since I was born" and "we're all getting closer to death at any age." Multiple participants who completed the paper survey in the presence of the researcher commented on their concerns as well. Statements included "this makes no sense" and "I don't know about other old people. I can only comment about myself." The IMOA scale was removed from analysis due to the number of missing data (over 15%) for these items and the nature of participants' feedback.

Physical activity. Results for participant-reported levels of physical activity are presented in Tables 4.17 and 4.18. Items for the International Physical Activity Questionnaire for older adults (IPAQ-E) found 90% of participants walked for more than 10 minutes at a time in the last seven days, 89% engaged in moderate physical activity

Table 4.17			
<i>Physical Activity Types Survey Items</i>			
<u>Survey item</u>	<u><i>n</i></u>	<u><i>%</i></u>	<u><i>N</i></u>
Walked for more than 10 minutes at a time in the last 7 days	171	90.0	190
Moderate physical activity engagement in the last 7 days	168	88.9	189
Vigorous physical activity engagement in the last 7 days	112	59.9	187

Table 4.18						
<i>Physical Activity Amounts Survey Items</i>						
<u>Survey item</u>	<u><i>n</i></u>	<u><i>Mean</i></u>	<u><i>Range</i></u>	<u><i>Min</i></u>	<u><i>Max</i></u>	<u><i>SD</i></u>
Days a week walked more than 10 minutes at a time	188	5.44	7	0	7	2.34
Time spent walking one of those days (minutes)	186	99.096	660.00	0.00	660.00	112.87
Days a week moderate physical activity was performed	187	4.64	15	0	15	2.54
Time spent performing moderate physical activity	188	100.281	480.00	0.00	480.00	94.18
Days a week vigorous physical activity was performed	184	2.34	10	0	10	2.44
Time spent performing vigorous physical activity	183	50.628	360.00	0.00	360.00	74.27
Note: Valid N (listwise) 176						

and 60% performed some kind of vigorous activity within the last seven days.

Participants performed moderate physical activity on an average of four and a half days a week. Participants reported an average of 2.34 days a week of vigorous physical activity and an average of 50 minutes of vigorous physical activities at a time.

Continuous IPAQ-E scores were calculated by totaling up the minutes per week for each of the three activities (walking, moderate physical activity and vigorous physical activity). Minutes for each activity are then used to create a metabolic equivalency of task

score (MET) for each level of activity. MET is a measure of energy expenditure over and above that which is required to sitting quietly. Walking minutes per day are multiplied by the number of days a week walked and then multiplied by 3.3. Moderate activity minutes are multiplied by the number of days a week performed and multiplied by 4 and the same procedure for vigorous activity minutes a week multiplied by 8. These figures approximate the amount of energy used, where vigorous physical activity is about 8 times the energy expenditure of sitting. Reported minutes that exceed 240 minutes a week per each activity are truncated to 240 to normalize distributions per expert judgement (IPAQ, 2004). The MET for the three categories are then totaled for a MET total score for physical activity. Descriptive statistics on the MET score variable are presented in Table 4.15.

Physical activity self-efficacy. Descriptive statistics for the Exercise Self Efficacy Scale (EXSE) are presented in Table 4.19. Sixty three percent of participants reported being “not at all sure” they would exercise regularly for 20 minutes at time, 3 days a week.” For the last item 18% of participants stated “very sure” to exercising while away from home and 34% of participants were only “a little sure” they would exercise when they have too much work to do at home. Scores for each of the nine scale items were scored between 1 and 4 with *not at all sure* =1 and *very sure* = 4. EXSE score is the mean of the nine responses. The average EXSE score was 2.92 and scores ranged from 1 to 4.

Data screening. Missing values for survey items were treated with the following:

- Items and scales with missing values \leq to 5%, cases with missing values were deleted with the listwise default from SPSS software.

- Items and scales with missing data > 5% and ≤ 15%, missing values were replaced with the sample average for that item and/or scale.
- Items and scales with > 15% of missing values, the item or scale was deleted from analysis.

<u>Survey item</u>	<u>N</u>	<u>Very Sure</u>	<u>Pretty Sure</u>	<u>A Little Sure</u>	<u>Not at All Sure</u>
Exercise Regularly (3 times a week for 20 minutes each)	189	9.0	6.9	21.2	63.0
Exercise when you are feeling tired	188	18.1	18.6	26.6	36.7
Exercise when you are under pressure to get things done	189	17.5	18.0	33.3	31.2
Exercise when you are feeling down or depressed	186	15.1	16.1	29.0	39.8
Exercise when you have too much work to do at home	185	14.6	23.2	34.6	27.6
Exercise when there are other more interesting things to do	188	13.8	20.2	29.8	36.2
Exercise when your family or friends do not offer any kind of support	187	11.8	12.8	23.5	51.9
Exercise when you don't really feel like it	187	14.4	19.8	29.9	35.8
Exercise when you are away from home (e.g., traveling, visiting, in vacation)	187	18.2	27.8	28.9	25.1

Note: Percentages reported in columns 3-6

ATOA, EXSE and MET scales all had missing cases > 5% < 15% so the sample average was computed and used to replace these missing data. Income and IMOA had missing values > 15% so these items were removed from analysis.

To ensure reliable statistical equations and results, emphasis was placed on a proper ratio of predictor variables to the number of cases for each test run. Best practice

is ~15 cases for each predictor variable (Stevens, 2001). For the hierarchical regressions discussed in the following section, the ratios of total number of cases to predictor variables ranged from ~14 cases per predictor, to ~20 cases per predictor variables.

RQ4: What Is the Relationship Between Participants' Perceptions of Aging and Perceptions of Communication Technology?

Testing for hypothesis 1 was conducted with hierarchical multiple regression to control for socioeconomic variables of age, gender, race, education, and ownership of communication technology devices.

H1: Attitudes toward aging will predict perceived value of communication technology devices. Three-step hierarchical model regression was used to analyze ATOA scores with perceived usefulness of communication technology devices. Eight cases with missing data were eliminated from analysis. three cases that were multivariate outliers were also deleted to adjust skewness. The data with deleted outliers did not perform better than original data, so the original data is analyzed here with a $n = 184$. The first step controlled for age, gender, race, and education level. This step was significant, $F(8, 175) = 4.54 p < .000$. The first step accounted for 17.2% of the variance of perceived usefulness of communication technology devices. The second step controlled for ownership of desktop, laptop, smartphone, and tablet devices. This second step was also significant with a substantial 13.1% increase in the variance of perceived usefulness of communication technology devices, $F(12, 171) = 6.2, p < .000$. The third step introduced ATOA into the model with no significant results, $F(13, 170) = 5.72 p < .000$. The change in R^2 value to .304 demonstrated inclusion of ATOA ($\beta = -0.03, p = .63$) was not a significant increase in the explained variance of perceived usefulness of

communication technology devices. The education level of high school or less ($\beta = -0.26$, $p = .039$), smartphone ownership ($\beta = 0.24$, $p = .001$), and tablet ownership ($\beta = 0.24$, $p = .001$) were all significant in the third step of the model. This analysis fails to reject the null hypothesis. Results from this hierarchical regression are presented in Table 4.20.

Variable (N=184)	Model 1		Model 2		Model 3	
	β	t	β	t	β	t
Age	-0.20	-2.8**	-0.07	-1.01	-0.07	-1.02
Gender	0.10	1.36	0.07	1.05	0.07	1.03
Race/White	0.62	2.34*	0.36	1.42	0.36	1.44
Race/Hispanic/Latino	0.47	2.02	0.28	1.28	0.28	1.29
Race/other	0.35	1.81	0.18	0.97	0.19	0.99
High School or less	-0.36	-2.7**	-0.26	-2.08*	-0.26	-2.08*
BA or some college	-0.28	-1.61	-0.23	-1.42	-0.23	-1.43
Graduate school	-0.14	-0.80	-0.20	-1.22	-0.20	-1.22
Desktop ownership			0.09	1.30	0.10	1.34
Laptop ownership			0.08	1.00	0.08	1.01
Smartphone ownership			0.24	3.41**	0.24	3.43**
Tablet ownership			0.23	3.23**	0.24	3.25**
ATOA					-0.03	-0.49
R	.415		.551		.552	
R ²	.172		.303		.304	
ΔR^2			.131		.001	

Note: * $p < .05$, ** $p < .01$, *** $p < .001$

RQ5: What Is the Relationship Between Participants' Perceptions of Aging and Use of Communication Technology?

Testing for hypotheses 2_A – 2_B was conducted with hierarchical logistic regression. Testing for hypothesis 2_C was conducted with hierarchical multiple regression. These types of regressions were used to control for the socioeconomic factors of age, race, and education. Results of the regression analyses are presented in tables.

H2A: Attitudes toward aging will predict ownership of a smartphone. Cases that selected “do not know” for smartphone ownership were eliminated from analysis. Data screening lead to the deletion of seven outlier cases. These combined with missing data lead to an $n = 183$. Hierarchical logistic regression was conducted to determine whether attitudes toward aging (ATOA) is a predictor of smartphone ownership. Data screening lead to the deletion of outliers. Transformed data did not perform better, so original data is presented here. Step one of the model controlled for age, race, and education level. Regression results from step two indicated that the overall model fit of ATOA was questionable ($-2 \text{ Log likelihood} = 150.79$) but was statistically reliable in distinguishing between smartphone ownership ($\chi^2(1) = 27.83, p < .001$). The model correctly classified 83.1% of the cases. Regression coefficients are presented in Table 4.21. *Wald* statistics indicated that ATOA significantly predict smartphone ownership. However, odds ratios for these variables indicated little change in the likelihood of smartphone ownership. The null hypothesis is rejected.

Table 4.21				
<i>Summary of Hierarchical Logistic Regression for Variables Predicting Smartphone Ownership</i>				
Variable (N=183)	Model 1		Model 2	
	<i>B</i>	Odds Ratio	<i>B</i>	Odds Ratio
Constant	8.58	5344.73	5.22	184.74
Age	-0.08	0.93***	-0.07**	0.93
Gender (Female = 1)	-0.40	0.67	-0.45	0.64
Race/White (Yes = 1)	-1.74	0.18	-1.53	0.22
Race/Hispanic/Latino (Yes = 1)	-1.60	0.20	-1.44	0.24
Race/other (Yes = 1)	-1.15	0.32	-0.81	0.45
High School or less (Yes = 1)	1.19	3.27	1.25	3.48
BA or some college (Yes = 1)	0.83	2.30	0.82	2.26
Graduate school (Yes = 1)	-0.12	0.88	-0.01	0.99
ATOA			0.83*	2.29

Note: * $p < .05$, ** $p < .01$, *** $p < .001$

H2_B: Attitudes toward aging will predict ownership of a tablet device. Results from H2_B are presented in Table 4.22. Hierarchical logistic regression was conducted to determine whether ATOA is a predictor of tablet ownership. Data screening led to the deletion of outliers. Transformed data did not perform better, so original data is presented here. Step one of the model controlled for age, race, and education status. Regression results indicated that the overall model fit was highly questionable (-2 Log Likelihood = 220.06) but was statistically reliable in distinguishing between tablet ownership [$\chi^2(1) = 33.57, p < .0001$]. The model correctly classified only 65.1% of the cases. Regression coefficients are presented in Table 4.22. *Wald* Statistics indicated age significantly predicted tablet ownership, but the ratios for this variable indicated very little change in the likelihood of tablet ownership.

ATOA was not found to significantly predict tablet ownership. The null hypothesis is not rejected.

Table 4.22				
<i>Summary of Hierarchical Logistic Regression for Variables Predicting Tablet Ownership</i>				
<u>Variable (N=183)</u>	<u>Model 1</u>		<u>Model 2</u>	
	<u>B</u>	<u>Odds Ratio</u>	<u>B</u>	<u>Odds Ratio</u>
Constant	44.66	2.48	43.07	5.08
Age	-0.05	0.96*	-0.04*	0.96
Gender (Female = 1)	-0.32	0.73	-0.34	0.71
Race/White (Yes = 1)	-21.51	0.00	-21.38	0.00
Race/Hispanic/Latino (Yes = 1)	-21.26	0.00	-21.11	0.00
Race/other (Yes = 1)	-21.51	0.00	-21.35	0.00
High School or less (Yes = 1)	1.68	5.36	1.64	5.13
BA or some college (Yes = 1)	-0.04	0.96	-0.10	0.91
Graduate school (Yes = 1)	-0.87	0.42	-0.89	0.41
ATOA			0.41	1.51

Note: * $p < .05$, ** $p < .01$, *** $p < .001$

H2_C: Attitudes toward aging will predict frequency of Internet use on a mobile device. Results from H2_C are presented in Table 4.23. Analysis for frequency of Internet and email use on a mobile device was limited to cases that specified ownership of either a smartphone or tablet. A relationship between ATOA and smartphone ownership was found in a previous test. Since every case of “0” no Internet/email use on a mobile device did not own a smart mobile device, 29 cases of no smart mobile device ownership were eliminated. Two cases with missing data were eliminated. Both univariate and multivariate outliers were eliminated from analysis, for a total $n = 145$.

Table 4.23				
<i>Summary of Hierarchical Regression for Variables Predicting Internet and Email Frequency of Use on a Mobile Device</i>				
<u>Variable (N=145)</u>	<u>Model 1</u>		<u>Model 2</u>	
	β	t	β	t
Age	-0.23	-2.84	-0.22	-2.73***
Gender	-0.11	-1.28	-0.10	-1.25
Race/White	0.72	2.21*	0.68	2.09*
Race/Hispanic/Latino	0.39	1.37	0.37	1.29
Race/other	0.43	1.86	0.42	1.82
High School or less	0.05	0.35	0.06	0.46
BA or some college	0.14	0.73	0.17	0.89
Graduate school	0.22	1.16	0.25	1.29
ATOA			0.11	1.38
R	.378		.394	
R ²	.143		.155	
ΔR^2			.012	

Note: * $p < .05$, ** $p < .01$, *** $p < .001$

The first model controlling for age, gender, race, and education level significantly accounted for 14.3% of the variance in frequency of Internet and email use on a smart mobile device, $F(8, 136) = 2.84 p < .006$. The addition of ATOA in the second step model was also significant, $F(9, 135) = 3.96 p < .006$ but the change in R^2 was not significant. ATOA ($\beta = 0.11$, $p = .17$) did not significantly contribute to the model and did not impact

frequency of Internet and email use on a smart mobile device. Age ($\beta = -0.22$, $p = .007$) and the race category white ($\beta = 0.68$, $p = .038$) were significant in the model where age decreased with an increase in mobile device use and participants who identified as white had increased Internet and email use on their mobile devices. The null hypothesis is not rejected.

RQ6: What Is the Relationship Between Participants' Perceptions of Aging and Physical Activity/Exercise Self-Efficacy?

Testing for hypothesis 3 was conducted with a three-step hierarchical multiple regression to control for socioeconomic variables of age, gender, race, education level, MET scores, and health status. Results from this test are presented in Table 4.24.

Variable (N=173)	Step 1		Step 2		Step 3	
	β	t	β	t	β	t
Age	0.00	-0.04	0.00	-0.04	0.00	0.05
Gender	-0.06	-0.83	-0.01	-0.07	-0.01	-0.15
Race/White						
Race/Hispanic/Latino	-0.04	-0.46	-0.04	-0.53	-0.04	-0.54
Race/other	-0.06	-0.73	-0.05	-0.67	-0.06	-0.79
High School or less	-0.09	-1.04	-0.05	-0.56	-0.05	-0.60
BA or some college						
Graduate school	0.11	1.28	0.09	1.20	0.08	1.07
Health status			0.29	3.87***	0.21	3.02**
MET			0.23	3.14**	0.24	2.95**
ATOA					0.13	1.61
R	.194		.425		.440	
R ²	.038		.181		.193	
ΔR^2			.143		.013	

Note: * $p < .05$, ** $p < .01$, *** $p < .001$

H3. Attitudes toward aging will predict a person's physical activity/exercise self-efficacy. Missing data for variables in this regression model and the deletion of multivariate outliers provided a $n = 173$. Step one, controlling for age, gender, race, education level was not significant, $F(6, 166) = 1.08 p < .38$. Step two added MET and health status to the model and was significant with 18.1% explanation of the variance in physical activity/exercise self-efficacy $F(8, 164) = 4.52 p < .000$. Step three was also significant at $F(9, 163) = 4.34 p < .000$ when ATOA was added to the model, but the change in R^2 demonstrated no significant increase in the explained variance of physical activity/exercise self-efficacy. MET ($\beta = 0.24, p = .003$) and health status ($\beta = 0.21, p = .004$) were both significant in this model where an increase in physical activity/ exercise self-efficacy means an increase in physical activity behavior output and higher reports of health status. The variables "race/White" and "BA or some college" were automatically excluded from the models due to collinearity. ATOA was not found to be a significant variable ($\beta = 0.13, p = .11$). The null hypothesis is not rejected.

Quantitative Arm Summary

To answer research questions 4 and 5 hierarchical multiple and logistic regressions were performed to test the hypotheses whether scores on attitudes toward aging could predict perceived usefulness of communication technology, mobile technology ownership, and frequency of Internet use on mobile devices. The only relationship that was found in this analysis was between scores on attitudes toward aging scale and smartphone ownership. This was a statistically significant relationship, meaning attitudes toward aging can predict smartphone ownership, though this relationship was very small. In other words, though attitudes toward aging can predict smartphone

ownership, these attitudes do not greatly increase the odds that a smartphone will be owned.

To answer research question 6, a hierarchical multiple regression was used to test the hypothesis that attitudes toward aging could predict physical activity self-efficacy. Results from this analysis did not find a significant relationship between aging attitudes and physical activity self-efficacy.

This section concludes the results chapter of this mixed methods study. The next chapter will discuss the significance of these findings and implications for theory and future research.

Chapter 5

Discussion

This chapter discusses the importance of the research findings, theoretical implications for behavior change and technology adoption, limitations of the study, and directions for future research. This section will start with a brief summary of this project.

Summary

This summary will review key points from the first chapter.

Project Summary

The project summary will review the introduction, problem statement, statement of purpose and overview of methodology.

Introduction to the study. The primary goal of this study was to expand knowledge on older adults' perceptions of aging, physical activity, and communication technology use for health purposes. The following aims guided the investigation of these specific concepts:

Aim 1: To understand the perceptions older adults in the community have towards aging, technology use and physical activity.

Aim 2: To assess whether the attitudes community older adults have towards aging impact their communication technology perspectives and use.

Aim 3: To assess whether the attitudes community older adults have towards aging impact their physical activity self-efficacy.

This study was a collaboration with The Department of Senior Affairs in Albuquerque, New Mexico. Findings from this study were used in an accreditation process for senior center locations currently applying for national accreditation with The

National Institute of Senior Centers (NISC), a division of The National Council on Aging (NCOA).

The collaboration with this city department combined the topics of this study, specifically older adult perspectives on aging, physical activity and technology, with the city's need to understand older adult use of services pertaining to physical activity, technology use, and quality of life in their aging experiences, per assessment needs.

Problem statement. Older adults experience many barriers to physical activity. One such barrier is negative attitudes towards aging. Negative aging attitudes and ageism act as significant barriers to active aging and physical activity in later life (Swift et al., 2017). Though negative attitudes towards aging are detrimental to healthy behaviors, reversing negative perspectives on aging increases physical activity behaviors (Levy et al., 2014).

One effective strategy to help older adults overcome these barriers to physical activity could be the incorporation of information communication technologies in older adult health research. Older adult adoption and use of mobile technologies are increasing (Pew, 2017) and evidence shows use of these technologies can contribute to healthy aging (Abdulrajak, Malik, Arab, & Reid, 2013; Chaudry, Reeves, & Chawla, 2016).

Lack of older adult physical activity, diverse perspectives on physical activity, negative attitudes toward aging and older adult use of technology are all important concepts to consider for healthy aging for older adults.

Statement of purpose. The purpose of this study was to gather and understand older adult perspectives on physical activity, aging and technology. A secondary purpose of the study was to explore whether and how attitudes toward aging impact older adult

physical activity self-efficacy and technology use. A third purpose of the study was to understand older adult use of various technologies and their role in healthy aging.

Overview of methodology. A Mixed Methods Research (MMR) approach was used in this study. The study consisted of the research instruments of interviews, focus groups, and a survey. There were 37 individual interviews and two focus groups with seven to ten participants in each. The interviews and focus groups used semi-structured schedules to guide the conversation about perceptions of physical activity, aging, and technology. The transcripts of these conversations were analyzed using the qualitative methods of thematic cyclical coding and constant comparison analysis. The qualitative analysis arm of this study adopted a constructivist grounded theory approach (Charmaz, 2014).

The survey instrument included 30 questions that contributed to the quantitative arm of the study. The responses to survey questions were developed into variables of ratings of health, attitudes towards aging, physical activity behavior types and amounts, use of technology, and types and amount of technology use including technology use for health purposes. Relationships among these variables were tested with hierarchical logistic and multiple regressions.

Interpretation of the Findings

The findings of this study are discussed by research question. These findings are summarized and conclude with the integration of qualitative and quantitative data.

Qualitative Findings

RQ1: How do participants perceive their aging experiences? This research question investigated participants' perceptions of their aging experiences. Participants

discussed aging as a time of change that necessitates mental and physical strategies to maintain a sense of control and agency in their aging experiences. For those in this study, aging was a time of challenges and opportunities. The challenges of aging were predominantly discussed as declines and losses that come with the later stages of life. Decline in physical health and abilities limited older adults. They admitted they could not do many things that were possible in their younger years. Participants also discussed the loss of family and friends as a normal part of their aging experiences. Though these declines and losses could be demotivating, participants faced these declines and losses so they could have an honest perspective of their older age.

Participants' discussion of aging as a time of decline and loss aligns with previous research (de Medeiros, 2017; Katz, 2006). The concept of aging as decline is a predominant theme, one that has defined age perspectives for decades (Cruikshank, 2013). Theorists and researchers challenge the framing of aging as decline and see it as devaluing older adult experiences (Gullette, 2004). Though such researchers challenge the decline perspective as a way of helping to empower older adults, de Medeiros (2017) argues that challenging the age as decline trope can lead to unrealistic aging ideals and an erroneous discourse of denial. Participants in the present study approached their aging experiences with honesty, recognizing decline and loss, but not overly concerned with their new limitations. Participants' acceptance of and adjustment to their age-associated losses allowed them to transform aging as loss and decline to aging as a time of change.

Participants accepted and adjusted to the changes that accompanied their aging experiences. This acceptance and adjustment allowed participants to reconcile with the things in their life they could not control so they could recognize and work on those areas

where they still had control. The older adults in this study spoke of the acceptance of decline and acceptance of death as important strategies for their aging experiences. The acceptance of age associated decline and death is supported by previous research (Baltes & Baltes, 1990; Clarke & Warren, 2007). One construct that supports acceptance of decline in older age is *flourishing* (Keyes, 2010). Flourishing emphasizes a state of being as wellness for older adults and recognizes health as something beyond mere absence of disease. Though participants admitted some decline in their physical health status, they could still perceive themselves as healthy and able to pursue healthy activities. The other type of acceptance participants emphasized was the acceptance of death. Clarke and Warren (2007) discussed older adult acceptance of death and making end-of-life arrangements an important activity that gives older adults a sense of agency and control. Participants talked about their acceptance of death as an important step in letting go of things that are out of their control so they can put more effort toward the adjustments needed to maintain their sense of ability.

Adjustment to age-associated decline was important for participants in this study. Adjustment entailed modifications to physical activities that honored real limitations that placed these older adults into positive mental dispositions to support their efforts in aging. Baltes and Baltes (1990) developed a model of aging that entails the acceptance of changes and strategies of adjustment (compensation) to support successful aging experiences. One key step in this model is selection, where older adults adjust their individual expectations to align with new physical limitations (Baltes & Baltes, 1990). This adjustment supports a sense of control and ability and encourages life satisfaction within newfound limits. The second step to this model is optimization. Here, older adults

typically engage in new or modified behaviors that maximize their efforts within new guidelines. The last step is compensation, where activities are substituted or modified. This compensation is an adjustment to reduced behavioral capacities. The acceptance and adjustments of older adults in this study demonstrate their successful aging strategies. These successful strategies are not an overly optimistic and unrealistic approach to their experiences, but rather an honest approach and realistic understanding to aging.

The second significant theme that emerged from participants discussion of aging was the importance of staying challenged, finding a purpose in life and helping others. Participants' emphasis on life's purpose and helping others is supported by previous research (Cole, 1997; Erikson & Erikson, 1995; Hollis, 2014; Nimmer, 2018). Participants discussed the importance of living life for a purpose and helping others to increase their life satisfaction. One of the most important ways participants increased their life satisfaction was giving back to others and having a positive impact on society. Erikson and Erikson (1995) discuss this as generativity in their life stages model of human development. Generativity is the mentality and effort of older adults in finding importance in their lives by helping others.

One significant finding of this study was participants' need to be challenged in their aging experiences. Though previous research has discussed the importance of growth in older age (Hollis, 2014) and the benefits of cognitive challenges for brain health in older age (Nussbaum, 2011), less is known about older adults' needs to be physically and cognitively challenged in order to increase their sense of accomplishment and fulfillment. The selection, optimization and compensation of Baltes and Baltes (1990) discusses compensation of behaviors to meet goals but is still conceptualized in

the negative where compensation is as a strategy to just reduce the impact of loss. Participants' desire for challenge seems to be about personal gains and growth despite modifications and compensations. It encourages the efforts of older adults to keep striving for new, challenging goals. This need for challenge seems to complicate the aging experience, where older adults seek gains within the modifications and limits that aging experiences require.

The last emergent theme from this research question was how aging is a sociocultural experience that is learned through the examples and experiences of others. Participants discussed how they use the examples and experiences of others to develop expectations of aging. Participants looked to other older adults to make decisions about what was possible in their own aging experiences. Older adults who were caretakers for ill parents used these experiences to support active strategies of preventive health behaviors and a positive outlook towards aging. Participants also seemed to use older adult role models as good examples and motivators for positive aging behaviors and mindsets to help them change what it means to age.

Aging as a social and cultural experience has been researched by many scholars (Cruikshank, 2013; Gullette, 2004; Katz, 2005; Tulle, 2008). Aging research has gone beyond the biological determinants of aging (e.g., worn telomeres, decreased circulation, etc.) and considers those behaviors and mindsets of old as socially constructed. For example, Katz (2005) problematizes the notion that aging is just biological changes and looks at the values and beliefs societies ascribe to these physiological changes. Aging role models were discussed by Horton, Baker, Côté, and Deakin (2008) and by Jopp, Jung, Damarin, Mirpuri, and Spini (2016). Aging role models are an important construct

for older adults when the increase in the older adult population has changed the presence older adults now have in society. These role models aid older adults to better understand their aging potential in a world that devalues and disenfranchises older adult bodies and experiences.

The next section discusses the findings on communication technology use.

RQ2: What are participant perspectives on communication technology use?

Research question two investigated participant perspectives on communication technology use. Overall, participants had a holistic and pragmatic approach to communication technology. Participants showed great concern for the harms of communication technology but still recognized certain benefits that these technologies provide. Three major themes emerged from this question in support of participants' holistic and pragmatic approach to communication technology.

The first theme described the concern participants had towards the harms of communication technology. Older adults in this study saw communication technology devices as distracting and believed many people today to be overly dependent on devices like the smartphone. Participants referenced how these technologies damage human communication and encourage sedentary behavior. Another harm participants discussed was specifically related to their own aging experiences. Participants believed the communication technology industry to be mercenary and make older adults prey to malicious scams.

Older adult concerns for the harms of communication technology is not a new phenomenon. Previous research on older adults' attitudes toward technology found such adults to be wary of overuse of communication devices, to be concerned about the

neglect of human communication and about decreased social skills, and to worry about the negative behaviors and attitudes these devices encourage (AARP, 2001; Lehtinen, Nasanen, & Sarvas, 2009). Also, van Deursen & Helsper (2015) found older adults to be generally distrustful of communication technologies like the Internet and see the cost of these devices as prohibitive and thus as barriers to use.

The second major theme that emerged from participant perceptions of communication technology involved their references to previous technology experiences and broad communication constructs. These references were used to justify either a pragmatic contextualization of the normal concerns of technology development or a cautionary view of the detriments of technology. These examples of past technology showed how participants took a holistic approach to communication technologies. This holistic approach means participants contextualize the harms, benefits and uses of technology through these historical references and the technology experiences of their lives. The participants' attitudes towards communication technology seem to take on a lifespan and philosophical approach. These examples of history and personal experience impart their wisdom gained over the course of a lifetime of technological revolutions, gains, and even setbacks.

The ways participants discuss their views toward and use of past technologies is an interesting finding of this study. Research on technological development, particularly on technology adoption and use, tends to neglect potential users' worldviews and experiences (Beimborn, Kadi, Koberer, Muhleck, & Spindler, 2016). These historical examples empower older adult experiences of past technologies. Technological advancement is often framed as a youthful attribute to modern society (Samuel, 2017).

The technology experiences participants shared in the present study provide a more complex understanding of technology development over the course of generations. These experiences that participants shared challenge this youth bias within technology conversations. The knowledge older adults gained through a lifetime of technology use and development provide an insight into technology's place in society that is often neglected in technology development research. If technology developers want to engage older adults in meaningful ways, there should be more interaction with older adults to uncover these more "human centered" ways in which older adults understand these technologies. These perspectives of older adults are "necessary for a rich understanding and a responsible shaping of a technologized ageing society" (Beimborn et al., 2016, p 1). This holistic and historical approach to technology provides more context and understanding to older adult resistance to communication technologies like the Internet and smartphones.

The third major theme that emerged from this research question demonstrated how participants practice a purposeful resistance to and mindful balance of communication technology. The perceived harms of communication technology motivated older adults in this study to practice mindful technology behaviors. Some participants even kept their technology adoption limited to email and online information-seeking only so as to resist technology culture. Participants wanted to avoid overdependence on these technologies and practice technology use that prevents the intrusive nature of smartphone technology from negatively impacting their lives.

Previous research has investigated older adult resistance to technology. Older adults were found to resist technology if the technology was seen as addictive or

damaging to face-to-face interactions (Hakkarainen, 2012). Many older adults refuse to adopt communication technologies if they lacked perceived benefits or were seen as irrelevant to their aging experiences (Melenhorst, Rogers, & Bouwhuis, 2006). A lack of interest was also found to prevent older adults from using computers or the internet (Carpenter & Buday, 2007; Morris, Goodman, & Brading, 2007).

Though participants actively resisted negative influences of technology on their lives, they were motivated to adopt technologies like laptops, smartphones, and social media if they contributed to their lives in meaningful ways. One of these meaningful contributions was communication with family members, particularly grandchildren. Participants shared how they enjoyed joining social media sites like Facebook to stay engaged with grandchildren by sharing pictures of vacations and holidays online. Other participants discussed the advantages of text messages to stay in touch with grandkids since these youth rarely answered phone calls but would respond to texts rather quickly. These findings of older adult technology use for family communication is supported by previous research. Bosch and Currin (2015) found that older adults use the computer and Internet because it allows them to stay connected with family, friends and their neighborhood. Harley, Howland, and Harris (2016) found that older adults appreciate a passive consumption of family posts on social media. Older adults are one of the fastest growing populations adopting social media platforms. In 2011, those 65 years of age and older made up 33% of all social media users (Zickuhr & Madden, 2012). In 2018, that percentage increased to over 40% of all users (Smith & Anderson, 2018).

As demonstrated in their interest to engage in social media, older adults have complex and nuanced perspectives and uses of communication technology. Though they

resist overdependence and seek a mindful approach to its use, older adults are still able to adopt these technologies when their adoption proves useful and functional to their lives. Participants use these technologies as a tool. Participants in this study used their smartphones, flip phones computers and even tablets if their respective functions were useful and meaningful. This technology-as-tool approach is explained in previous research (White & Weatherall, 2000). Also, baby boomers were found to generally accept technology but keep its use to a practical minimum to serve specific purposes (Rogers, 2009)

Another significant use participants had for their computers and smart devices was access to online health information. Participants would go online to find information needed for disease management and prevention. They sought information that would help them understand information they received from medical providers. They also looked for information to double check advice from doctors. This active use of information-seeking prevented mindless compliance with medical advice. These participants did not trust some of the information they received from their doctors and would use online information as a second opinion. Though most participants discussed their use of online health information, many participants lacked concrete evaluation strategies for this information, and some seemed to lack Internet literacy skills to adequately access and evaluate credible online information.

Findings concerning participant access to and use of online health information share some similarities to those in existing research on general online health information as well as older adult online information seeking behaviors. Medlock, Eslami, Askari, Arts, Sent, de Rooij, et al. (2015) found that older adults predominantly go online to

access medical information about diagnoses from medical providers, to better understand disease and illness prognoses and to seek information on medications. Access to online health information is beneficial to those older adults who have adequate health and digital literacies to both navigate and evaluate online health information. But access to online health information can be problematic for those older adults who lack sufficient understanding to evaluate information. This lack of understanding and exposure to erroneous information can be detrimental to older adult health (Neter & Brainin, 2012; Zajac, Flight, Wilson, Turnball, Cole, & Young, 2012).

Though most of the findings in response to this research question have been found in previous research, those from the present study still offer contributions to the topic of older adult perspectives of communication technology. Participants approach their technology use with agency and purpose. Previous research frames older adult resistance as a barrier to adoption and their behaviors as something to change. The finding that emerged from the present study, however, concerns older adults' lifespan approach to technology. This shifts the conversation from older adult resistance as a barrier to technology adoption and instead makes older adult resistance to and experience with previous technology an opportunity to learn about the role technology currently plays in our society. Simply put, older adults have something to teach society when it comes to effective communication technology use. The perspectives of older adults here really challenge the technology-determined approach that eHealth research adopts (Garattini & Prendergast, 2015). There is a tendency for such research to carelessly assume these technologies are inherently good for older adults. The older adult perspectives shared in the present study, however, demonstrate the often neglected harms of technology and fail

to celebrate older adult technology resistance as beneficial checks and balances on technology. Participant perspectives shared in this study argue that technologies are not neutral. More consideration must be paid to the inherently bad and inherently good aspects of technologies (Garattini & Prendergast, 2015). Older adults provide this insight. It is important to avoid technological determinism as it relates to technology development and promotion for older adults. It is important that technology be considered within the broader social and cultural landscape.

The next section presents the findings on older adults' perceptions of physical activity.

RQ3: How do participants perceive the role of physical activity in their aging experiences? The third research question looks at how participants perceive physical activity in their aging experiences. Older adults in this study believed physical activity to be an integral part of their aging experiences. Two major themes emerged from this question that explain how older adults use physical activity as a strategy to age well.

The first major theme presented the ways that older adults in this study use diverse conceptualizations of physical activity to support notions of activity. Every participant in this study admitted that physical activity was important for aging well. Where participants differed was in how they defined and understood what constitutes physical activity. Definitions of physical activity ranged from vague examples of just getting up out of a chair to 30 minutes of sustained heart rate elevation. These definitions also included social activities as substitutes for physical activities. Though different understandings of what constitutes physical activity is not a new concept (Caperchione, Kolt, Tennet & Mummery, 2011; Henderson & Ainsworth, 2001; Lusmägi, Einasto, &

Roosmaa, 2016), how participants used these definitions is new. Participants used their respective physical activity definitions to support their beliefs that they themselves engaged in activity that was beneficial to their lives, regardless of whether those definitions align with CDC (2011) recommendations needed for positive health outcomes.

These findings may be explained by what Murphy (2018) identified as societal pressure for older adults to be active. This pressure may encourage the older adults in the present study to want to identify as active, even if they do not actually adhere to the recommended guidelines for physical activity. Some participants even challenged the efficacy of these guidelines, saying that they don't apply to disabled older adults or that these older adults are not motivated to be active. The findings as discussed here argue that it is normal for older adults to be seen as active, but they challenge how activity guidelines may not align with older adult abilities. This may argue for a shift in older adult attitudes towards physical activity, where it is now a normal pursuit in older age. This is a shift from findings of previous research where older adults saw physical activity as not appropriate for people in their own age group (Ostrow & Dzewaltowski, 1986; Ostrow, Keeney, & Perry, 1986).

The second major theme that emerged from this research question was how participants used physical activity as an essential health strategy. Participants engaged in physical activity to maintain their functional capacity and to manage and prevent disease, specifically cognitive diseases such as dementia and Alzheimer's Disease. The ways in which participants used these activities show they know the benefits of physical activity for physical and cognitive health.

The physical and cognitive benefits of PA have been shown in research over several years (Blumenthal & Gullette, 2001; Macera et al., 2017; Northey, Cherbuin, Pumpa, Smees, & Rattray, 2017; Norton, Matthews, Barnes, Yaffe, & Brayne, 2014; Panza, Taylor, MacDonald, Johnson, Zaleski, Livingston et al. 2018). What is interesting about these findings is how participants discussed these motivating benefits to demonstrate control over their own aging experiences. This relates to the work of Tulle (2008). Tulle positions physical activity behaviors as not just beneficial to health but as an opportunity for older adults to reclaim their agency and power over the declines of aging. The health benefits are secondary to the control and agency these participants discuss.

This has implications for physical activity research and promotions since the overarching benefit is control. This relates to participants' desire to be active so they can appear to engage in controlling behaviors regardless of explicit health benefits. The appearance and identification as active older adults was important for participants.

The next section presents the first set of findings from the quantitative arm of the study.

Quantitative Findings

RQ4: What is the relationship between participants' perceptions of aging and perceptions of communication technology? Research question four investigated the relationship between participants' perceptions of aging and their perceptions of the usefulness of communication technologies. Since attitudes towards aging has been shown to influence positive health behaviors like social engagement and health prevention strategies (Luijckx, Peek, & Wouters, 2015; Xavier, D'Orsi, Wardle et al., 2013) it was

hypothesized that more- positive attitudes towards aging would predict increased perceived usefulness of communication technologies. Results from the hierarchical multiple regression failed to reject the null hypothesis. Positive attitudes toward aging were not found to predict perceived usefulness of communication technologies. These findings could be explained in various ways.

One reason attitudes towards aging were not related to perceived usefulness in the present study may be due to the simplistic and general way usefulness of communication technology was defined in the study. Participants were asked general questions about whether they believed laptops/desktops, smartphones, and tablets were useful for their lives. This general approach to usefulness fails to acknowledge the diverse and complex ways older adults approach communication technology. To better capture older adult attitudes toward technology as it relates to aging, research should consider the specific ways older adults use these technologies to fulfill needs within psychosocial domains of their lives. Older adults use these technologies for diverse functions and for different types of fulfilment in their lives (Hauk, Hüffmeier, & Krumm, 2018). For example, it may have been better to ask older adults about the usefulness of these communication devices for age-specific uses, such as communication with family and whether they perceived these devices to be helpful in their search for online health information.

Another shortcoming of how perceived usefulness was used in this study was its neglect of older adults' intention to use these devices for specific purposes. Investigations into technology attitudes should consider opinions about technology and technology behaviors to understand how people perceive technology (Arning & Ziefle, 2007). Components of Technology Acceptance Models (TAM) should have been used to

construct better questions that captured more detail about older adult perceptions and use of these technologies (Burnett, Mitzner, Charness, & Rogers, 2011). TAM is the framework most often used to explain perceptions and use of technology (King & He, 2006). TAMs include both attitudinal beliefs and perceived usefulness as factors that co-construct technology use (Venkatesh & Bala, 2008). Perceived usefulness as operationalized in the present study lacked a behavioral intention component, thus providing an incomplete picture of older adult perceptions of technology.

The next section discusses the relationship between participants attitude towards aging and technology behaviors.

RQ5: What is the relationship between participants' perceptions of aging and use of communication technology? The fifth research question looked at how attitudes toward aging could predict ownership of smart devices and how frequently older adults in this study used these devices to access the Internet. It was hypothesized that more positive attitudes towards aging would increase the odds a participant would own a smartphone and/or a tablet device. It was also hypothesized that attitudes towards aging would predict frequency of Internet use on these mobile devices. Hypotheses for RQ5 were justified with the same arguments for RQ4: attitudes towards aging have been shown to influence prosocial behavior and preventive health strategies. Since ownership and use of these devices have been shown to encourage prosocial behavior, it makes sense to connect these concepts.

Of the three hypotheses that were tested here, only one demonstrated a significant relationship with attitudes towards aging. Attitudes towards aging were found to significantly predict smartphone ownership, but this relationship did not *greatly* increase

the likelihood of smartphone ownership. In other words, attitudes towards aging have a positive relationship with smartphone ownership, but one that is rather limited. This relationship only explains a small amount of what is entailed in older adults' smartphone ownership. Attitudes towards aging were not found to significantly predict older adult tablet ownership or older adult frequency of use.

The limited findings for this research question could be related to the simplistic way technology use was measured. As Hunsaker and Hargittai (2018) point out, research on technology use often employs simple and dichotomous questions that cannot adequately capture the nuances of technology engagement. These simplistic approaches prevent in-depth exploration of device ownership and Internet use. The present study needed to develop technology-use measures that captured more of the complexity of how older adults use technologies and the diverse functions they serve.

The next section presents the findings for the last research question.

RQ6: What is the relationship between participants' perceptions of aging and physical activity/exercise self-efficacy? The last research question looked at whether attitudes towards aging could predict participants' physical activity/exercise self-efficacy. Positive attitudes towards aging have been shown to increase physical activity engagement and use of other positive health preventive behaviors (Bryant, Bei, Gilson, Komiti, Jackson, & Judd, 2012). It was hypothesized that attitudes towards aging would predict participant scores on the exercise/physical activity self-efficacy scale. The hierarchical regression did not find a significant relationship between attitudes towards aging and physical activity/exercise self-efficacy. One explanation for the lack of findings here could be the use of an exercise self-efficacy scale to measure physical

activity self-efficacy. Though *general exercise* self-efficacy scales are frequently used to measure *physical activity* self-efficacy (French & Warner, 2018), this confusion and conflation of exercise and physical activity may not have worked for participants in the present study. The difference in language between the physical activity scale (IPAQ) and exercise term of the self-efficacy scale many have confused participants. There was one instance when a participant commented on the discrepancy between the physical activity language of the IPAQ and exercise term in the self-efficacy scale. This participant admitted she regularly participates in heavy gardening to achieve her moderate physical activity engagement but did not see how the *exercise* self-efficacy scale related to this type of activity.

The limited findings from the quantitative arm of this study may be explained through the integration of the qualitative and quantitative findings.

Summary and Integration of Findings

Though the quantitative arm of this study failed to find substantial findings, the qualitative data offers detail that can provide deeper insight into the research concepts of older adult attitudes towards aging, technology use and physical activity. The interview and focus group data found that participants see aging as a time of change that necessitates mental and physical strategies to maintain a sense of control and agency. Older adults in this study accepted declines associated with age and made practical adjustments that respected physical limits and simultaneously encouraged physical and personal growth. For older adults in this study, personal growth in older age meant finding a purpose in life and doing good for others. Also, participants discussed how the experiences and examples of other older adults helped them understand their own aging

experiences and influenced strategies for their own aging. These examples of other older adults included age role models who embodied healthy and active aging behaviors. Participants seemed to look to others to create for themselves new expectations and definitions of what it means to be old. Interestingly, older adults in this study did not appreciate the age stereotype variable in the survey. Participants found the words and questions problematic, since they were asking about stereotypes of old people. Some participants wrote statements in the margins of the survey that challenged these general terms, saying they don't work anymore since aging is an individual experience and that older adults today are more capable and active than those in previous age cohorts. This integration of the qualitative and quantitative data could demonstrate how older adults in this study see the concept of aging as changing.

The qualitative data also found that older adult participants have a holistic and pragmatic approach to communication technology. Participants use their knowledge and experiences of past communication technologies to support purposeful and mindful use of their smartphones, flip phones, computers, social media and the Internet. In regards to physical activity, older adults in this study believed physical activity to be an integral part of their aging experiences. The older adults in this study were eager to identify as being active and used various notions of what constitutes physical activity so their behaviors could be seen as active and healthy.

These themes from the qualitative data may help explain why the results from the quantitative arm of this study had limited findings. Scores on the attitudes towards aging scale were not found to significantly predict participants' perceived usefulness of desktops/laptops, smartphones or tablets or ownership of a tablet device or frequency of

internet use on a smart mobile device. This in part could be due to the fact Technology Acceptance Model concepts were not used in the creation and utilization of perceived usefulness of technology measures. The qualitative findings may also help explain the lack of findings. Older adults in this study have conscious and purposeful technology habits. These habits are kept to meaningful, even simple functions, but these older adults do not have a simple approach to technology. They understand technology in complex ways and consider the social, historical, cultural and moral implications of what it means to use the Internet or even a smartphone. Their rationales for their communication technology habits are based on how these technologies contribute to their lives in meaningful ways. They also use their resistance to and mindfulness of the social harms of technology to not only avoid these harms for themselves, but also to take a stand against the threat of a technology-driven existence. Most existing research on older adult communication technology behaviors focus on the lag of older adults and attempt to find ways to encourage technology engagement for this population. Perhaps it is time we take a step back and consider how older adults have something to teach us about communication technology use.

The only significant finding from the quantitative arm of the study was that attitudes towards aging predicted older adult smartphone ownership. Though significant, this relationship is of very limited effect and tells us just a small part of what influences older adult ownership of smartphones. Though this relationship is small, the implications must be considered. In the qualitative data, older adults seemed highly critical of smartphones and some even purposefully avoided these devices. This seeming contradiction could be a glimpse into the complex ways older adults approach

smartphone technology. Though the smartphone was characterized as a device of distraction and detrimental to human interaction, older adults also described smartphones as convenient tools that enable quick access to health information and almost instantaneous communication with family members, including grandchildren. This juxtaposition of the harms and advantages of smartphones is an example of the ways older adults mindfully use technology. These qualitative findings offer a richness and complexity of ideas the quantitative data alone cannot.

The quantitative arm of the study also failed to find a relationship between attitudes towards aging and physical activity self-efficacy. The use of an exercise self-efficacy scale may explain these non-significant findings. The qualitative data may also help explain the relationship between older adult attitudes towards aging and their physical activity self-efficacy. Participants used their perceptions of physical activity and physical activity behaviors to maintain a sense of control in their aging experiences. Participants accepted losses and declines they could not control so they could focus on areas of their lives that were still under their control.

The participants in the present study used specific (and perhaps self-serving) definitions of physical activity so that their behaviors could be seen as active. They also used physical activity behaviors to control their health in older age. Self-efficacy is the belief that one has the ability to perform a given task. In the interviews and focus groups, many older adults wanted to say that they themselves were capable of performing physical activity, so they adjusted the concept of physical activity. Also, participants used physical activity behaviors to manage their health, particularly to prevent cognitive diseases. These two factors of older adult physical activity could be part of their search

for aspects of their lives they have control over to compensate for those losses they cannot control. Here, self-efficacy for older adults could involve aspects of control beliefs as well. Perhaps the concept of self-efficacy as measured by scale item questions about specific behaviors (e.g., exercise when you are feeling tired) do not adequately contain contexts to the behaviors (e.g., beliefs and norms).

Theoretical Implications

These findings have important implications for behavior change and communication technology theoretical constructs.

Physical Activity and Behavior Change Theory

This was the first study to investigate the relationship between attitudes towards aging and physical activity self-efficacy. Though the research question that explicitly investigated this relationship did not yield significant findings, the qualitative data that was part of this mixed method study can elucidate this relationship. The importance of participants' perceived control over their aging experiences influenced other domains of older adult experiences, including physical activity. Physical activity behaviors were discussed in this study as effective strategies for older adults to maintain control over aspects of their lives. Participants in this study used their concepts of physical activity behaviors to maintain their beliefs that they were able to be active and have some type of control over their health. This suggests that older adults in this study use physical activity to maintain their self-efficacy. Self-efficacy is often conceptualized in physical activity research as preceding physical activity behaviors, but less is known about ways older adults use physical activity self-efficacy as a behavior maintenance strategy (Warner & French, 2018). Findings from the qualitative arm of this study may provide clues as to

how physical activity behaviors maintain physical activity self-efficacy. Such clues may be the links between attitudes towards aging and physical activity self-efficacy. Older adults need a sense of control over their lives to maintain those behaviors that encourage successful aging (attitude towards aging). This need for control influences positive control beliefs about the norms (e.g., the normalcy of physical activity for older adults) and outcomes of physical activity behaviors (e.g., physical and cognitive benefits). This in turn encourages participants' beliefs they should and can be active (physical activity self-efficacy). Simply put, participant attitudes towards aging influence control beliefs which can then serve to increase older adult physical activity self-efficacy.

Previous research on older adult physical activity self-efficacy supports this relationship but has not explicitly investigated these concepts. Interestingly, a considerable amount of physical activity self-efficacy research uses behavioral control and self-efficacy interchangeably (Fishbein & Capella, 2006; French, 2015) or just recognizes the overlap that exists between these two constructs (Johnston, Dixon, Hart, Glidewell, Schröder, & Pollard, 2014). Attitudes towards aging could be the construct that clearly connects these behavior change constructs.

Technology Acceptance and Use

There are two important implications for technology use and acceptance theories from this study. Findings in this study confirm certain processes of Diffusion of Innovation Theory (Rogers, 2003). Older adult technology adoption strategies were consistent with the innovation characteristics of relative advantage and compatibility. Older adults in the present study adopted social media and other communication devices such as laptops and smartphones in order to be more engaged with their grandchildren.

Though these older adults would have preferred to not use technology devices for these communications, their ability to stay in touch with grandchildren was seen as a relative advantage to previous technology behaviors. Similarly, many participants discussed their resistance to overuse of certain devices but adopted these devices anyway if they contributed to their lives in a positive way. Here, compatibility plays a role where compatibility is when an innovation can adequately satisfy certain needs of a user and the user's skills are sufficient for effective use (Rogers, 2003).

Though these examples support Diffusion of Innovations Theory, one aspect of the present study challenges the adopter category construct. Older adults are frequently categorized as laggards to innovation adoption. Though Rogers (2003) admits that *laggard* is neutral term, the concept still carries a negative connotation to those who avoid innovation adoption. A limitation of this categorization is that it does not consider if the resistance or delay to an innovation adoption has positive motivations, as were observed in many of the older adults in the present study who purposely resisted technology adoption to avoid harms.

Limitations

Though this study has interesting findings, it also has its limitations. One of the limitations to the study was the sampling procedures for both the qualitative and quantitative arms. The qualitative recruitment procedures may not have encouraged a diverse pool of interview and focus group participants. Due to the nature of the research, those people who are comfortable with the topic of aging were probably more likely to participate in an interview or focus group. It is likely that qualitative participants had more positive attitudes towards aging and that people with more negative attitudes

towards aging were not likely to participate. Though the potential similarity of participants for the qualitative arm of this study provided extensive richness in data, they may have, at the same time, offered a limited number of perspectives on the topics of the study.

For the quantitative arm of the study, the convenience and snowball sampling procedures prevented the one significant result to be generalized to other populations. Also, the lack of technology adoption constructs used to develop a more effective survey instrument may have greatly weakened the usefulness of that instrument.

Future Research

Future research on the topics of aging, technology use and physical activity should investigate further some of the concepts explored in the present study. First, more research should investigate the sociocultural and historical perspectives of older towards communication technology. A deeper understanding of older adults' lifespan perspectives on modern-day technology could increase awareness about balanced and mindful technology habits applicable to diverse age populations. Research is still needed to clearly investigate the relationship between older adult attitudes towards aging and the technology behaviors of older adults. Future research on this relationship must consider technology acceptance model constructs like attitudinal beliefs as they relate to perceived usefulness in order to catalyze deeper insights into technology behaviors of older adults.

Lastly, more research is needed on the relationship between attitudes towards aging and physical activity self-efficacy. Research should develop further the relationship between control beliefs and self-efficacy as a function of attitudes toward aging. Such research could develop a conceptual framework based on previous research and then

develop new scales and measures that reflect the complexity of older adult perspectives and experiences of physical activity in their aging experiences.

Conclusion

The present study investigated the concepts of aging, technology use, and physical activity of older adults. The study attempted to contribute to academic research on the importance of older adult health behaviors, build relationships with local government, and engage with members of the community. This completed study is an example of the power of community partnerships and what is possible when communities pool resources and find mutual benefit in various pursuits.

Appendices

Appendix A: Recruitment Material

Appendix B: Interview/Focus Group Demographic Survey

Appendix C: Interview/Focus Group Guide

Appendix D: Survey Instrument

Appendix E: Focus Group/Interview Informed Consent

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Appendix A

Recruitment Material

THE UNIVERSITY of
NEW MEXICO

Older Adult Perspectives on Physical Activity, Aging and Technology

Seeking people that are 50 years of age or older to participate in a research study.

This study wants to look at how people feel about physical activity, aging and using technology.



To join the study, you may complete an online survey (~20 min)

Link to the online survey:

<https://www.surveymonkey.com/r/physical-activity-aging>

Participants will be entered into a drawing for a chance to win an Amazon Fire 7 computer tablet.

This study is being conducted by Andrew West, a PhD student at UNM.

Please call **505-585-1110** or email **andrewwest@unm.edu**

to get more information or to schedule an appointment.

Appendix B

Interview/Focus Group Demographic Survey

Thank you for taking the time to complete the interview or focus group and this brief demographic survey. You can refuse to answer any of the questions at any time. If you are interested in being contacted for follow up purposes and to know the results of this research study, please check the box(es) below and provide your contact information.

To thank you for your time, you will be entered into a drawing for a chance to win an Amazon Fire 7, a mobile computer tablet device. If you want to be eligible for this drawing, please check the box below and provide your contact information on the line below.

CHECK ALL THAT APPLY:

- I am interested to be contacted for follow up purposes.
- I am interested to receive the results of this study.
- I want to enter the drawing for a chance to win a new Amazon Fire 7 tablet.

If you selected any of the boxes above, please fill out the following information.

Name: _____

Email address: _____ **and/or**

Telephone Number: _____ **and/or**

Other contact information: _____

This information is not attached to your answers to this survey. The survey is confidential. This sheet will be removed immediately after you complete the survey. This sheet will be kept separate from your survey responses and stored in a locked box in the researcher's office.

Please turn the page to start the survey

1. What is your age?

(Please write your age here) _____

2. What is your gender?

- Male
- Female
- Other (Please Specify) _____

3. What term do you use to identify yourself?

- Asian/ Asian American
- Black/African-American
- Hispanic or Latino
- Native American
- Native Hawaiian/ Pacific Islander
- White/ Caucasian
- Other (please specify) _____

4. What is your marital status?

- Single, never married
- Domestic partnership
- Married
- Widowed
- Divorced
- Separated _____

5. What is your total household income?

- Less than \$10,000
- \$10,000 to \$19,999
- \$20,000 to \$29,999
- \$30,000 to \$39,999
- \$40,000 to \$49,999
- \$50,000 to \$59,999
- \$60,000 to \$69,999
- \$70,000 to \$79,999
- \$80,000 to \$89,999
- \$90,000 to \$99,999
- \$100,000 to \$109,999
- \$110,000 to \$119,999
- \$120,000 or more
- I would rather not say

6. What is the highest level of education you have achieved?

- Did not finish High School
- High School Diploma or GED
- Some College or Associates (2-year degree)
- Vocational Degree
- Bachelor's (4-yr degree)
- Graduate Degree
- Other (Please specify): _____

Appendix C

Interview/Focus Group Guide

Hello, My name is Andrew West and I am a researcher from the University of New Mexico. I am a health communication doctoral student and I am interested to hear your opinions and thoughts on physical activity, aging and technology. I have a list of questions prepared, but these are just to guide our conversation. This should be a friendly conversation between you and me.

First off, tell me a little about yourself. (small talk to get to know the interviewee)

I would like to get your thoughts about physical activity.

- 1. What does physical activity mean to you?**
- 2. What do you think influences your beliefs about physical activity?**
- 3. Do you think you are able to do physical activity? Why or why not?**
- 4. What makes you (or *what do you think would make you*) want to do physical activity?**
- 5. What do you think society in general thinks about physical activity and people your age?**
- 6. Do these expectations affect the types of physical activity that you do? How? Why or why not?**

Thank you. Since we have started to talk a little about aging, I would like to know some of your thoughts about aging.

- 7. What does aging mean to you?**
- 8. How would you describe your aging experiences?**
- 9. What is important to aging successfully?**
- 10. What are your suggestions on how to age well and recommendations for specific interventions to promote healthy aging?**
- 11. Do you ever visit or use services at a senior/multigenerational center? Why or why not?**
- 12. If so, what are your thoughts on these services?**

Thank you for your input. Before we finish, I would like to know a little about how you use technology.

- 13. When I talk about technology like cellphones, or smartphones and/or computers, what comes to mind?**
- 14. Do you use these technologies? Why or why not? How?**
- 15. Do you use these technologies for health purposes? How?**
- 16. Do you think they can contribute to healthy aging and health promotion? How? Why or why not?**

Thank you very much for your time and opinions. Do you have any other questions for me? Thank you again and enjoy the rest of your day

Appendix D

Survey Instrument

Physical Activity, Aging, and Technology Survey

Thank you for taking the time to complete this survey. If you are interested in being contacted for follow up purposes and to know the results of this research study, please check the box(es) below and provide your contact information.

To thank you for your time, you will be entered into a drawing for a chance to win an Amazon Fire 7, a mobile computer tablet device. If you want to be eligible for this drawing, please check the box below and provide your contact information on the line below.

CHECK ALL THAT APPLY:

- I am interested to be contacted for follow up purposes.
- I am interested to receive the results of this study.
- I want to enter the drawing for a chance to win a new Amazon Fire 7 tablet.

If you selected any of the boxes above, please fill out the following information.

Name: _____

Email address: _____ **and/or**

Telephone Number: _____ **and/or**

Other contact information: _____

This information is not attached to your answers to this survey. The survey is confidential. This sheet will be removed immediately after you complete the survey. This sheet will be kept separate from your survey responses and stored in a locked box in the researcher's office.

Please turn the page to start the survey

Section 1 – Demographics**1. What is your age?**

(Please write your age here) _____

2. What is your gender?

- Male
- Female
- Other (Please Specify) _____

3. What term do you use to identify yourself?

- Asian/ Asian American
- Black/African-American
- Hispanic or Latino
- Native American
- Native Hawaiian/ Pacific Islander
- White/ Caucasian
- Other (please specify) _____

4. What is your marital status?

- Single, never married
- Domestic partnership
- Married
- Widowed
- Divorced
- Separated _____

5. What is your total household income?

- Less than \$10,000
- \$10,000 to \$19,999
- \$20,000 to \$29,999
- \$30,000 to \$39,999
- \$40,000 to \$49,999
- \$50,000 to \$59,999
- \$60,000 to \$69,999
- \$70,000 to \$79,999
- \$80,000 to \$89,999
- \$90,000 to \$99,999
- \$100,000 to \$109,999
- \$110,000 to \$119,999
- \$120,000 or more
- I would rather not say

6. What is the highest level of education you have achieved?

- Did not finish High School
- High School Diploma or GED
- Some College or Associates (2-year degree)
- Vocational Degree
- Bachelor's (4-yr degree)
- Graduate Degree
- Other (Please specify): _____

Section 2 – Technology Use

7. Do you own or have access to a desktop or laptop computer?

Check ALL that apply:

Desktop Computer Laptop Computer No I don't know

8. Do you use the Internet (go on the web) on a desktop or laptop computer?

Yes No I don't know I do not use a computer

9. Do you use email on a desktop or laptop computer?

Yes No I don't know I do not use a computer

10. Where do you use the Internet or access your email?

Check ALL that apply:

Home Library At a neighbor's/family's home
 Senior/Multigenerational Center Other (Please specify) _____

11. Do you ever use the Internet to get information about health?

(Examples of this include looking for health information, scheduling a doctor's appointment or even tracking your exercise.)

Yes No I don't know

12. How often do you use the Internet on a computer?

Several times a day
 About once a day
 Several times a week
 About once a week
 I do not use the Internet

13. Do you own or have access to any mobile device like a cellphone, smartphone or tablet?

CHECK ALL THAT APPLY:

- A tablet (iPad, Samsung Galaxy Tab, Microsoft Surface, or Amazon Fire)
- A cellphone or mobile phone (Samsung, iPhone, Google Phone, etc.)
- I don't have a mobile phone or tablet (*skip to section 3 Opinions on Health*)

14. If you do not have a tablet, cellphone or mobile phone, are you interested to know how these mobile devices can be used?

- Yes No I don't know

15. If you have a cellphone or mobile phone, do you use text messaging?

- Yes No I don't know I don't have a cellphone

16. Some cellphones are called "smartphones" because of certain features they have. Smartphone features include programs/ buttons that let you use the Internet, check the weather, and even play games. Is your cellphone a smartphone such as an iPhone, Android, Blackberry or Windows phone?

- Yes No I don't know I don't have a cellphone

17. Do you access the Internet or check email on a cellphone, smartphone, tablet or other mobile handheld device?

- Yes No I don't know I don't have a mobile phone or tablet

18. If you do use the Internet on a cellphone, smartphone, tablet or other mobile handheld device, how often do you use the Internet on any of these devices?

- Several times a day
- About once a day
- Several times a week
- About once a week
- I do not use the Internet

19. Do you ever use apps on a smartphone or tablet?

(Examples of apps include programs that check weather, listen to music, use Facebook or Instagram and play games).

Yes No I don't know I don't have a mobile phone or tablet

20. Do you ever use health apps?

Examples of this include keeping track of medications, tracking exercise, checking your heart rate or looking for health information

Yes No I don't know I don't have a mobile phone or tablet

21. Do you use any technology, such as computers, tablets, smartphones or the Internet for health?

Yes No I don't know

22. If you do use any of these technologies for health, which of the following things do you use technology for?

CHECK ALL THAT APPLY

- Access health information
- Learn about or track activity/exercise
- Track my diet/ what I eat
- Track a health measure like blood pressure, blood sugar, etc.
- Check my medical records/labs
- Keep a diary or log of my symptoms
- Help me stop a habit, like quitting smoking
- Chat with my doctor/s or another health professional
- Remind me to take my medication
- Other reasons

Please Specify:

Section 2 continued.

These questions ask about some of your ideas of technology use.

23. Please check the one box to the right of the statement that best corresponds to how you feel about the statement. If you are not sure, go ahead and check the box that you think **BEST** matches your feelings.

	Totally Disagree	Disagree	Agree	Totally Agree
<u>A Laptop or desktop computer can be useful for me</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>A tablet can be useful for me</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>A smartphone with apps can be useful for me</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>When I have problems with technology, I have someone who can help me.</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>When I need help looking for health information on a computer, tablet or smartphone, I have someone who can help me</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Section 3 – Opinion on Health

This question asks about your health.

24. Please check the one box to the right of the statement that best corresponds to how you feel about the statement. If you are not sure, go ahead and check the box that you think **BEST** matches your feelings.

	Excellent	Very Good	Good	Fair	Poor
In general you would say your health is	<input type="checkbox"/>				

Section 4 – Opinions on Aging

This section asks questions about what you expect about aging.

25. Please check the one box to the right of the statement that best corresponds to how you feel about the statement. If you are not sure, go ahead and check the box that you think **BEST** matches your feelings.

	Totally Disagree	Disagree	Agree	Totally Agree
“I have as much pep as last year”	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
“Things keep getting worse as I get older”	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
“As I get older, I am less useful”	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
“As I get older, things are better than I thought they would be”	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
“I am as happy now as when I was younger”	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Section 4 continued.

- 26.** After each word or phrase, please tell me the number from 0-6 that best shows how well the word matches your image or picture of old people in general, with 0 being furthest from what you think and 6 being closest to what you think.

	Far from what you think of old people				Close to what you think of old people			
active	0	1	2	3	4	5	6	
senile	0	1	2	3	4	5	6	
will to live	0	1	2	3	4	5	6	
family oriented	0	1	2	3	4	5	6	
wise	0	1	2	3	4	5	6	
wrinkled	0	1	2	3	4	5	6	
positive outlook	0	1	2	3	4	5	6	
helpless	0	1	2	3	4	5	6	
given up	0	1	2	3	4	5	6	
	Far from what you think of old people				Close to what you think of old people			
sick	0	1	2	3	4	5	6	
well groomed	0	1	2	3	4	5	6	
full of life	0	1	2	3	4	5	6	
walks slowly	0	1	2	3	4	5	6	
capable	0	1	2	3	4	5	6	
grumpy	0	1	2	3	4	5	6	
dying	0	1	2	3	4	5	6	
lonely	0	1	2	3	4	5	6	
healthy	0	1	2	3	4	5	6	

Section 5 – Physical Activity

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives.

The questions will ask you about the time you spent being physically active in the last 7 days.

Please answer each question even if you do not consider yourself to be an active person.

To describe the intensity of the physical activity, two terms (Moderate and Vigorous) are used:

- **Moderate activities** refer to activities that take moderate physical effort and make you breathe somewhat harder than normal.
- **Vigorous physical activities** refer to activities that take hard physical effort and make you breathe much harder than normal.

27. Think about the time you spent walking in the last 7 days. This includes at work and at home, walking to travel from place to place, and any other walking that you might do solely for recreation, sport, exercise, or leisure.

During the last 7 days, did you walk for at least 10 minutes at a time?

Yes No *(if you answered no, skip to question 3).*

How many days did you walk for at least 10 minutes at a time?

_____ Days

How much time did you usually spend walking on one of those days?

_____ hours _____ minutes

28. Think about the time you spent on moderate physical activities in the last 7 days. Examples of moderate physical activities are gardening, cleaning, bicycling at a regular pace, swimming, dancing or other fitness activities.

During the last 7 days did you do moderate physical activities for at least 10 minutes at a time? Do not include walking.

Yes No *(if you answered no, skip to question 4).*

If you answered yes, on how many days did you do moderate physical activities for at least 10 minutes at a time? Do not include walking.

_____ Days

If you answered yes, how much time did you usually spend doing moderate physical activities on one of those days?

____ hours ____ minutes

29. Think about the time you spent doing vigorous physical activities during the last 7 days. Examples of vigorous physical activities are heavy lifting, heavier garden or construction work, chopping woods, aerobics, jogging/running, fast dancing or fast bicycling.

During the last 7 days did you do vigorous physical activity for at least 10 minutes at a time?

Yes No *(if you answered no, skip to the end).*

If you answered yes, on how many days did you do vigorous physical activities for at least 10 minutes at a time?

_____ Days

If you answered yes, how much time did you usually spend doing vigorous physical activities on one of those days?

____ hours ____ minutes

Section 6 – Physical Activity / Exercise Beliefs

30.

Please check the one box to the right of the statement that best corresponds to how you feel about the statement. If you are not sure, go ahead and check the box that you think **BEST** matches your feelings.

How sure are you that you will do each of the following?

	Very Sure	Pretty Sure	A Little Sure	Not at All Sure
Exercise Regularly (3 times a week for 20 minutes each)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Exercise when you are feeling tired	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Exercise when you are under pressure to get things done	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Exercise when you are feeling down or depressed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Exercise when you have too much work to do at home	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Exercise when there are other more interesting things to do	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Exercise when your family or friends do not offer any kind of support	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Exercise when you don't really feel like it	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Exercise when you are away from home (e.g. traveling, visiting, in vacation)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

End of Survey. Thank you for your participation!

Appendix E

Focus Group/Interview Informed Consent

Older Adult Perspectives on Physical Activity, Aging and Technology Use Informed Consent for Focus Groups/Interviews

4/2/2018

Andrew West, from the Department of Communication and Journalism at the University of New Mexico is conducting a research study. The purpose of the research is to understand how older adults in the community think about their health, physical activity, aging and technology. You are being asked to participate in this study because you are 50 years of age or older.

Your participation will involve answering questions and discussing physical activity and aging. The interview should take about 45 minutes to complete. The interview includes questions such as *How would you define successful aging? And what type of activities do you do?* Involvement in the study is voluntary, and you may choose not to participate. You can refuse to answer any of the questions at any time. You may leave the interview at anytime. The interview will also entail a brief demographic survey. This survey will ask you for your contact information and whether you are willing to be contacted for follow up purposes. Your contact information will be immediately separated from this survey and stored in a locked file box. Your survey responses are confidential and will only be associated with the de-identified transcripts of the interview. Paper copies of the survey will be stored in a separate locked file box away from participant contact sheets.

There are no known risks in this study, but some individuals may experience discomfort discussing some topics (e.g. aging) or loss of privacy when answering questions. This interview will be audio recorded and all names and identifiable information will be deleted in the transcripts of this interview and replaced with a participant identification code. The researcher will keep a separate document that records participant names and identification numbers. This document will be kept separate from interview transcripts. Recordings will be destroyed after transcription and de-identified copies of these transcripts along with the participant list will be stored on a password locked computer.

To compensate you for your time and participation, you will be entered into a drawing for a chance to win an Amazon Fire 7 mobile computer tablet. You have an estimated 1/550 chance of winning this tablet.

The findings from this project will provide information on how to improve health services for older adults in the community. If published, results will be presented in summary form only.

You can withdraw your participation responses and have them destroyed and deleted from this study up until data collection has completed, after which your responses cannot be removed.

If you have any questions about this research project, please feel free to contact Andrew West at 505-585-1110 or email him at andrewwest@unm.edu. If you have questions regarding your rights as a research subject, or about what you should do in case of any harm to you, or if you want to obtain information or offer input you may call the UNM Office of the IRB (OIRB) at (505) 277-2644 or irb.unm.edu.

By participating in this interview, you will be agreeing to participate in the above described research study.

Appendix F

Survey Informed Consent

Older Adult Perspectives on Physical Activity, Aging and Technology Use Informed Consent for Survey

4/2/2018

Andrew West, from the Department of Communication and Journalism at the University of New Mexico is conducting a research study. The purpose of the research is to understand how older adults in the community think about their health, physical activity, aging, and technology. You are being asked to participate in this study because you are 50 years of age or older.

Your participation will involve answering the questions of this survey. The survey should take about 20 minutes to complete. The survey includes questions such as *how do you rate your health?* and *how often do you exercise?* Your involvement in the study is voluntary, and you may choose not to participate. You can refuse to answer any of the questions at any time.

There are no names or contact information associated with your responses. Your survey responses are completely confidential. Your survey responses will be given a participant identification code known only to the researcher and names and contact information will be removed from survey responses. The researcher will have a separate document that lists participant names, contact information and participant identification codes. This document will be kept separate from survey responses. For surveys completed online, responses will be saved on a password and encrypted protected website during data collection. After data collection, all survey responses will be transferred to a password protected computer and online survey responses will be deleted from the survey website.

For online survey responses only, please note the online survey is hosted by Survey Monkey, which is a web survey company located in the USA. All responses to the survey will be stored and accessed in the USA. This company is subject to U.S. Laws, in particular, to the US Patriot Act/Domestic Security Enhancement Act allowing authorities to access records with your responses stored and accessed in the USA. The security and privacy policy for Survey Monkey can be viewed at: [surveymonkey.com/mp/policy/privacy-policy/](https://www.surveymonkey.com/mp/policy/privacy-policy/).

To compensate you for your time and participation, you will be entered into a drawing for a chance to win an Amazon Fire 7 mobile computer tablet. You have a 1/550 chance of winning this tablet.

The findings from this project will provide information on how to improve health services for older adults in the community. If published, results will be presented in summary form only.

You can withdraw your participation responses and have them destroyed and deleted from this study up until data collection has completed, after which your responses cannot be removed.

If you have any questions about this research project, please feel free to call Andrew West at 505-585-1110. If you have questions regarding your rights as a research subject, or about what you should do in case of any harm to you, or if you want to obtain information or offer input you may call the UNM Office of the IRB (OIRB) at (505) 277-2644 or irb.unm.edu.

By completing this survey and returning it to the researcher by hand, you will be agreeing to participate in the above described research study.

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