An Ecological Approach to Understanding Older Adults' Experiences with Active Transportation in Washington, DC

by Gregory S. Maxson

B.Sc. in Exercise Science, August 2014, Brigham Young University
M.P.H. in Global Health, January 2017, The George Washington University

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Dissertation directed by

Melissa Napolitano
Professor of Prevention and Community Health & Exercise and Nutrition Sciences

The Milken Institute School of Public Health of The George Washington University certifies that Gregory S. Maxson has passed the Final Examination for the degree of Doctor of Public Health as of March 11, 2025. This is the final and approved form of the dissertation.

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Gregory S. Maxson

Dissertation Research Committee:

Melissa Napolitano, Professor of Prevention and Community Health & Exercise and Nutrition Sciences, Dissertation Director

Loretta DiPietro, Professor of Exercise Science and Nutrition Sciences, Committee Member

Sandra Vanderbilt, Research Assistant Professor of Educational Leadership, Committee Member

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Abstract of Dissertation

An Ecological Approach to Understanding Older Adults' Experiences with Active Transportation in Washington, DC

Background: Physical activity is critical for older adults' health and wellbeing, yet many do not meet recommended activity levels. This presents a significant public health challenge for many communities. Active transportation—human-powered modes of travel, such as walking, bicycling, and rolling—is an acceptable and feasible form of physical activity for many older adults. This presents a valuable opportunity for communities to support physical activity behavior in this group. However, the needs of older adults are unique from other groups and warrant exploration to better understand the range of factors that influence their active transportation decisions and experiences.

Aims and Methods: The conceptual framework for this research is based on an ecological model of behavior, which assumes factors across multiple levels of influence contribute to active transportation behavior. These levels include the policy environment, behavior settings, social-cultural environment, natural environment, perceived environment, and intrapersonal factors.

The first aim was to describe the policy environment around active transportation and physical activity within Washington, DC, understand how it addresses the needs of aging and older adults, and inform policymakers of opportunities to support age-friendly active transportation. A systematic expert opinion and policy review identified best practices and policy recommendations for "age-friendly active transportation." A content analysis of strategic planning and policy documents from DC was conducted to review and describe the existing policy landscape in relation to the topic.

The second aim was to understand how intrapersonal, social-cultural, and other environmental factors influence older adults' active transportation decisions and experiences in Washington, DC. Walking interviews were conducted with 15 older adults residing in Ward 5 of Washington, DC to explore these factors. Data was collected from interviews, observations, and photographs. Thematic analysis was performed using a combined approach of deductive and inductive coding to derive overarching themes and subthemes.

Results: For Aim 1, the systematic expert opinion and policy review identified 101 policy recommendations for supporting "age-friendly active transportation." Using the recommendations as a benchmark, review of the policy environment revealed significant alignment between recommended policies and existing policies and strategies in DC. For Aim 2, 10 overarching themes and 30 subthemes of factors were identified that influenced older adults' decisions and experiences with active transportation. Themes included: safety, pedestrian and bicycling infrastructure, social environment, nearby destinations, appearance and attractiveness, neighborhood environment and characteristics, public transit, individual characteristics, community policy and responsibility, and natural environment. Subthemes were found to correspond to ecological levels of influence, reinforcing the relevance of the conceptual framework.

Conclusion: This dissertation emphasizes the opportunity to promote active transportation as a strategy for improving physical activity and health outcomes in older adult populations. Findings provide potential strategies for integrating age-friendly considerations within active transportation systems. This research also adds to the literature of factors that shape older adults' perceptions and experiences with active transportation. Additional research should continue to explore factors in different contexts and examine the strength of their associations

with active transportation behavior. As a whole, this dissertation reinforces the multi-layered approaches needed to support active transportation systems that are safe, comfortable, and accessible for older adults.

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Glossary of Terms

Active transportation: a form of physical activity defined any human-powered form of transportation or travel, though most often considered within the context of walking or bicycling (Centers for Disease Control and Prevention, 2022)

Age-friendly active transportation: active transportation policies and interventions that integrate accommodations for and specifically address the needs of older adults

Age-friendly community: communities which encourage healthy and active aging by adapting policies, structures, and services in ways that are more accessible and inclusive of the needs of older adults (World Health Organization, 2007)

Aging in place: the ability to maintain independence, mobility, autonomy, and social networks within older adults' preferred homes and environments, usually accomplished through adaptations of homes and community environments that address functional abilities or limitations (Centers for Disease Control and Prevention, 2009; Wiles et al., 2012)

Built environment: physical, human-made infrastructure, such as roads, houses, and buildings; often described within the context of neighborhoods and communities

Older adults: for the purposes of this research—and by definitions used for physical activity guidelines within the United States—defined as individuals ages 65 and older (U.S. Department of Health and Human Services, 2018, 2023)

Chapter 1: Background

Introduction

Regular physical activity helps to prevent, delay, and manage a variety of non-communicable diseases (NCDs), which include coronary heart disease, stroke, diabetes, and certain forms of cancer (World Health Organization, 2018). It is also protective against metabolic risk factors for disease, such as hypertension and unhealthy weight (U.S. Department of Health and Human Services, 2018; World Health Organization, 2021). Beyond physiological and metabolic benefits, regular physical activity is also associated with improved cognitive function, emotional health, and social well-being, which can be of particular benefit for older adults—defined here as individuals aged 65 years and older (Langhammer et al., 2018; Suryadinata et al., 2020; U.S. Department of Health and Human Services, 2018). Further, physical activity can support physical functioning and mobility, which are important for healthy aging and linked to overall quality of life (Izquierdo et al., 2021; U.S. Department of Health and Human Services, 2023).

As communities and health systems explore strategies to enable and promote physical activity, particularly among older adult populations, an important opportunity may be through active transportation. Active transportation is often defined as any human-powered form of transportation or travel (Centers for Disease Control and Prevention, 2022). Though it is most often defined within the context of walking or bicycling, other examples of active transport may occur using wheelchairs or walking mobility devices (U.S. Department of Health and Human Services, 2023). In contrast to planned exercise or recreational forms of physical activity, active transportation is typically incidental or destination-oriented, i.e., travel to or from work, school, or grocery stores (Cerin et al., 2017; Klicnik & Dogra, 2019). The use of public transportation is

also closely linked to active transportation, as it requires individuals to actively travel to, from, or between transit stops to their ultimate destination (Herbolsheimer et al., 2020).

Many forms of physical activity may be perceived by older adults as unfeasible or too intensive to engage in; however, active transportation is often considered a more accessible and inexpensive form of physical activity (Mertens et al., 2019; Nguyen & Mertens, 2021). Walking for transportation, in particular, is widely considered an acceptable and feasible activity to integrate within older adults' daily routines (Van Cauwenberg et al., 2013). While younger populations might engage in active modes of transportation for commutes to school or work, active transportation for older adult populations might include walking or biking for daily errands, medical appointments, volunteer and social commitments, etc. (Klicnik & Dogra, 2019). Older adult populations are also estimated to benefit more from shifts to active transportation than younger populations, partly due to their increased risk for development of NCDs and declines in mobility (Mueller et al., 2015). Studies have also demonstrated that active transportation, as a form of physical activity, positively contributes to overall activity levels in older adults, which can promote healthy aging while also reducing the prevalence of illness and loss of mobility (Cerin et al., 2017; Webber et al., 2010).

Utilization of active transportation, however, depends on a number of influences that may range from individual-level perceptions and barriers to various aspects of neighborhood environments and the impact of policy environments within communities. For older adults, constraints to engaging in active transportation may be unique from other age groups (Klicnik & Dogra, 2019; U.S. Department of Health and Human Services, 2023). Constraints often include low self-efficacy, concerns for personal safety, and a lack of destinations within proximity of their residences, while opportunities for social connectivity may help to facilitate the use of

active modes of transport (Brüchert et al., 2020; Cerin et al., 2017; Hoehner et al., 2005; Van Cauwenberg, Van Holle, et al., 2012). Further, these and other factors have been found to interact with each other to either exacerbate or mitigate barriers to utilizing active transportation (Glanz et al., 2015; Sallis et al., 2006). Therefore, promotion of active transportation as a means of improving physical activity levels among older adults must attempt to understand their unique perceptions and experiences in order to effectively support their needs.

Public Health Issue

Physical activity in the United States (US) tends to decline as people age, greatly contributing to the likelihood of reduced mobility, the development or exacerbation of NCDs and cognitive disorders, and low physiologic reserves, i.e., the ability to adapt or recover from injury, illness, and other stressors (Anderson & Durstine, 2019; DiPietro, 2015; Keadle et al., 2016; Suryadinata et al., 2020; Thompson & Chen, 2023). Data from the National Health Interview Survey indicates less than 15% of older adults report meeting federal physical activity recommendations (at least 150 minutes of moderate or 75 minutes of vigorous physical activity and two days of muscle strengthening activities each week), and as older adults continue to age levels of physical activity often continue to decrease (Centers for Disease Control and Prevention, n.d.; U.S. Department of Health and Human Services, 2023).

As of 2019, Medical Expenditure Panel Survey data estimated that while older adults comprise 17% of the general population, they account for 35% of total health expenditures within the US—largely due to chronic illness (Ortaliza et al., 2021). Based on population estimates from the US Census Bureau, this population is also one of the fastest growing segments of the general population and is expected to grow to 22% of the general population by

2040, effectively doubling in size during the 40-year period between 2000 and 2040 (2021 Profile of Older Americans, 2022).

These trends in physical activity and demographic shifts also appear to be consistent within Washington, District of Columbia (DC). Nearly 27% of older adults in DC report doing no physical activity or exercise other than what may be required in their regular job, which is a significantly higher rate than other age groups (United Health Foundation, 2023). DC also expects a significant shift in age demographics in coming years: as of 2024, the population of older adults aged 65 and older was estimated to be nearly 15% of the general population (totaling just over 100,000 persons), but by 2030 is expected to grow to more than 20% of the general population (totaling nearly 104,000 persons) (DC Health Matters, 2024; *The State of Older Adults in the District of Columbia*, 2020).

As aging adult populations continue to grow, there are significant health and economic imperatives for communities to engage in efforts that may support prolonged health, physical functioning and mobility, independence, and quality of life (Keadle et al., 2016). It is important for communities to explore and invest in strategies—such as active transportation efforts—which may help to reduce the burdens of disease and disability by leveraging the multiplicative benefits of physical activity.

Research Setting

Within recent decades, Washington, DC, has developed and implemented several policy frameworks and infrastructural investments in support of active modes of transportation. Examples include multiple iterations of a Bicycle Master Plan to guide the development of safe and convenient bicycling infrastructure and a Pedestrian Master Plan, first developed in 2009, which provided guidelines, recommendations, and metrics to support safe and accessible

pedestrian networks throughout the city (District of Columbia Bicycle Advisory Council & District of Columbia Department of Transportation, 2005; District of Columbia Department of Transportation, 2009). Current strategic plans and policy frameworks across local transportation, urban planning, and health agencies in DC—sectors were identified as being particularly important for active transportation efforts (Giles-Corti et al., 2016)—now include *moveDC*—a long-range transportation plan for the city—, the *Comprehensive Plan for the National Capital*—the city's current plan for urban design and land use—, and the Department of Health's *Health Systems Plan* (Department of Health, 2017; District of Columbia Department of Transportation, 2021; District of Columbia Office of Planning, 2021).

In 2012, Washington, DC also joined the World Health Organization (WHO) Global Network for Age-Friendly Cities and Communities in recognition of the need to support a growing older adult population (Age-Friendly DC, n.d.). This network supports cities in developing age-friendly communities, i.e., communities that enable active and healthy aging by implementing policy frameworks and adapting structures, services, and environments in ways that are inclusive and accessible to older adults (World Health Organization, 2007). The city's first Age-Friendly Strategic Plan was implemented in 2015, a second iteration was implemented in 2018, and in 2023, efforts were underway to evaluate progress and prepare for the next five-year plan (Age-Friendly DC, n.d.; G. Kohn, personal communication, November 4, 2022).

Review of these various strategic planning and policy documents indicated that there are many elements of the policy environment in Washington, DC that align with evidence-based policy recommendations to develop supportive built environments for active transportation and physical activity behavior, such as the adoption of Complete Streets policies for road design and mixed land-use policies within urban planning and development (District of Columbia

Department of Transportation, 2021; District of Columbia Office of Planning, 2021; Young et al., 2020). The *Age-Friendly DC 2023 Strategic Plan* also includes certain priorities that may support active transportation for older adults, such as ensuring transit stops are accessibility-compliant and committing funding to improve the safety of pedestrian and bicycle infrastructure (Age-Friendly DC 2023 Strategic Plan, 2018). However, it is less clear how active transportation policies and strategies within the current policy environment in DC—specifically within the transportation, urban planning, and health sectors—are aligned with concurrent efforts to promote an age-friendly community. Similarly, the degree to which the current active transportation policy environment integrates other evidence-based considerations and accommodations for older adults has not been studied. This may be a reflection that there is minimal guidance available from policy organizations or published literature for the development and implementation of "age-friendly active transportation" policies and practices, i.e., active transportation policies and interventions that integrate accommodations for and specifically address the needs of older adults (Klicnik & Dogra, 2019). Additionally, in order to better inform future policies and strategies within communities that promote active transportation among older adult populations, it is important to engage with them to strengthen understanding of their own perspectives, experiences, and desires (Lin & Cui, 2021; World Health Organization, 2023).

To further explore this topic and address these needs, the setting for this research was based within the context of Washington, DC. Research questions around policies and strategic efforts that aim to develop the built environment and support active transportation focused on actions that take place at a city-wide level. However, given the size of the city and its population, research questions that center on the experiences of older adults focused on a research setting

within Ward 5 of Washington, DC—one of eight geographic sections of the city. This study setting within Ward 5 was intended to approximate a fairly-representative sampling pool of the older adult population of DC, as well as represent a built environment that is diverse in land use and development. (See Chapter 3, "Study 2 Methods" for more information about this setting.)

Research Topic and Purpose

The purpose of this research is to apply an ecological perspective to understand how older adults in Washington, DC perceive and experience active transportation through qualitative research methods. To meet this purpose, two primary study aims are: 1) to describe the policy environment around active transportation and physical activity within Washington, DC, understand how it addresses the needs of aging and older adults, and inform policymakers of opportunities to support age-friendly active transportation (Study Aim 1), and 2) to understand how intrapersonal, social-cultural, and environmental factors influence older adults' active transportation decisions in Washington, DC (Study Aim 2). Given a lack of comprehensive guidelines for age-friendly active transportation from policy organizations and published literature, the research also intends to conduct a systematic search of best available evidence and policy recommendations to provide a benchmark against which to analyze and describe the current policy environment.

Key questions that guided Study Aim 1 include:

1. What are the policies and strategies outlined within Washington, DC's current citywide health, transportation, and urban design strategic plans that reflect active transportation within the environment for older adults?
2. How do these policies and strategies align with active transportation-related elements of the Age-Friendly DC 2023 Strategic Plan?

3. How do these policies and strategies align with current recommendations and best available evidence for community-level, age-friendly active transportation policies and interventions?

Research questions that guided Study Aim 2 are:

1. What are the intrapersonal, social-cultural, and environmental factors that older adults who live in Ward 5 of Washington, DC perceive and experience in relation to active transportation?
2. How do these factors and perceptions interact to influence older adults' active transportation behavior?

This research highlights current policy and strategic approaches to support active transportation for older adults in Washington, DC, and engaged directly with older adults as an important strategy for identifying potential gaps between these efforts and their actual perceptions and experiences with active transport within their communities (Lin & Cui, 2021; World Health Organization, 2023). It also contributes to the general literature on the experiences and particular needs of older adults when engaging in active transportation. Findings from this research provide additional insights for future research, as well as additional policy directions for policymakers to promote active transport and physical activity within this population.

Ultimately, these research objectives can help communities respond to the needs of aging populations by providing additional evidence and guidance for the promotion of age-friendly active transportation as an important strategy for achieving the myriad benefits associated with increased physical activity levels among older adults. These benefits are known to include reduced risk for the development of many NCDs including cardiovascular disease, hypertension, type 2 diabetes, and various forms of cancer; positive mental and cognitive outcomes related to

dementia risk, depression, anxiety, sleep, and overall quality of life; improved mobility and physical functioning (U.S. Department of Health and Human Services, 2023). These outcomes contribute not only to healthy aging and quality of life for older adults but also contribute to the health and sustainability of local communities and economies as a whole (World Health Organization, 2007).

Theoretical Framework

Historically, physical activity research and interventions have often emphasized individual behavioral and social influences as dominant theories for behavior change. In recent years, increasing attention has been given to ecological models to explain behavior, which are characterized by the assumption that a range of factors across multiple levels exert influence on behavior (Sallis et al., 2006). Levels of influence may include individual, social, cultural, environmental, and policy. In addition to the influence on behavior that may come from each level, a core principle of ecological perspectives is that there may be interactions between factors across different levels of influence (Glanz et al., 2015; Sallis et al., 2006). Ecological models have been cited as being especially useful for explaining physical activity behavior, including physical activity that may occur through active transportation (Sallis et al., 2006).

Individual and environmental constraints to physical activity behavior among older adult populations have been studied previously, as have their associations with active transportation (Cerin et al., 2017; Nguyen & Mertens, 2021). However, little research to date has been situated with a deep understanding of the policy landscape and context within communities as it relates to active transportation. Additionally, relatively few studies have used qualitative approaches to understand the unique perspectives and challenges of older adults when engaging in active

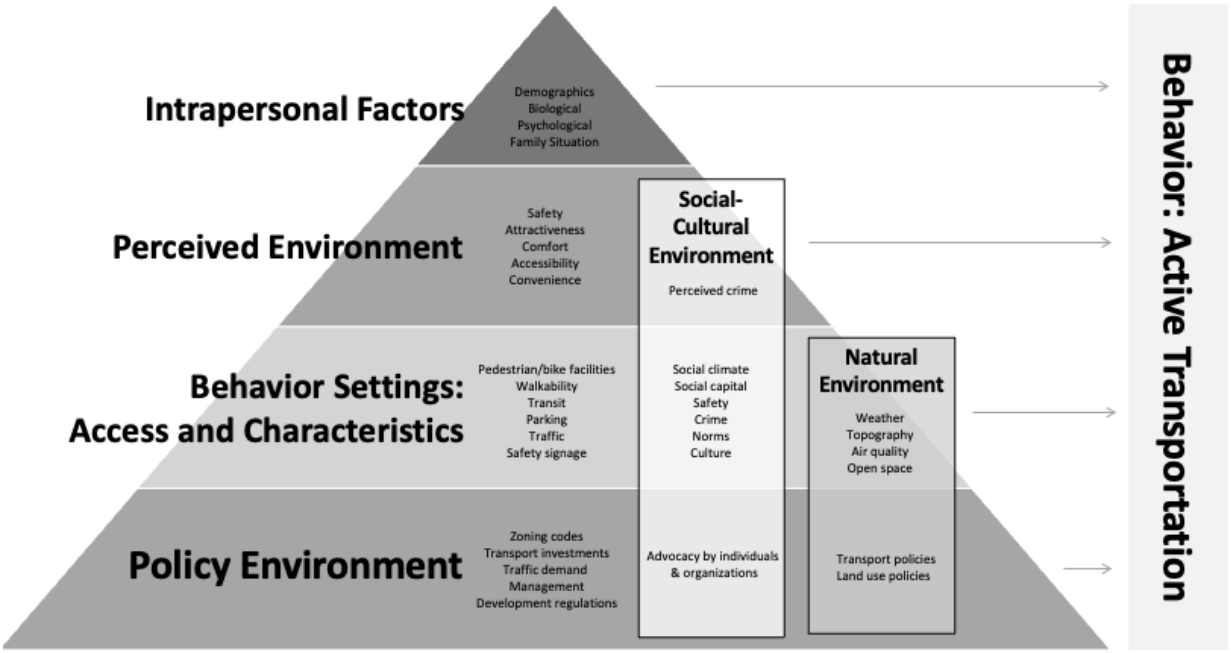
transportation (Klicnik & Dogra, 2019). Both of these observations contributed to the basis and rationale of this dissertation's research and study design.

The Ecological Model of Four Domains of Active Living, presented by Sallis et al. (2006) helps to guide this research (see Appendix A). The model highlights active transportation as one of several domains of active living behavior and illustrates multiple levels of influence for physical activity, including intrapersonal and interpersonal influences as well as behavior settings and policy environments as external levels of influence on behavior. As explained by Sallis et al. (2006), intrapersonal influences may include biological or psychological factors and interpersonal influences could be cultural or social variables. Behavior settings are the neighborhood and built environments, which may include factors such as the walkability and proximity of desirable destinations to where people live and work. Lastly, policy environments include mechanisms that impact the built neighborhood and community environments, often through zoning codes, infrastructure development regulations, traffic policies, public transportation, etc. Additional environmental levels of influence, which are defined as the social-cultural environment (crime, social climate, or culture) and natural environment (weather, topography, open spaces) can be considered across multiple levels (Sallis et al., 2006).

While The Ecological Model of Four Domains of Active Living outlines multiple aspects of active living behavior, this dissertation focuses specifically on active transportation behavior as the primary behavior of interest. A review of literature indicated that factors within each layer of influence contribute in different ways to older adults' perceptions and experiences with active transportation (see Chapter 2: Literature Review). Therefore, for the purposes of this research an adapted version of the model was developed to more clearly highlight elements of the model that are linked to active transportation behavior among older adults (see Figure 1).

Figure 1

An Adapted Ecological Model of Active Transportation for Older Adults, adapted from The Ecological Model of Four Domains of Active Living



Note. Adapted from The Ecological Model of Four Domains of Active Living outlined in "An Ecological Approach to Creating Active Living Communities," by J.F. Sallis, R.B. Cervero, W. Ascher, K.A. Henderson, M.K. Kraft, & J. Kerr, 2006, *Annual Review of Public Health*, *27*(1), 297–322 (https://doi.org/10.1146/annurev.publhealth.27.021405.102100). Copyright 2006 by Annual Reviews; and the Social Ecology Model presented in "The Built Environment and Physical Activity Connection," by M. Fenton, 2015 (markfenton.com).

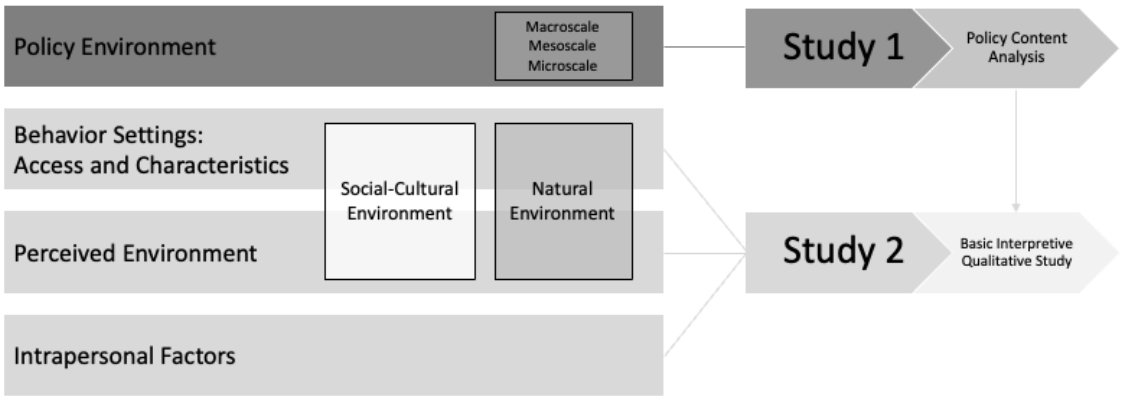
While the ecological layers and relevant factors outlined within the adapted model are largely informed by The Ecological Model of Four Domains of Active Living, its structure is also adapted from a schematic of the social ecological model presented by Mark Fenton (Fenton,

2015). This structure reorganizes ecological layers into a pyramidal structure in a way that provides visual emphasis of the potential impact of the different layers of the model. For example, the policy environment and behavior settings are presented as the base layers of the pyramid, indicating the strength of their impact as powerful determinants of active transportation behavior within communities.

The layers outlined within this model serve to inform different components of the research and study design (see Figure 2). In order to explore a holistic perspective of the factors that influence older adults' experiences with active transportation behavior within the research setting, each level of influence was considered across the two studies. These ecological layers—the policy environment, behavior settings, perceived environment, social-cultural environment, natural environment, and intrapersonal factors—help to guide investigation of the policy landscape around active transportation wherein the study population resides and informed primary domains of inquiry to explore older adults' perspectives and experiences related to active transport behavior. These layers of influence also provide a framework for analyzing data, categorizing themes, and reporting on study results.

Figure 2

Visual Representation of Links Between Theoretical Constructs and Studies



Summary of Methodology

This dissertation applied qualitative methods of data collection and analysis to examine the research questions posed and has been guided by the theoretical framework introduced previously. The research questions corresponding to **Study Aim 1** employed a content analysis approach to review a selection of citywide policy frameworks and strategic plans implemented by the Government of the District of Columbia. The analysis identified policies and strategies to modify and create a built environment that supports active modes of transportation in DC, particularly for the older adult population. This analysis was preceded by a systematic expert opinion and policy review that created a benchmark of best available evidence and current policy recommendations for community-level interventions that support age-friendly active transportation.

Methods for **Study Aim 2** utilized a basic interpretive qualitative study design and conducted walking interviews with older adults to explore older adults' experiences and perceptions across different levels of influence—including intrapersonal, social-cultural, and environmental levels—in relation to active transportation behavior. Findings from Study 1—particularly in relation to environmental influences, i.e., specific aspects of the built environment that are addressed within citywide policies and strategies that support active transport—were used to help inform the interview guide and protocols for qualitative interviews and observations. Data collected through interviewing and observation methods were analyzed using thematic analysis approaches. The theoretical framework guiding this research also provided a coding and analysis framework for the identification of predetermined codes.

Chapter 2: Literature Review

Introduction

As many communities—including Washington, DC—experience the public health and economic challenges of population aging, the promotion of safe, accessible, and convenient modes of active transportation for older adults is an important strategy for leveraging the benefits of increased levels of physical activity (Cerin et al., 2017; Keadle et al., 2016).

The following sections describe in greater detail recent data and estimates surrounding demographic trends within aging populations, estimated levels of physical activity within the older adult population, and the current state of efforts to develop age-friendly communities that incorporate age-friendly active transportation.

As previously mentioned, this research centers itself around the ecological model introduced in Chapter 1. This review also summarizes current literature about various factors that influence active transportation behavior across different ecological layers. The published literature that focuses on active transportation behavior specifically among older adult populations is still limited, though the range of factors that influence this behavior among younger or more generalized populations have been studied more extensively. While several studies have identified and described certain factors that appear to be unique among older adults, many of the factors that influence active transportation behavior more broadly are also highlighted with the assumption that they may be largely relevant to older populations as well.

Demographic Shifts

The general population in the United States is experiencing a major demographic shift, with the number of older adults outpacing the number of children in the country for the first time in its history (Vespa, 2018). Adults aged 65 and older currently represent 16% of the United

States' total population—more than 1 in 6 people (United States Census Bureau, 2021). Estimates from the United States Census Bureau project that by 2030, older adults will comprise 21% (more than one in five Americans) of the total population, and by 2060, nearly one in four Americans will be 65 years and older (McAuliff et al., 2014).

These demographic shifts towards growing aging populations, coupled with overall increases in life expectancy and a higher prevalence of chronic diseases among older adults compared to other age groups imply enormous potential healthcare costs and burdens unless substantial investments and efforts are made to mitigate the incidence and severity of disease (Langhammer et al., 2018; Mertens et al., 2019). The need for these investments and efforts, in response to the acceleration of population aging, has established a foundation for the development of the research. It also underscores the value and importance of this research, which seeks to explore certain opportunities to promote physical activity through active transportation as a critical intervention for sustaining the health of older adult populations and to contribute findings and recommendations for future policy and research.

Physical Activity in Older Adult Populations

The multiple benefits of physical activity are well-documented and include reduced risk of multiple chronic diseases, such as cardiovascular diseases, type 2 diabetes, stroke, and certain forms of cancer (Langhammer et al., 2018; U.S. Department of Health and Human Services, 2018; World Health Organization, 2018). Beyond physiological benefits, physical activity supports mental, social, and cognitive health for older adults (Langhammer et al., 2018). While everyone can benefit from physical activity regardless of age, it is one of the most important things older adults can do to maintain quality of life, physical functioning, and overall health (Langhammer et al., 2018; U.S. Department of Health and Human Services, 2018).

Muscle-strengthening activities can preserve muscle mass and strength, which reduces the risk of functional limitations, falling, and fall-related injuries among older adults (Izquierdo et al., 2021; U.S. Department of Health and Human Services, 2018). Habitual aerobic activity has also been shown to support brain health in older adults in terms of improved cognition and lower incidence of depression and dementia, reduced anxiety, and improved sleep (Cerin et al., 2017; U.S. Department of Health and Human Services, 2018).

National physical activity guidelines for older adults recommend at least 150 to 300 minutes of moderate-intensity aerobic activity per week, or 75 to 150 minutes per week of vigorous-intensity activity (or an equivalent combination of both moderate and vigorous activity), plus strength training activities that involve all major muscle groups on at least two days per week (U.S. Department of Health and Human Services, 2018). Older adults are also recommended to incorporate multicomponent forms of physical activity, including balance training, into aerobic and muscle-strengthening activities (U.S. Department of Health and Human Services, 2018). A review of multiple national survey datasets of physical activity behavior among older adults, however, found that estimates of the number of older adults who meet aerobic activity guidelines range from 27% to 44% (Keadle et al., 2016), though other estimates have been as low as 23% (United Health Foundation, 2023). Older adults meeting both aerobic and muscle-strengthening recommendations are estimated to be less than 15% (U.S. Department of Health and Human Services, 2023). Reports on data from the Behavioral Risk Factor Surveillance System have also estimated that as of 2022, 30.9% of older adults in the US report doing no physical activity or exercise outside of their jobs, which has increased from 29.4% in 2018 (United Health Foundation, n.d., 2024).

Declines in physical activity with increasing age have also been demonstrated. An analysis of 2016-2018 data from the National Health Interview Survey (NHIS) estimated that the proportion of older adults who met both aerobic and strength training guidelines decreased with age from approximately 17% to 14% to 12% to 7% in those aged 65-69 years, 70-74 years, 75-79, and 80 years and older, respectively (U.S. Department of Health and Human Services, 2023). Regarding the prevalence of *physical inactivity*—as opposed to the prevalence of meeting physical activity guidelines—separate analyses of NHIS data showed inactivity rates that increased with age from 36.3% to 53.0% among older adults aged 65-74 years, and 75 years and older, respectively (Benjamin et al., 2017).

Physical activity is an important behavior for supporting health, longevity, and overall quality of life, especially for older adults. These trends in decreasing physical activity levels among aging populations highlight the importance of researching and promoting strategies that can help to sustain active lifestyles among aging populations, even in the oldest age groups. They also reflect the necessity of understanding the needs of older adults and continuing to develop strategies for physical activity promotion that are feasible and sustainable through older age. These reflections further inform and substantiate the value and importance of this research as it aims to explore and understand older adults' needs, particularly within the context of community-level policies and efforts that aim to support them.

Healthy Aging and Age-Friendly Communities

Given the pace of population aging—and the potential health and economic burdens associated with it—, the World Health Organization has emphasized the imperative to promote research, encourage behavior, and develop adaptations that enable healthy aging within age-friendly communities (World Health Organization, 2023). Healthy aging is defined by the

process of developing and maintaining the functions and abilities needed for overall wellbeing in older age and may consist of managing chronic conditions and preventing injury; promoting physical, cognitive, and mental health; sustaining mobility—both within the home and within the community; and facilitating social engagement (De Biasi et al., 2020; World Health Organization, 2023). Age-friendly communities are described as those which encourage healthy and active aging by adapting policies, structures, and services in ways that are more accessible and inclusive of the particular needs of older adults (World Health Organization, 2007).

In 2007, the World Health Organization released its first guidelines and framework for promoting age-friendly cities (World Health Organization, 2007). Among objectives to support active and healthy aging, age-friendly cities also aim to support "aging in place" for older adults, which is believed to enable them to maintain independence, mobility, autonomy, and social networks within their preferred homes and environments (Wiles et al., 2012). Historically, aging in place has emphasized the adaptation of individual homes according to functional abilities or limitations, but there is greater recognition that aging in place and healthy aging require supportive neighborhoods and local community environments as well (Centers for Disease Control and Prevention, 2009; Grove, 2021; Wiles et al., 2012).

In 2012, Washington, DC joined the WHO Global Network for Age-Friendly Cities and Communities, affirming its commitment to improving the city in ways that encourage accessible and active living for its residents (Age-Friendly DC, n.d.). The city's most recent age-friendly policy framework, the *Age-Friendly DC 2023 Strategic Plan*, includes policy recommendations and actions that focus on the built environment, encourage social participation and civic involvement, and promote health and safety services to address the needs of the city's aging population. It also includes specific elements that aim to improve pedestrian, bicycle, and public

transit infrastructure and safety—all of which are important aspects of active transportation and physical activity behavior (Age-Friendly DC 2023 Strategic Plan, 2018).

To understand how these priorities may influence active transportation behavior and physical activity outcomes for older adults, it is important to assess how the plan aligns with the broader policy environment for active transportation within the community. Researchers have indicated that age-friendly cities often do not adequately address active transportation, which highlights the importance of understanding the alignment—or lack thereof—that may exist between age-friendly and active transportation initiatives (Klicnik & Dogra, 2019; Van Hoof & Marston, 2021).

Additionally, a deeper understanding of how older adults perceive and experience these priorities in relation to active transportation and physical activity may help to inform ongoing improvements and priorities for age-friendly policies in DC. Research that engages with older adults can highlight collective concerns, needs, and desires, which is important for informing the types of community policy-making and implementation decisions that can support an age-friendly environment (Lin & Cui, 2021; World Health Organization, 2023). Building evidence for age-friendly initiatives across different geographical contexts and where limited research current exists is also important to ensure evidence is relevant to a particular setting (Lin & Cui, 2021; World Health Organization, 2023). While research and evaluation of age-friendly community initiatives have taken place both globally and within the context of many US cities, there appears to be very limited research within the published literature about the experiences of older adults within DC, especially related to the connection between age-friendly efforts and active transportation (Black & Oh, 2022; Rémillard-Boilard et al., 2020).

This research helps to address these gaps by exploring the alignment between age-friendly efforts and active transportation policies within DC. The research also contributes to this literature gap by engaging with older adults to explore their perspectives and experiences with active transportation within a context that has not yet been well-explored in the published literature. These contributions can inform decisionmakers of opportunities and recommendations for future age-friendly and active transport policies and strategies in DC, while also highlighting examples for other communities for integrating active transportation with age-friendly community initiatives. It also contributes to the limited published literature on this topic and provide a basis for future research on the integration between age-friendly and active transportation efforts.

Age-Friendly Active Transportation

Active transportation is an important strategy for supporting greater levels of physical activity within the population, including within the older adult population. Within its published guidelines for age-friendly cities, the WHO identifies transportation as one of several key domains for healthy, active aging (World Health Organization, 2007). These guidelines, however, primarily emphasize the accessibility and affordability of public transportation for older adults (i.e., buses, trains, shuttles, other community transport services). While public transit can often be an important facilitator of walking and bicycling, the guidelines are less explicit in how to facilitate the promotion of active transportation and physical activity behavior (Chaix et al., 2014; World Health Organization, 2007). Broadly speaking, there appears to be minimal guidance that specifically addresses community strategies and policies for the development and implementation of active transportation policies and practices that are age-friendly and specific to the needs of older adults (Klicnik & Dogra, 2019).

The development of evidence-based guidelines and recommendations for integrating age-friendly considerations with active transportation policies and strategies, however, can help communities to more effectively develop community and neighborhood environments that enable and promote opportunities for older adults to engage in active transportation. While few studies have focused on long-term outcomes of age-friendly community initiatives on health, (Forsyth & Lyu, 2023), the evidence related to the impact of active transportation behavior on physical activity outcomes is substantial, including for older adults (Chaix et al., 2014; Mueller et al., 2015; Wanner et al., 2012). As previously discussed, it is well-established that physical activity is particularly important for older adults and contributes to physical health and healthy aging by reducing the risk and burden of chronic diseases, such as cardiovascular disease, hypertension, type 2 diabetes, and several forms of cancer, and by supporting physical functioning, mobility, and ability to independently perform activities of daily living (Langhammer et al., 2018; U.S. Department of Health and Human Services, 2018, 2023). The health outcomes associated with physical activity—which can be facilitated through active transportation—also support mental health outcomes (reduced risk of depression and anxiety), cognitive outcomes (reduced risk of dementia and improved cognition) and social connectedness, all of which contribute to healthy aging and prolonged quality of life—key objectives that align with age-friendly community initiatives (Cerin et al., 2017; Langhammer et al., 2018; U.S. Department of Health and Human Services, 2018, 2023).

Research that aims to more fully understand and identify barriers and facilitators to active transport behavior for older adults can serve to inform policy recommendations for age-friendly active transportation strategies and ultimately contribute more effectively to improved physical activity and health outcomes for older adult populations and communities at large. While

published literature provides useful insight into the particular needs, perceptions, and experiences of older adults with active transport, the majority of research to date appears to have been done in international settings, including Canada, China, and European countries (Amaya, Moulaert, et al., 2022; Cerin et al., 2017). However, to more effectively identify, promote, and encourage the adoption of age-friendly active transport policies and practices within US cities—such as in the case of Washington, DC—, there is a need to more fully understand the factors which contribute and influence older adults' utilization of active modes of transport within these particular contexts. This need, combined with a general lack of published guidelines and evidence for age-friendly active transportation policies and practices, provide additional basis and context for this research to explore the unique experiences of older adults and what they report to be important for their utilization of active transportation. This understanding can guide further research and inform the development of policies and strategies that address these concerns and enable greater opportunities for physical activity through active transportation.

Ecological Overview of Active Transportation

Overview of Active Transportation Benefits

In recent decades, active transportation has received increasing attention and interest within many communities—both globally and within the US—for its interconnected benefits across transportation, environmental, economic, and health sectors. Within the transportation and environmental sectors, active transport is recognized for helping to limit traffic emissions and congestion (Götschi et al., 2015). Communities have also experienced economic benefits associated with active transportation, including benefits to local businesses and economies as a result of increased foot and bike traffic and transportation-related savings for individuals (Buehler & Hamre, 2015). Importantly, within the health sector active transportation contributes

to regular physical activity for individuals by enabling opportunities for incidental and low-cost activity (Brown et al., 2016; Chaix et al., 2014).

In a systematic review of the associations between active transportation and overall physical activity levels, researchers found that 93% of the included studies found positive associations between active transport and general levels of physical activity (Wanner et al., 2012). The mechanisms by which active transportation contributes to physical activity levels are primarily through increased walking and bicycling behavior and research has demonstrated that the health benefits associated with physical activity can also be linked specifically to walking and bicycling activity (Buehler et al., 2016). In one example of a study examining active transportation-related physical activity, researchers found that a substantial percentage of daily physical activity levels were gained from engaging in active transportation (Chaix et al., 2014). In another study examining associations between active transportation and health outcomes among adults aged 20 years and older, researchers found that increased active transportation was associated with lower mean BMIs and lower odds of having hypertension and diabetes, even among those who did not meet recommended levels of physical activity (Furie & Desai, 2012).

These benefits of active transportation—and the associated impact on physical activity levels and health outcomes—appear to be consistent for older adult populations yet have not been systematically investigated. However, one review of studies has suggested that older adults may actually experience greater health benefits from active transportation when compared to younger adults, possibly due to their increased risk of chronic disease (Mueller et al., 2015). Further, active transportation has been reported to be more accessible, inexpensive, and acceptable to older adults than other forms of physical activity (Mertens et al., 2019; Nguyen &

Mertens, 2021; Van Cauwenberg et al., 2013). This may be in part because walking, in particular, does not require special skills and has little risk of injury (Murtagh et al., 2010).

Ecological Levels of Influence on Active Transportation

Ecological models have become a well-established and useful framework for understanding and promoting physical activity behavior, including active transportation behavior (Sallis et al., 2006). As mentioned in the previous chapter, an Adapted Ecological Model of Active Transportation for Older Adults helps to guide the research and provides a framework for understanding multiple layers of factors which may influence the ways older adults perceive and engage in active transport (Sallis et al., 2006).

The sections below provide further explanation of each of the levels of influence outlined in Figure 1. These sections also review specific factors within each level of influence that have been reported in the literature as being relevant to active transportation behavior, particularly those which may be unique or salient among older adults.

Intrapersonal Factors. Within the context of an ecological framework, intrapersonal influences represent the individual-level factors that may influence perceptions and adoption of behavior (Sallis et al., 2006). While individual-level determinants of behavior have been studied and framed through many different psychosocial models, they may broadly include demographic characteristics associated with daily mobility and active transportation, such as age, gender, income, and education (Choe et al., 2022; Sallis et al., 2006). They may also include psychological characteristics, such as individual knowledge and beliefs, e.g., self-efficacy, which has been found to have significant relationships with active transport behavior (Bopp et al., 2013; Cusack, 2021). Biological factors, such as the incidence of disease or other types of impairment may also play a role at this level (Cerin et al., 2017; Sallis et al., 2006).

Previous studies have reported associations between individual-level factors and active transportation (Mertens et al., 2019; Van Cauwenberg, Clarys, et al., 2012), though it has been suggested that these individual-level barriers to active transport may generally have less influence on behavior than factors at other levels of influence (neighborhood walkability within the built environment, for example) (Cerin et al., 2017). However, demographic, psychosocial, and biological factors have been found to have significant interaction effects between environmental factors and active transportation behavior, though these interaction effects are still largely unexplored (Cerin et al., 2017). Therefore, additional exploration of which individual influences on active transportation behavior are most salient for older adults, and the processes by which they might interact with other layers of influence, were important for the research. This exploration will be valuable to guide future research on the strength of their associations and effects on active transportation behavior.

Demographic Factors. Certain intrapersonal factors appear to have direct associations with active transportation behavior; however, literature seems to indicate that demographic variables are more likely to have indirect, moderating effects on active transportation behavior. In a systematic review of active travel among older adults from Cerin et al. (2017), age, sex, and education were tested as moderators for the association between walking for transportation and various environmental attributes believed to support active transport (e.g., walkability, street connectivity, access to/availability of services, etc.). Age appeared to have some effect: land use mix and the presence of benches and sitting facilities within neighborhoods were more strongly correlated with walking among older adults aged 75+ than among those aged 65-74 years old (Cerin et al., 2017). In the same review, sex and education appeared to have little to no effect on walking behavior (Cerin et al., 2017). Other studies, however, have found that older adults with

higher levels of educational attainment were more likely to engage in walking for transportation (Mertens et al., 2019).

Income has also been cited as a potential influence on transportation behavior for older people. Even though walking and cycling are generally considered to be cost-effective modes of transport, especially for lower-income older adults, some may still experience financial barriers, e.g., in instances where walking aids may be needed, or bicycle parts and maintenance may be necessary (Rozynek & Lanzendorf, 2023). Income levels may also preclude access to public transportation—which is often a facilitator for active transportation—, as well as to other activities outside the home that might motivate travel within neighborhood and community environments (Choe et al., 2022; Rozynek & Lanzendorf, 2023).

Psychosocial Factors. Mental health—which has been defined by the WHO and Centers for Disease Control and Prevention (CDC) as emotional and psychological wellbeing that enables individuals to handle stress and realize their abilities— has been associated with increased walking behavior (About Mental Health, 2023; Mental Health, 2022). Older adults who self-report higher levels of mental health tend to walk more and use public transit more frequently than those who report lower mental health (Choe et al., 2022). Older adults with higher levels of self-efficacy for physical activity, i.e., the confidence in one's ability to be physically active, have also been found to be more likely to engage in walking for transportation than those with lower levels of self-efficacy (Baert et al., 2011; Mertens et al., 2019).

Biological Factors. Some studies have found that certain chronic conditions, such as genitourinary diseases, vision or hearing impairments, or mobility limitations and frailty may also moderate the relationship between walking behavior and neighborhood environments. For example, access to/availability of services and pedestrian infrastructure such as benches and

restroom facilities have been found to be particularly important for individuals with functional mobility limitations, fears of falling and injury, or urinary incontinence when walking for transportation (Barnett et al., 2016; Cerin et al., 2017).

Summary of Intrapersonal Factors. In summary, a review of current literature indicates that individual-level factors that may influence older adults' active transportation behavior include demographic factors (age, education, and income), psychosocial factors (mental health and self-efficacy), and biological factors (prevalence of chronic conditions or physical impairments) (Barnett et al., 2016; Cerin et al., 2017; Choe et al., 2022; Mertens et al., 2019). Factors that appear to be particularly important, given consistency of findings across reviews of studies, include age (being older than 75 years), levels of self-efficacy, and the prevalence of chronic conditions or physical impairments (Baert et al., 2011; Barnett et al., 2016; Cerin et al., 2017; Mertens et al., 2019). There is very little published research available about older adults' experiences with active transportation in Washington, DC, and the intrapersonal factors that they report as influences on their utilization of active transport. In order to explore these intrapersonal and individual-level determinants that are expected to be relevant to the study population (i.e., age, self-efficacy for physical activity, and the potential impact of chronic conditions on physical activity), it is important create space and empower participants to share their experiences. Considerations for exploration of these potential determinants are incorporated within **Study 2**, its corresponding research questions, and through its research methods—namely, one-on-one interviewing methods—described in Chapter 3.

Perceived Environment. The Ecological Model of Four Domains of Active Living outlines the perceived environment between the layers of intrapersonal factors and other environmental influences. Perceptions of the environment may be determined and/or influenced

by individual-level factors and are distinguished by the subjective aspects of one's environment (as opposed to objective measures of the environment). As explained by Sallis et al. (2006), factors within the perceived environment may include individual perceptions of safety (for example, either from crime or from falls and injury), convenience, accessibility, or aesthetics of the surrounding environment.

In studies of the association between environmental factors (proximity to desirable destinations, transit accessibility, sidewalk quality) and active transportation behavior, some findings have indicated that *perceived* measures of the environment are not always comparable to corresponding *objective* measures of the environment (Jensen et al., 2017; Saelens et al., 2003). For example, perceived safety concerns about traffic have been cited as a major influence to active transportation for older adults, but the objective risk of crashes or injuries from traffic while walking or bicycling are generally quite low (Brüchert et al., 2020; Cao et al., 2019; Cerin et al., 2017). This highlights the importance for researchers to understand individuals' perceptions of the environment and its influence on active transportation behavior and this exploration is emphasized as a component of the research (Saelens et al., 2003).

Perceived Proximity to Destinations. In one study of associations between environmental measures and active transportation, researchers found that the strongest correlation with active transport was the perception of having destinations within walking distance of homes (Hoehner et al., 2005). Multiple qualitative studies support the finding that perceived access to desirable destinations is a strong facilitator of walking for transportation (Mertens et al., 2019; Strath et al., 2007; Van Cauwenberg, Van Holle, et al., 2012). For older adults, studies have suggested that the most desirable destinations tend to include shops and commercial businesses, grocery stores, banks, post offices, pharmacies, and parks and recreational facilities (Cerin et al., 2017; Van

Cauwenberg, Van Holle, et al., 2012). An additional insight gained from a study of older adults in Belgium indicated that being in proximity to desirable destinations also contributes to the perception of safety from crime due to the presence of other people visiting the same destinations (Van Cauwenberg, Van Holle, et al., 2012).

Perceived Traffic Safety. The risks of crashes and injuries to pedestrians and bicyclists are generally low, even within the US, and observational studies do not appear to show a strong relationship between objective measures of traffic safety and walking for transport among older adults (Brüchert et al., 2020; Cerin et al., 2017). Qualitative studies, however, indicate that there is a strong influence of perceptions of safety and safety concerns in relation to traffic, which may include concerns for drivers' behavior wherever there are street crossings (Cao et al., 2019). These perceived safety concerns have been cited as a major barrier to active travel for older adults (Brüchert et al., 2020; Van Cauwenberg, Van Holle, et al., 2012).

In contrast, the provision of safe street crossings has been cited by older adults as an important factor influencing their perception of safety, which may be especially important in locations with high traffic volume and speeds (Buehler et al., 2016; Van Cauwenberg, Van Holle, et al., 2012).

Perceived Safety from Crime. Some qualitative studies have also indicated that older adults report concerns about crime, especially after dark and when few other people are present in the streets (Van Cauwenberg, Van Holle, et al., 2012). Similar to the perceived risk of danger from traffic, however, studies have shown that the influence of older adults' perception of danger from crime are much higher than objective measures would indicate (Brüchert et al., 2020).

Perceived Aesthetics. The aesthetics of the built environment within neighborhoods and communities—which may include the presence of greenery and scenery, well-maintained

infrastructure, or cleanliness from garbage, for example—appear to have some degree of influence on older adults' active transportation, though studies have shown mixed results across different contexts as to the relationship between aesthetically-pleasing environments and walking for transportation (Brüchert et al., 2020; Cerin et al., 2017; Hoehner et al., 2005). Cerin et al. (2017) suggest that while neighborhood aesthetics may not be an essential determinant for active transportation, it may still be a "peripheral facilitator" and thus a moderating factor for older adults' proximity to destinations. Alfonzo has asserted a similar hypothesis, arguing that within the "hierarchy of walking needs," aesthetics influences walking for transport only if access to services and proximity to destinations is met first (Alfonzo, 2005).

Summary of Factors within the Perceived Environment. Overall, individuals' perceptions of the environment are often found to have an influencing effect on active transportation behavior. Among studies of older adults, factors that appear to be especially important include the perceived proximity to desirable destinations (such as to grocery stores, banks, pharmacies, commercial businesses, and recreational facilities), and perceived safety from traffic crime and crime (Brüchert et al., 2020; Cerin et al., 2017; Mertens et al., 2019; Van Cauwenberg, Van Holle, et al., 2012). While the perceived aesthetics of the built environment may also have some influence on active transportation behavior, this association appears to be less important and consistent than other perceived factors (Alfonzo, 2005; Cerin et al., 2017).

Given the limited research on older adults' perceptions of neighborhood and community environments within DC, the research questions and methods for **Study 2** include considerations to explore older adults' perceptions of the environment as potential influences on their use of active transportation. Though it was not feasible to explore every potential factor identified in the literature, interviewing methods emphasized discussion of study participants' perceptions of

proximity to desirable destinations within their neighborhoods and their perceptions of safety, while also allowing opportunity for them to identify other factors which may be particularly salient for them through open-ended questioning (see Appendix D). Additionally, these factors that have been identified within the literature review (perceived proximity to destinations, traffic safety, safety from crime, and aesthetics) helped to provide a framework for thematic analysis of qualitative data collected for Study 2.

Social-Cultural Environment. Sallis et al. (2006) described variables within the social and cultural environment as factors that cut across or manifest within different levels of influence. Specific influences named in the model include perceived crime (which can be considered within the context of the perceived environment), and social climate, social norms, social capital, and culture (which are also framed within the context of the built environment) (Glanz et al., 2015; Sallis et al., 2006). The overlapping nature of the social and cultural environment with other levels of influence seems clear given the understanding that the social environment involves interactions that often take place within the built environment, e.g., parks, community centers, shopping centers, etc. These places create opportunities for older adults to interact and socialize with others and perform other activities of daily living (Engel et al., 2016). Brüchert et al. (2020) also suggested that social and cultural factors may influence older adults' perceptions of the aesthetics of their environments and thus have a joint influence on walking for transportation. Additional examples of this overlap may be manifest through inadequate access to infrastructure (which may be related to the built environment) or the inability to engage in active transportation (which may be related to intrapersonal factors), which may limit older adults' participation in social activities and its associated benefits (Klicnik & Dogra, 2019; World Health Organization, 2007).

Social Capital. Social isolation is a significant concern for aging populations and is often a key intervention point for programs that aim to support older adults (Klicnik & Dogra, 2019). Guidelines for age-friendly communities often emphasize programming and policies to encourage social interactions among older adults (De Biasi et al., 2020; World Health Organization, 2007).

Several studies provide evidence that active transportation may help to facilitate social connection. In some studies of older adults, participants reported that making social contacts was a factor contributing to walking for transport, and that they enjoyed their social contacts from seeing friends and neighbors while walking (Cao et al., 2019; Van Cauwenberg, Van Holle, et al., 2012). Social capital gained through interactions during active transportation increase health-promoting behavior, and people who live in environments that support active transportation have a greater sense of social capital than those who live in more car-centric communities (Klicnik & Dogra, 2019). Other studies have also affirmed that active transportation has positive associations with social capital and community participation (Giles-Corti et al., 2010; Mattisson et al., 2015; Stroope, 2021). Further, neighborhood environments that enable access to social destinations also support social engagement within the local community (Nathan et al., 2012).

Social Norms. Perceived social norms towards active transport may also be a motivating factor for older adults to engage in active behaviors. In one study of adults in two US cities, survey respondents who observed more active people within 400 meters of their homes were two to three times more likely to engage in active transportation activity compared to those who observed fewer active individuals near their home (Hoehner et al., 2005). In contrast, older adults have also reported dislike for places that are too crowded and that the presence of younger

people engaging in antisocial behavior (such as ignoring traffic rules) are a negative influence on active transportation behavior (Van Cauwenberg, Van Holle, et al., 2012).

Summary of Factors within the Social-Cultural Environment. Within the context of the social-cultural environment, the published literature has identified social capital and social norms as important influences on active transportation behavior for older adults (Cao et al., 2019; Hoehner et al., 2005; Klicnik & Dogra, 2019; Mattisson et al., 2015; Van Cauwenberg, Van Holle, et al., 2012). The risks associated with social isolation and loneliness are particularly concerning for older adults, and the prevalence of these issues was only exacerbated by the impact of the COVID-19 pandemic (Centers for Disease Control and Prevention, 2021; Su et al., 2023). Programs and policies within DC, including components of the Age-Friendly DC 2023 Strategic Plan, emphasize priorities to promote social participation and social inclusion for older adults within the community (Age-Friendly DC 2023 Strategic Plan, n.d.). Within this context, and given findings from the literatures, the role of social capital and social connections for older adults were important to consider within the methods for **Study 2**. The interviewing methods discussed in Chapter 3 included the social-cultural environment as a domain of inquiry, using open-ended and probing questions to explore how social capital and social connections may influence and/or interact with other factors to influence active transportation behavior (See Appendix D).

Natural Environment. Similar to the social-cultural environment, variables relating to the natural environment may be framed within the context of different levels of influence. Factors relating to weather, topography, and air quality may be considered within the realm of behavior settings, while some of the same factors may be directly influenced by actions within

the level of the policy environment, which often govern or influence land use policies or air quality within a given setting (Sallis et al., 2006).

A qualitative study with older adults in Belgium reported that they enjoy the presence of greenery, vegetation, and trees while walking, which were perceived as being quiet, peaceful, and healthy (Van Cauwenberg, Van Holle, et al., 2012). The same study discussed the influence of weather and seasons on walking for transportation, which also interacted with other perceptions of the environment. For some participants, wintertime was associated with decreased sense of personal safety from crime due to the earlier darkness and due to fears of falls from snowy and icy conditions (Van Cauwenberg, Van Holle, et al., 2012). Rainy conditions were also reported as a barrier to walking due to puddles and mud on sidewalks and walking paths (Van Cauwenberg, Van Holle, et al., 2012). Even in cases where neighborhoods have been made to be wheelchair accessible, older adults in Singapore have noted that the accessible infrastructure does not account for rainy or other weather conditions, resulting in slippery ramps or sticking points (Cao et al., 2019). Excessively hot and/or humid weather, especially without sufficient tree or shade canopy, and cold, snowy, or icy conditions have also been reported to be a significant concern for some older adults (Cao et al., 2019).

While weather constraints appear largely non-modifiable, researchers in Ontario, Canada found that many of these factors interacted with modifiable aspects of the built environment and, thus, could potentially be mitigated through local policies actions. An example includes using municipal management or technological advances to ensure sidewalks are well-maintained and/or heated during cold weather (Klicnik & Dogra, 2019).

Summary of Factors within the Natural Environment. To summarize findings from these studies, certain factors within the natural environment, particularly adverse weather

conditions, appear to have potentially significant influence on active transportation behavior for older adults. These factors may be particularly important to consider and assess because of how they may interact with or exacerbate other influencing factors, e.g., increased concerns about perceived safety from traffic (a factor related to the perceived environment) during rainy or icy conditions (a factor of the natural environment). The effects of weather and seasons may also be highly contextual across different research settings, further emphasizing the importance to create space to explore these potential influences in **Study 2** in order to understand how older adults within DC perceive these factors, and to consider if and how these barriers might be mitigated through local policy or other actions.

Behavior Settings: Access and Characteristics. Behavior settings largely refer to the objective built environment—the physical, human-made surroundings and infrastructure, such as homes, buildings, and streets—within neighborhoods and communities. Behavior settings are the places and the specific characteristics wherein active transportation occurs (Sallis et al., 2006). Neighborhood and community characteristics highlighted within the active transportation domain of the Ecological Model of Four Domains of Active Living include walkability, pedestrian and bicycling infrastructure, and public transportation networks (Sallis et al., 2006).

It is well established that behavior settings and the characteristics of the built environment are important determinants of active transportation behavior, including for the older adult population (Brüchert et al., 2020; Buehler et al., 2016; Sallis et al., 2006). Built environment variables are not only expected to have direct effects on behavior, but to also interact with perceptions of those environments, the natural environment, and the social-cultural environment (Sallis et al., 2006).

Neighborhood Walkability. Perhaps the most commonly cited aspect of the built environment that influences active transportation behavior—specifically, walking behavior—is the walkability of a neighborhood or community. While neighborhood walkability refers specifically to access, comfort, convenience of walking behavior, it is consistently associated with both walking and cycling for transportation (Sallis et al., 2006). Walkability is often assessed through subjective measures of individual perceptions, but it is also frequently gauged through objective, macroscale measures of mixed land use, connected streets, and residential density (Sallis et al., 2006).

In studies of the built environment's associations with active transportation among older adults, specific characteristics that are commonly cited, and which contribute to neighborhood walkability, include 1) proximity to destinations, 2) pedestrian and bicycling infrastructure, 3) access to public transportation, 4) street connectivity, and 5) aesthetics (Brüchert et al., 2020; Buehler et al., 2016; Cerin et al., 2017; Lin & Cui, 2021; Van Cauwenberg, Van Holle, et al., 2012). (Since neighborhood aesthetics are more likely to be measured as a subjective aspect of the built environment, rather than assessed through objective measures, neighborhood aesthetics has been discussed previously under "Perceived Environment.")

Proximity to Destinations: The proximity of destinations refers to the accessibility of destinations and services that are important or commonly frequented by community residents from where they live or work, such as grocery stores, pharmacies, banks, etc. (Omura et al., 2020). Multiple studies have found that proximity to desirable destinations is one of the most important attributes of the built environment for walking behavior (Brüchert et al., 2020). A meta-analysis by Cerin et al. (2017) supports the conclusion that proximity to desirable destinations is a "driving force of active mobility in older adults." While not all destinations are

equally important across different segments of the older adult population, shops and commercial businesses, parks and recreational facilities, grocery stores, banks, post offices, and pharmacies appear to be the destinations that most consistently associate with and encourage active transportation (Cerin et al., 2017; Van Cauwenberg, Van Holle, et al., 2012).

Pedestrian and Bicycling Infrastructure. For all ages and demographics, the availability of safe and convenient walking and bicycling infrastructure is central to active transportation (Buehler et al., 2016; Van Cauwenberg, Van Holle, et al., 2012). Pedestrian infrastructure includes sidewalks, crosswalks, and paths that are physically separated from vehicle roadways, and bicycling infrastructure also includes dedicated bike lanes or paths (Buehler et al., 2016). When discussing pedestrian infrastructure, older adults have reported that in addition to the presence of sidewalks, microscale characteristics are important, such as the quality and design of sidewalks. Sidewalks that are well-maintained, wide enough to walk side-by-side with someone and have some separation from motorized traffic on the streets were seen as positive factors for walking for transport (Van Cauwenberg, Van Holle, et al., 2012). In contrast, sidewalks that were uneven or cracked, or with poor lighting, steep curbs, ramps, or stairs were reported to increase the difficulty of walking (Van Cauwenberg, Van Holle, et al., 2012).

The chronic conditions that many older adults experience can also contribute to limitations in functional mobility and intensify the fear of falling when the quality of infrastructure is inadequate (Cerin et al., 2017). In addition to high-quality sidewalks and walking paths, other microscale features of pedestrian and bicycling infrastructure include benches and sitting facilities, streetlamps, and easy access to residential entrances (Cerin et al., 2017). These microenvironmental features that support a safe, comfortable, and pedestrian-

friendly environment may be especially important and decisive factors for older adults' engagement in active transportation (Buehler et al., 2016; Cerin et al., 2017).

Access to Public Transportation. For older adults who do not live in close proximity to desired destinations, access to public transportation stops has been found to be especially important as it enables people to reach other destinations that may not be within a comfortable walking distance (Cerin et al., 2017; Van Cauwenberg, Van Holle, et al., 2012). Commonly cited barriers that influence older adults' access and use of public transportation include long walking distances to stops or stations, limited or infrequent schedules, and inadequate facilities (station shelters and comfortable seating) (Lin & Cui, 2021).

Street Connectivity. Street connectivity is defined as the density of street networks and intersections. Neighborhoods with high street connectivity have many streets and intersections, typically resulting in shorter blocks, more direct routes, and more route options (Buehler et al., 2016; Mecredy et al., 2011). Street connectivity has been found to be another important determinant of walking behavior for older adults because it can reduce the walking distance between destinations and increase the number of route options available (Brüchert et al., 2020).

Summary of Factors within Behavior Settings. In summary, the characteristics of the built environment within neighborhoods and communities are strongly associated with active transportation behavior for older adults. Within the built environment, neighborhood walkability is an attribute that is consistently and strongly associated active transportation behavior (Sallis et al., 2006). For older adults, specific characteristics that contribute to overall neighborhood walkability have been found to include the proximity of desirable destinations, the presence of adequate walking and bicycling infrastructure, access to public transportation, and the perceived aesthetics of the built environment (Brüchert et al., 2020; Buehler et al., 2016; Cerin et al., 2017;

Lin & Cui, 2021; Van Cauwenberg, Van Holle, et al., 2012). (These characteristics that contribute to neighborhood walkability for older adults are summarized in Table 1.)

Table 1

Common Factors that Contribute to Neighborhood Walkability for Older Adults

Contributing Factor	Summary of Factors Important to Older Adults	Ecological Layer
Proximity to Destinations	Desirable neighborhood destinations include grocery stores, pharmacies, banks, commercial businesses, and parks and recreational facilities.	Behavior Settings (Built Environment)
Pedestrian and Bicycling Infrastructure	Positive factors include quality and design, adequate maintenance, and separation from motorized traffic are important. Deterrents may include uneven or cracked sidewalks; poor lighting; or steep curbs, ramps, and stairs.	
Access to Public Transportation	Public transportation is especially important when not in proximity to desirable destinations. Barriers include long walking distances to stops or stations, limited and infrequent schedules, and facilities without adequate shelter, seating, etc.	
Street Connectivity	Shorter blocks, more direct routes, and more route options contribute to shorter walking distances and more route options to desirable destinations.	
Aesthetics	The presence of greenery and scenery, well-maintained infrastructure within walking/biking routes, general cleanliness	Perceived Environment

Note. Findings from Brüchert et al., 2020; Buehler et al., 2016; Cerin et al., 2017; Lin & Cui, 2021; and Van Cauwenberg et al., 2012

The perceptions and experiences that older adults report of the built environment and neighborhood walkability and their impact on their active transportation behavior within DC are not well explored in the published literature. Assessing older adults' perspectives and experiences provides evidence of what barriers or facilitators to active transport are most important to them and what gaps have yet to be addressed within this research setting. Therefore,

the research questions for Study 2—and the research methods that informed them, including one-on-one interviewing —provided space and opportunity for older adults to identify and discuss how they experience these aspects of the built environment. Observational methods and visual data collection, which were a component of the methods for Study 2, provide additional data for analysis of objective features within the environment. These specific factors also provided a start list of predetermined codes for deductive coding of qualitative data (See Chapter 3, "Study 2 Methods.") Further, a reporting of findings can provide an evidence base to inform local policymakers and stakeholders of key intervention points for future policies and strategies to further develop a built environment in DC that supports age-friendly active transportation. Well-informed strategies that support active transportation for older adults within the community are important for facilitating opportunities and access to accumulate increased levels of physical activity and achieve improved health outcomes within the population.

Policy Environment. A distinguishing feature of ecological models is the attention directed to factors within the policy environment, which are often the root causes of a behavior (Sallis et al., 2006). While the built environment is a predictor of community walkability, bikeability, and access to active transportation, these characteristics are affected by the various policies that emerge from multiple sectors and government agencies within a community (Sallis et al., 2006). Thus, the policy environment largely governs how and to what degree the built environment is developed to support active transport (Sallis et al., 2006).

Promoting active transportation through policies and systems has been identified as one of the leading evidence-based strategies to improve physical activity, regardless of age, racial or ethnic background, or socioeconomic status (Young et al., 2020). Young et al. (2020) and other researchers have also described three different levels at which policy and systems interventions

should occur: the macroscale, the mesoscale, and the microscale. The macroscale is defined as the high-level zoning ordinances and planning processes that affect the density and mix of land use within a community. The mesoscale refers to the networks and facilities within neighborhoods and communities that enable active transport, such as sidewalks, bicycle lanes, public transit service, as well as the funding and programs that support those networks and facilities. The microscale includes design and functional details that promote convenience, safety, accessibility, and aesthetics of active modes of transportation (Mogaji & Uzondu, 2022; Young et al., 2020). These categories provide a useful framework for considering policies, strategies, and other efforts within the policy environment that influence active transportation behavior. Qualitative data analysis for **Study 1** used these categories as a starting point to organize coded data and to facilitate the reporting of results from this study. (See Chapter 3, "Study 1 Methods.")

Changes to community design, transportation infrastructure, and other aspects of a community's built environment require significant public support and political will (Sallis et al., 2006). It is also recognized that doing so requires integrated planning and interdisciplinary coordination across local community sectors, as opposed to siloed approaches within each sector (Giles-Corti et al., 2016, 2022). These integrated approaches are needed to positively influence the overall health of communities and their residents (Stevenson et al., 2016). Specific sectors that have a particularly important role within the policy environment for supporting policies and systems for active transportation include the health, land use (urban planning), and transportation sectors (Giles-Corti et al., 2016).

Health Sector. City planning policy is often inconsistent with public health evidence. This contributes to community designs that foster car dependence and limit pedestrian, bicycling,

and public transportation access to jobs, shops, parks, etc. (Lowe et al., 2022). Given the potential health outcomes and multiple benefits associated with active transportation, especially for aging populations, leaders within the health sector have the imperative to lead and advocate for integrated policies and planning, particularly across urban design and transportation sectors (Giles-Corti et al., 2016).

The role of the health sector in how the policy environment shapes the built environment has been emphasized by numerous global agencies and researchers (Giles-Corti et al., 2016). In this process, researchers have recommended that health leaders advocate for the inclusion of health goals and indicators *within* urban planning and transport policies (Lowe et al., 2022).

Exploration of the extent to which the health sector in DC incorporates active transportation related goals and indicators within its own strategic planning efforts are part of **Study 1**—an analysis of the DC's policy landscape around active transportation.

Urban Planning Sector. The urban planning and land use sector is closely tied to public health, given the numerous measures that aim to promote health and safety, e.g., zoning policies that protect communities from environmental hazards and sanitation policies that limit the spread of infectious diseases (Giles-Corti et al., 2016; Sallis et al., 2006). Urban planning policies and decisions also shape land use and travel patterns, which in turn influence lifestyles and human health (Lowe et al., 2022). Together with the transportation sector, urban planning is a primary contributor to the infrastructure and facilities needed to support active transportation.

One urban planning framework, in particular, that has been found to help reduce car use and promote active transportation is the "Five Ds" model. The "Five Ds" include **D**ensity (population or household density within an area), **D**iversity (land-use mix, neighborhood retail), **D**esign (street connectivity indicators, road network density, sidewalk networks), **D**estination

(access to desirable destinations), and **D**istance to transit (the level of access to public transportation) (Buehler et al., 2016; Sallis et al., 2006). Combined, these attributes have been shown to have positive associations with active transportation, including with older adults in the US (Buehler et al., 2016; Lu et al., 2018).

The "Five Ds" design principles closely align with the previously discussed factors that contribute to neighborhood walkability within the built environment (proximity to destinations, pedestrian and bicycling infrastructure, access to public transportation, street connectivity, aesthetics). These principles are also examples of evidence-based policy recommendations that may have particular relevance to older adult populations, and which were expected to be identified through a systematic review of policy recommendations for age-friendly active transportation as part of **Study 1**. These, along with other policy recommendations that may be identified, provide a benchmark against which to analyze and describe the current policy environment for age-friendly active transportation within Washington, DC. (See Chapter 3, "Study 1 Methods.")

Transportation Sector. Although transportation policies are often centered around vehicular traffic demand and management, transportation networks and infrastructure exist within the urban environment; therefore, transportation policy is a major component of urban planning (Sallis et al., 2006). The transportation sector also encompasses the infrastructure needed for pedestrian and bicycling networks. Development of these networks, which are critical for engaging active transportation, are one of the Community Preventive Services Task Force's (CPSTF) top recommendations for developing a built environment that supports physical activity (Omura et al., 2020).

Specific transportation policy recommendations often include the adoption of Complete Streets and/or Vision Zero policies within communities. Complete Streets policies aim to help design streets in ways that allow all users (pedestrians, bicyclists, motorists) to travel safely and comfortably (Young et al., 2020). Complete Streets policies help to guide considerations for pedestrian infrastructure (sidewalks, street lighting, street crossings) and bicycling infrastructure (protected bike lanes, bicycle systems, trails), among other elements that help to reduce the risks posed by motorized vehicles (Omura et al., 2020; Young et al., 2020). Vision Zero strategies aim to implement policies that minimize the risk of crashes and injuries within transportation networks. Strategies include reducing speed limits for vehicle traffic, limiting traffic volume, enforcing traffic laws, and improving signage and markings for all road users (Omura et al., 2020; Young et al., 2020). Evidence has shown that transportation policies and strategies such as Complete Streets and Vision Zero may help address the common barriers that many older adults may perceive or experience within the built environment during active transport, namely safety from traffic, availability of safe, convenient pedestrian and bicycling infrastructure, and accessibility and affordability of public transportation options (Lin & Cui, 2021). They are also expected to have positive effects on the utilization of active transportation and physical activity behavior, which highlights their importance for improved physical activity-related benefits and outcomes (Omura et al., 2020).

The availability and accessibility of public transportation has also been identified as a key policy area for promoting active transportation. Challenges for older adults using public transportation have included limited access to bus or transit stops and poor facilities (shelters and seats), though transportation policy can help to address these barriers (Lin & Cui, 2021).

Elements of these transportation-related policies and strategies were expected to be identified as important recommendations relevant to older adults during a systematic review of policy recommendations for age-friendly active transportation as part of **Study 1**. These, along with other transportation policy recommendations that may be identified, further contributed to a benchmark against which to analyze and describe the current policy environment for age-friendly active transportation within Washington, DC. (See Chapter 3, "Study 1 Methods.")

Summary of the Policy Environment. Within an ecological perspective, the policy environment largely governs the development of a community's built environment, including how and to what degree it may support active transportation (Sallis et al., 2006). The promotion of active transportation through community policies and systems is a leading evidence-based strategy for improving physical activity and should encompass interventions across different levels, including the macroscale (high-level zoning and planning policies), the mesoscale (infrastructure and facilities), and the microscale level (design, aesthetics, and functional details) (Young et al., 2020). It should also be approached through integrated planning and coordination across sectors, particularly health, urban planning, and transportation sectors (Giles-Corti et al., 2016, 2022; Stevenson et al., 2016).

Health sectors have been identified as having a particularly important role in leading and advocating for integrated approaches to active transportation, which could include the inclusion of health-related goals and indicators within urban planning and transport policies (Giles-Corti et al., 2016; Lowe et al., 2022). Urban planning frameworks, such as the "Five Ds" model, have been shown to have positive associations with active transportation (Buehler et al., 2016; Lu et al., 2018). Within the transportation sector, Complete Streets policies and Vision Zero frameworks have also been identified as key policy interventions to help guide the development

of pedestrian and bicycling infrastructure that serves the needs of vulnerable users, including older adults (Young et al., 2020). The availability and accessibility of public transit is also a key element of the policy environment for supporting older adults' use of active transportation (Lin & Cui, 2021).

Exploration and identification of these and other potential policy recommendations for supporting active transportation for older adults, i.e., age-friendly active transportation, are component of **Study 1**. It also served as a basis for analysis and description of the current policy environment in DC as a means of contextualizing older adults' perceptions and experiences with active transportation (explored in **Study 2**), and to inform policymakers of potential gaps and opportunities for enabling and promoting age-friendly active transportation.

Summary and Application of the Ecological Levels of Influence on Active Transportation

In order to effectively promote active transportation as a strategy for improving physical activity and healthy aging outcomes among older adult populations in Washington, DC, it is important to more fully understand the multiple factors that may influence active transportation behavior within this particular research setting. In a review of current literature, several potential factors influencing older adults' active transportation behavior have been identified across different ecological layers of influence.

For older adults, intrapersonal influences may include factors such as age (being above 75 years), mental health and levels of self-efficacy, as well as the prevalence of chronic conditions or physical impairments (Barnett et al., 2016; Cerin et al., 2017; Choe et al., 2022; Mertens et al., 2019). Perceptions of the environment, such as the perceived aesthetics of the environment, proximity to desirable destinations, and safety from traffic and crime may also influence older adults' use of active transport (Brüchert et al., 2020; Cerin et al., 2017; Hoehner

et al., 2005; Mertens et al., 2019; Van Cauwenberg, Van Holle, et al., 2012). The literature also indicates that additional factors within the social-cultural and natural environments may include the desire for social connection, or the influence of social norms towards walking and bicycling, as well as the influence of adverse weather conditions (Cao et al., 2019; Klicnik & Dogra, 2019; Mattisson et al., 2015; Stroope, 2021; Van Cauwenberg, Van Holle, et al., 2012). Various aspects of behavior settings, i.e., the built environment of the neighborhoods and communities where people live, have also been shown to greatly influence the accessibility, convenience, and safety of using active modes of transportation. Neighborhood walkability, and the factors which contribute to it, is a major determinant of older adults' active transportation behavior (Cerin et al., 2017; Sallis et al., 2006).

Lastly, the outermost layer of the ecological model is the policy environment, which largely governs how the built environment is developed and maintained. Community-level policies that influence active transportation behavior often emphasize development of the built environment and require cooperation across health, urban planning, and transportation sectors (Giles-Corti et al., 2016). Policy frameworks, including Vision Zero, Complete Streets, and the principles of the "Five Ds" model in urban planning are a few examples of policy recommendations that have been identified in the literature to benefit active transportation and which may include elements that promote age-friendly environments (Buehler et al., 2016; Omura et al., 2020; Young et al., 2020). Similar frameworks were included in analysis during identification of best practice policy recommendations as part of **Study 1**, and they were reviewed to identify elements that may be of particular relevance to the needs of older adults.

The policy environments that exist within local communities are highly contextual. Therefore, in order to understand how the policy environment within Washington, DC may

influence active transportation behavior among the older adult population within this research setting—an important piece of an ecological perspective on this issue—, there is a need to analyze the policies and strategies that have been developed within this particular context to support this behavior. Through community policies that support increased access to and utilization of active transportation, older adults are likely to accumulate greater levels of physical activity and gain the benefits associated with it, including the reduced risk of cardiovascular disease, hypertension, type 2 diabetes, and various cancers; improved physical functioning and mobility; and decreased risk of dementia, depression, anxiety, among other benefits (U.S. Department of Health and Human Services, 2018, 2023). These contributions to healthy aging can help communities to relieve and minimize the health and economic burdens associated with disease and disability (World Health Organization, 2023).

Health, urban planning, and transportation sectors have been identified to have particularly important roles in creating and implementing policies and strategies to develop a community's built environment in ways that support active transportation and physical activity behavior. Therefore, the current policy guidelines and strategic planning frameworks that correspond to the local departments of each of these sectors in DC—*moveDC* from the District Department of Transportation, the *Comprehensive Plan for the National Capital* from the District of Columbia Office of Planning, and the *Health Systems Plan* from the District of Columbia Department of Health—were prioritized in the review and analysis. A structured analysis of these documents—and other policy frameworks embedded within them, such as Complete Streets policies, and Vision Zero strategies—contextualize how this layer of the ecological model may influence active transportation for older adults in DC and illuminate opportunities to integrate additional considerations for their needs.

It is also apparent that many different sources across peer-reviewed and grey literature highlight different policies and strategies for the promotion of physical activity and active transportation through a supportive built environment, ultimately aiming to achieve improved physical activity and health outcomes within communities. A seeming lack of comprehensive guidelines and recommendations specific to active transportation for older adults, however, highlights the value of a systematic search to compile current and best available evidence of policy recommendations and expert opinion on this topic as it specifically relates to this population. This component of the research serves to provide a benchmark against which to analyze and describe the current active transportation and age-friendly policy environment within DC. These needs and background provide a basis for **Study 1** and its corresponding research questions.

In addition to the policy environment, a review of the literature has pointed to several additional facilitators and barriers that may influence older adults' perceptions and experiences with active modes of transportation. These potential influences exist across multiple domains of the ecological model, as previously described. An important principle of ecological perspectives is the understanding that interactions may also occur between different factors at different levels of influence. As identified in the literature, factors such as the weather might influence perceptions of safety or comfort within the built environment (Klicnik & Dogra, 2019). Similarly, aspects of the built environment, such as proximity to social destinations, may have influence the social norms and social capital that people report (Nathan et al., 2012; Van Cauwenberg, Van Holle, et al., 2012). However, these influences—and the ways that they may interact—are relatively unexplored in the published literature among older adult populations within the context of US cities —including within Washington, DC (Amaya, Chardon, et al.,

2022). Given this gap in current literature, there is a need for research that creates space to understand and identify the factors that older adults experience and report within the research setting. This gap informed the development of **Study 2**, its corresponding research questions, and the methods for conducting this research. (See Figure 2 for a visual representation of links between theoretical constructs and studies.)

Chapter 3: Methods

Introduction

The purpose of this research is to apply an ecological perspective to explore and deepen understanding of factors across different levels of influence that contribute to older adults' perceptions and experiences with active transportation in Washington, DC. Ultimately, this research is intended to help communities, including Washington, DC, respond to the needs of aging populations by providing additional evidence and guidance for the promotion of age-friendly active transportation as an important strategy for achieving the benefits associated with increased physical activity levels among older adult populations.

To meet this purpose, two primary study aims are:

1. To describe the current policy environment related to active transportation and physical activity within Washington, DC, understand how it addresses the needs of aging and older adults, and inform policymakers of opportunities to support age-friendly active transportation (Study Aim 1), and
2. To understand how intrapersonal, social-cultural, and environmental factors influence older adults' active transportation decisions in Washington, DC (Study Aim 2).

The research follows the format of a two-paper dissertation. Each of the two manuscripts correspond to one of the two study aims, which were achieved through different methods of qualitative data collection and analysis.

Study Aim 1—which corresponds to the policy environment layer of the study's adapted theoretical framework—was approached through a content analysis of selected citywide policy frameworks and strategic plans implemented by the Government of the District of Columbia that are expected to support and encourage active modes of transportation, including for the older

adult population. A systematic expert opinion and policy review was also conducted to compile and identify best available evidence and current policy recommendations for community-level interventions that support age-friendly active transportation. This review provided a benchmark for the analysis of the active transportation and age-friendly policy environment in DC, which ultimately help to inform policymakers of opportunities to achieve improved physical activity and health outcomes within the older adult population.

Qualitative methods for **Study Aim 2** utilized a basic interpretive study design, which provided an opportunity to deepen understanding of how study participants perceive and ascribe meaning to the research topic (Merriam & Tisdell, 2015). The approach also allowed exploration of the processes by which other levels of influence outlined within the theoretical framework—including intrapersonal, social-cultural, and environmental levels—may interact and impact active transportation behavior. A combination of interviewing, observation, and visual data collection methods provided data for analysis and interpretation.

Findings from Study 1—particularly in relation to environmental influences, i.e., specific aspects of the built environment that are addressed within citywide policies and strategies in relation to active transport—were used to help inform the final interview guide and protocols for qualitative interviews and observations. Study 1 findings were also used to provide additional background and context of the policy environment when writing and reporting results from Study 2.

The following sections of this chapter outline the specific research questions for each study and then provide a discussion of philosophical assumptions and researcher reflexivity to position the methodology and the researcher within this research. Detailed description of the methods for data collection and analysis for Study 1 is discussed, followed by a similar

description for Study 2 which includes a discussion of the study setting, participant recruitment strategies, and detailed description of the data collection and analysis process.

Research Questions and Assumptions

Study Aim 1 Research Questions

Study Aim 1: To describe the current policy environment related to active transportation and physical activity within Washington, DC, understand how it addresses the needs of aging and older adults, and inform policymakers of opportunities to support age-friendly active transportation.

Research Questions:

1. What are the policies and strategies in place within Washington, DC's current citywide health, transportation, and urban design strategic plans that reflect active transportation for older adults within the environment?
2. How are these policies and strategies aligned with active transportation-related elements of the Age-Friendly DC 2023 Strategic Plan?
3. How do these policies and strategies align with current recommendations and best available evidence for community-level, age-friendly active transportation policies and interventions?

Study Aim 2 Research Questions

Study Aim 2: To understand how intrapersonal, social-cultural, and environmental factors influence older adults' active transportation decisions in Washington, DC.

Research Questions:

1. What are the intrapersonal, social-cultural, and environmental factors that older adults who live in Ward 5 of Washington, DC perceive and experience in relation to active transportation?
2. How do these factors and perceptions interact to influence older adults' active transportation behavior?

Key Assumptions

Based on findings from Chapter 2: Literature Review, it was expected that older adults in Washington, DC primarily report concerns for safety (personal safety, fear of falls, and crime), lack of self-efficacy, and lack of desired destinations proximate to their residences as barriers to engaging in active transportation. Desires for social connectivity were also expected to be noted as facilitators and motivators for active transport. Additionally, it was expected that perceptions of safety would be influenced by opportunities to engage in active transport with a partner and are exacerbated by inclement weather (extreme heat or humidity, cold, rain). Similarly, opportunities to engage in active transportation with a partner were expected to help minimize the influence of low-self efficacy as a barrier to walking or bicycling for transportation.

Philosophical Assumptions and Interpretive Framework

An important aspect of qualitative research is to understand and report on the beliefs and philosophical assumptions that inform the research (Creswell, 2013). This research is based on the epistemological assumption that knowledge and understanding can be developed through the subjective experiences of individuals (Creswell, 2013). I approach this research primarily through a postpositivist interpretive framework, which applies a scientific and systematic approach to the research plan, data collection, and analysis. Aspects of postpositivism, which are also relevant to this research, include an emphasis on understanding multiple perspectives from

participants and utilizing multiple methods of data collection and analysis (Creswell, 2013; Niebauer et al., 2020). **Study 2**, for example, conducted research in the field through a combination of interviewing and observational methods of multiple participants to collect information and data firsthand (Creswell, 2013).

The research questions and methods are also guided by a priori theoretical frameworks, namely, an Adapted Ecological Model of Active Transportation for Older Adults, adapted from the Ecological Model of Four Domains of Active Living (Sallis et al., 2006). Utilization of this framework applies a behavioral science lens which aligns with a postpositivist perspective of the likelihood of behavior change given certain conditions are met (Creswell, 2013).

Study 1 Methods

For Study Aim 1 and its corresponding research questions, the research utilized a content analysis-informed methodology to analyze a selection of policy frameworks and strategic planning documents to identify and describe DC's policy environment as it relates to active transportation and considerations for older adults. Preparation for the document analysis included a systematic review of best policy practices and recommendations for age-friendly active transportation which provided initial terms and coding categories needed for this approach. Therefore, methods for this study occurred in two phases: 1) systematic expert opinion and policy review, and 2) qualitative content analysis. Definitions and descriptions of the processes followed for these methods are provided in the sections that follow.

Phase 1: Expert Opinion and Policy Review

Overview. An expert opinion and policy review is a type of systematic review that complements peer-reviewed literature with the inclusion and synthesis of policy, expert opinion, and other credible text about a given topic (Munn et al., 2018; Sutton et al., 2019). The Joanna

Briggs Institute (JBI)—a research institution that provides formal guidance for systematic reviews—has indicated that expert opinion and policy review is appropriate for analyzing policies and may include expert opinions and consensus statements drawn from journals, reports, and other sources of grey literature (McArthur et al., 2020). Munn et al. (2018) have also identified expert opinion and policy systematic reviews as a valuable method in the health sciences for compiling and synthesizing expert opinion together with existing empirical research. While this type of review does not exclusively rely on primary research as its basis of evidence, it follows a documented protocol similar to other systematic review approaches (McArthur et al., 2020). Researchers have used similar approaches to examine policy recommendations for topics including obesity prevention and the promotion of wellbeing for inner city-dwelling older adults (Huang et al., 2014; Lobstein & Brownell, 2021). These examples helped to guide this component of the research.

The systematic policy and expert opinion review was done to identify current best available evidence and policy recommendations for community-level, age-friendly transport policies and interventions in urban settings. The review identified and compiled available evidence of best practices for integrating accommodations or considerations that address the needs of aging and older adults within active transportation systems and policies. This provided a frame of reference and benchmark against which to analyze and describe the policy environment within Washington, DC and answer the study's research questions. Importantly, this review also helped to generate and define the initial codes and categories that were needed for the subsequent content analysis phase of the study.

Research Plan. The systematic expert opinion and policy review served to identify current best available evidence and policy recommendations for community-level transport

policies, interventions, and practices that address the needs of aging and older adults within active transportation systems and policies. The protocol for this review was informed by guidelines published by JBI (McArthur et al., 2020). These guidelines aim to 1) clarify inclusion criteria for the review, 2) describe strategies for the systematic search, 3) identify tools for quality assessment, and 4) outline processes for recording and synthesizing data.

Inclusion Criteria. Inclusion criteria with respect to the population, intervention/phenomena of interest, and context (PICo) details of the review are described below.

Population of Interest: The population of interest are older adults, defined as those aged 65 years and older, and who live within cities or urban settings.

Intervention/Phenomena of Interest: The review intends to identify and consider policies, guidelines, and recommendations that describe opportunities or show evidence for enabling and/or promoting active transportation within older adult populations, particularly as they relate to the built environment. Policies, guidelines, and recommendations that identify elements intended to promote or enhance active transportation for vulnerable populations within the wider community are also considered.

Context: The context of the review focused on identifying evidence-based policy recommendations are associated with positive active transportation and physical activity outcomes for older adults within urban settings. This is focused on policies that are relevant within the context of US cities but acknowledging that they could be informed by policies and strategies based on evidence from international settings. Policies that are specific to making accommodations or considerations for older adults needed to be appropriate for urban-dwelling older adults. Policy recommendations identified in the review were relevant to community-level policies (actions that can be taken and implemented at the level of local jurisdictions). Policies,

recommendations, or guidelines that are intended for implementation by regional, state, or national level actors were not considered in the review. Additionally, reports or guidelines that have been published for a specific state, region, or other jurisdiction were not considered.

Types of Publications. In addition to a review of published, peer-reviewed literature, the systematic review considered expert opinion and policy recommendations published through grey literature in expert consensus documents, policy reports or statements, and other reports and sources from professional organizations, which included information published on web pages. The review only considered publications, reports, etc. that were published in the English language. Additionally, only publications and records published after 2015 were considered to ensure that policy recommendations were in line with current and recent research.

Search Strategy. The aim of the search strategy was to obtain and compile all publicly available documents that were relevant to the systematic review of recommendations for enabling and promoting age-friendly active transportation for older adults.

A multi-step strategy was used for the review. First, an initial search of the PubMed database was done using varying combinations of search terms related to 1) the topic of interest, i.e., "active transportation," "active transport," "active transit," and "built environment," and 2) the type of recommendations, i.e., "policies" or "strategies," and 3) the population of interest, i.e., "older adults." Additional keywords included "recommendations," "guidance," and "interventions."

This initial search was followed by an analysis of the title, abstract, and index terms of the initial results to identify any additional terms or keywords. Following this step, a second search was done using the search terms outlined above, plus additional keywords and index terms, across PubMed, Web of Science, and Google Scholar databases. The third step of the

search strategy reviewed reference lists of identified articles or papers to search for additional resources. This review led to additional sources from the grey literature.

A final search strategy included a Google search, using the same combinations of terms and keywords, to identify other sources of grey literature that did not appear in the other databases. Given the vast number of results from the Google search, only the first 50 results were screened, following advice from Godin et al. (2015). This search also browsed targeted websites of professional organizations and agencies, which were identified based on those referenced in earlier articles and prior knowledge of known experts in the field (Godin et al., 2015).

Lists of citations from each search were saved and exported to Covidence—a tool that supports these processes and which is available through GW Himmelfarb Health Sciences Library—for screening against the inclusion/exclusion criteria, assessment of quality, and for data extraction.

Assessment of Quality. Evidence-based policies and recommendations identified within peer-reviewed articles and publications were considered valid for inclusion in the review. All other expert opinion and policy reports, statements, sources from professional organizations and other sources of grey literature were also assessed for credibility using the JBI Critical Appraisal Checklist for Text and Opinion Papers (McArthur et al., 2020) (see Appendix B).

Data Extraction. The textual data and information extracted from papers included in the review followed a standardized approach, which helped to minimize error and provide consistency within the dataset for categorization, analysis, and synthesis of the policy recommendations (McArthur et al., 2020). The data extracted included details about the type of text or source included in the review (e.g., systematic review, consensus statement, white paper), the relevant population (e.g., older adult population), the conclusions made (i.e., the verbatim

policy recommendation or guideline), and the expected outcome (e.g., to support walking for transportation).

Once conclusions (policy recommendations) were identified from papers included in the systematic review, they were compiled and categorized based on their similarity. Policy recommendations were also categorized according to the scales of policy interventions described by Young et al. (2020): the macroscale, mesoscale, and microscale. As previously described in Chapter 2, the macroscale refers to high-level zoning ordinances and planning processes that affect the density and mix of land use within a community. The mesoscale includes actions that govern the networks and facilities within neighborhoods and communities that enable active transport, such as sidewalks, bicycle lanes, public transit service, as well as the funding and programs that support those networks and facilities. The microscale includes design and functional details that promote convenience, safety, and accessibility of active modes of transportation. These details may include benches, street lighting, trees, bicycle racks, traffic control measures, etc. (Mogaji & Uzondu, 2022; Young et al., 2020).

These conclusions and categories of conclusions served as the basis of a codebook to identify key words and phrases to use for the subsequent content analysis of strategic planning documents (Phase 2), as described in the following section.

Searches, screenings, and data extraction were documented using Covidence.

Phase 2: Policy Content Analysis

Content analysis is a research method which systematically interprets verbal, visual, or written data in order to describe a phenomenon (Bengtsson, 2016). As it pertains to written text, it is a process which facilitates a deeper examination of data to create organized categories of information (Kleinheksel et al., 2020). This research method has been used previously to

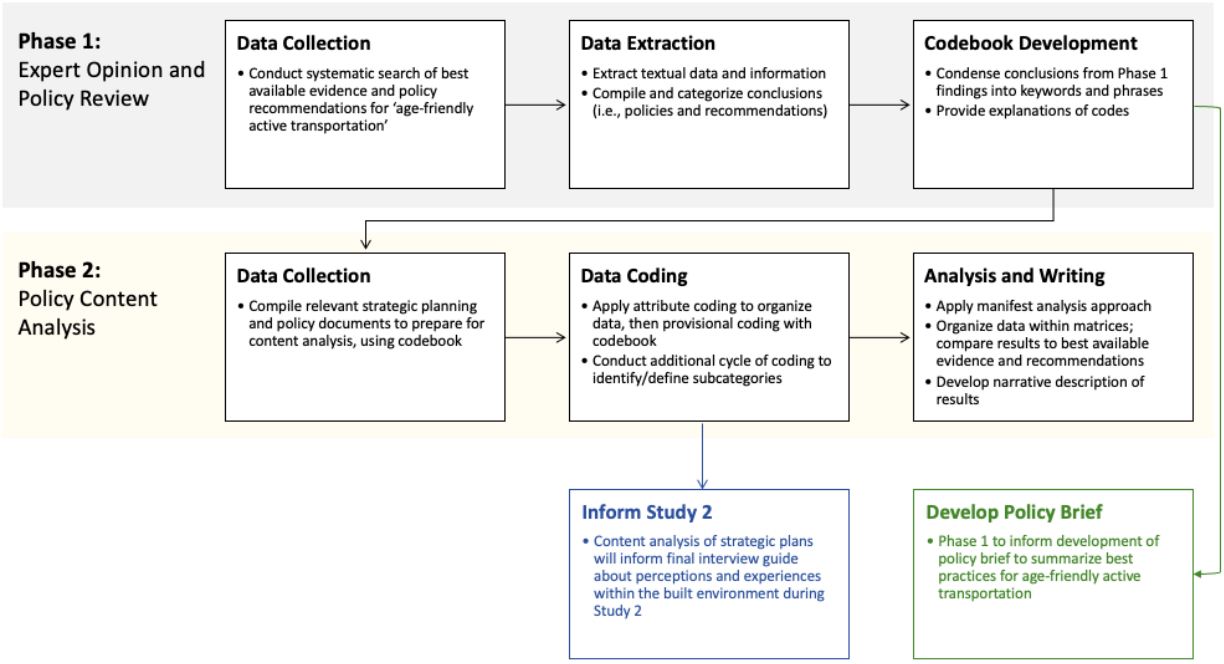
systematically review and examine policy documents, such as strategic and action planning documents, to identify common themes and potential gaps in transportation and climate health policies (Randazza et al., 2023; Singleton & Clifton, 2017). These two examples from Randazza et al. (2023) and Singleton & Clifton (2017) were used as models to help guide this approach.

It is important to note that the analysis and discussion of policies within the context of strategic and action planning documents used in this research represent organizational goals and directions, as opposed to formal policies and regulations established through formal legislation (Bryson et al., 2018). An understanding of the policies and strategies within these types of documents were expected to provide valuable insight into current and long-term community priorities (Randazza et al., 2023; Singleton & Clifton, 2017).

This content analysis reviewed a purposively selected sample of citywide strategic and state planning documents pertaining to policies and interventions that support active transportation. The selection of strategic planning documents was informed by findings from the literature review (see Chapter 2), which identified the particular role of health, urban planning, and transportation sectors in supporting active transportation within communities. Content analysis methods were used to explore these selected strategic planning and policy documents to identify specific policies, strategies, and other guiding frameworks that reflect efforts to support and enable active modes of transportation for older adults within Washington, DC. This analysis helped to draw comparisons and conclusions about their alignment with general policy recommendations and best available evidence for community active transport policies that include or specify accommodations for aging and older adult populations. (See Figure 3 for a summary of Study 1 activities.)

Figure 3

Study 1: Flowchart of Phase 1 and Phase 2 Activities



Research Plan. Preparation for the qualitative content analysis—the approach used to achieve Study Aim 1 and corresponding research questions—began with the systematic expert opinion and policy review (as previously described) to select and compile current recommendations for community-level active transportation policies and interventions, including those that are relevant to older adult populations.

Following Phase 1, the content analysis reviewed a select sample of planning and policy documents pertaining to policies, programs, and interventions within Washington, DC. The pool of data included citywide strategic planning documents that have been implemented by the city government of Washington, DC. This approach was modeled from previous studies that have conducted similar analyses of policy and strategic planning documents. Randazza et al. (2023), for example, collected heat action plans across multiple municipalities in the US through web searches and targeted outreach, which were then included for analysis based on relevant,

predefined criteria to determine alignment with evidence-based practices. Singleton & Clifton (2017) provided another useful example through their content analysis of long-range transportation plans. While both examples used a selection of policy and planning documents across multiple municipalities within a narrowly-defined sector, this research restricted its scope to policy and planning documents within a single municipality and with a topic that involves multiple sectors.

The process for conducting the content analysis of strategic planning and policy documents followed a multi-step process: 1) clarify and document the inclusion and exclusion criteria for texts to be included for analysis, 2) define the categories of data (units of meaning) to be used for coding, 3) develop and refine the codebook and coding rules, 4) code the selected text, and 5) analyze results and develop conclusions.

Inclusion and Exclusion Criteria. As summarized in Chapter 2, scholarly literature often highlights urban planning, transportation, and health sectors as those with the most influence and stake in developing and implementing policies and interventions in support of active transportation (Giles-Corti et al., 2016). Therefore, documents used for analysis were purposively selected to include citywide strategic plans that have been developed and published by the District of Columbia departments and agencies that most closely correspond to urban planning, transportation, and health sectors: District of Columbia Office of Planning, District Department of Transportation, and the District Department of Health (About DDOT, n.d.; About the DC Office of Planning, n.d.; District Department of Health, n.d.). Additionally, since the research is focused around the older adult population, strategic planning documents from Age-Friendly DC and the Department of Aging and Community Living were also included for

analysis (Age-Friendly DC 2023 Strategic Plan, 2018; Department of Aging and Community Living, 2023).

The selection and inclusion of strategic planning documents was based on the following criteria: 1) plans should have a citywide focus, 2) plans were the most current and active versions publicly available, 3) plans were sourced from government agencies or departments which correspond to urban design and planning, transportation, health, and aging/age-friendly sectors. Additionally, subplans or guidelines that were explicitly referenced, but which were not detailed in depth within the strategic planning documents themselves, were included for review, e.g., the Vision Zero Action Plan (Government of the District of Columbia, 2015).

Categories of Analysis. The units of meaning that were coded were specific policies, guidelines, recommendations, or other strategies that are expected to positively impact active transportation or physical activity for older adults, based on findings of best available evidence and recommendations identified through the Phase 1 policy review. As described in Phase 1, categorizations of these units were based on macroscale, mesoscale, and microscale types of interventions.

Codebook Development. Findings from Phase 1 (expert opinion and policy review) informed development of the codebook used for the content analysis of strategic planning and policy documents (Phase 2). After the policies and recommendations identified from Phase 1 were categorized, they were condensed into keywords and phrases. These keywords and phrases aimed to convey the original meaning of the policy/recommendation and also served as provisional codes to use for analysis. These codes were used to develop the codebook for the content analysis of strategic planning documents and policy frameworks. The codebook also included definitions and directions for use for each code.

Coding of Documents. For organizational purposes, an initial coding strategy—attribute coding—was used as a first step to organize data according to the type of document, its source, publication date, and implementation time frame. Since a start list of codes was already identified and defined within the codebook, a provisional coding method was used to deductively code strategic planning documents and policy frameworks. Documents were coded independently.

Analysis. This research relied on policy plans and reports as sources of data, which are inherently precise and intentional with the language used. Therefore, the coding and analysis of these documents primarily relied on a manifest content analysis methodology—as opposed to latent analysis—, which focuses on data and language that are easily observable (Bengtsson, 2016; Kleinheksel et al., 2020).

After coding, a data matrix was developed to indicate instances where policy recommendations were observed to either be: 1) explicitly stated, or 2) not explicitly stated, but partially addressed or inferred by the language of the document. Organization within this matrix facilitated visualization and analysis of the policy environment in DC related to active transportation, the needs of older adults, and potential gaps and opportunities to further support age-friendly active transportation within the community, thus helping to address Research Questions #1 and #3. It also facilitated analysis of the alignment of active transportation-related policies and strategies between the *Age-Friendly DC 2023 Strategic Plan* and other strategic planning documents, addressing Research Question #2.

A description of results in Chapter 4 highlight and summarize instances where strategic planning and policy documents reflect polices and strategies that are expected to support age-friendly active transportation within the city, as well as provide discussion of their alignment

with the policy recommendations. Additional discussion of results highlights the integration—or lack thereof—between active transportation and age-friendly efforts. The analysis and discussion highlight successes and remaining gaps within the policy environment, providing policy directions for future efforts around active transportation and accommodations for aging populations, particularly within the context of Washington, DC.

Coding and analyses of qualitative data was performed using ATLAS.ti 24.2.1 for Mac

Policy Brief

In addition to the manuscript that was developed for Study 1 (see Chapter 4), a policy brief was developed as a supplemental product to summarize the public health issue related to aging populations and opportunities to promote physical activity and health outcomes through age-friendly active transportation. The brief was informed by findings from Phase 1—the systematic review of expert opinion and community-level policies, interventions, and practices that address the needs of aging and older adults within active transportation systems. It provides an outline of best practice policy recommendations for integrating age-friendly considerations together with active transportation efforts. The policy brief has been developed with policymakers and local community leaders in mind as the intended audience, and for use by other interested stakeholders to support awareness and advocacy efforts. See Appendix C.

Study 2 Methods

Qualitative research methods for Study 2 utilized a basic interpretive study design, which seeks to understand how people interpret and make sense of their experiences with a certain phenomenon (Merriam & Tisdell, 2015). This type of study was chosen based on the broad, exploratory nature of the study and research questions—which did not align with other types of qualitative research, e.g., phenomenology, grounded theory, etc. This provided an opportunity to

explore how older adults describe various levels of influence—informed by the study's theoretical framework—that may interact and impact their active transportation behavior in Washington, DC.

A combination of interviewing, observation, and visual data collection methods provided data for analysis and interpretation. Interviewing strategies included "walking interviews," which were audio recorded and transcribed verbatim. Visual data was documented through photographs, and additional observational data was collected through field notes. The interview guide and protocol were informed, in part, by findings from Study 1. The guide and protocol were also informed by findings from the literature review which revealed the importance of the built environment and neighborhood walkability, as well as potential influences from individual perceptions of the environment (safety from traffic and crime, proximity to desirable destinations), factors within natural environment (weather, seasons) and social environment (social connections), and other intrapersonal factors (age, self-efficacy, chronic conditions) (Barnett et al., 2016; Brüchert et al., 2020; Cao et al., 2019; Cerin et al., 2017; Choe et al., 2022; Hoehner et al., 2005; Klicnik & Dogra, 2019; Mertens et al., 2019; Sallis et al., 2006; Stroope, 2021; Van Cauwenberg, Van Holle, et al., 2012). Interview transcripts and other observational data were coded using multiple coding strategies to prepare for analysis, interpretation, and reporting of results.

Additional information about the study setting, population, and approaches to data collection and analysis are discussed in the following sections.

Study Setting and Population

As of 2024, the District of Columbia was home to an estimated 100,469 older adults—defined as adults aged 65 years and older—, representing approximately 15% of the city's total

population (DC Health Matters, 2024). Due to the geographic size of the city and feasibility constraints for this study, the research focused on a subgroup of the broader older adult population within the city. The District of Columbia is geographically divided into eight wards and demographic data and statistics are typically reported according to these geographic areas. Given the convenience of these established boundaries, and the data that is made available at ward-level, it was decided to select one of these wards as the study site for participant recruitment and sampling. Specifically, Ward 5 was selected as the primary setting for this study. This selection was based on factors that aimed to 1) ensure a robust sampling pool of potential study participants, and 2) illuminate the range of typical experiences and perceptions of the broader older adult population across the city. Considerations about the potential effects of gentrification within Ward 5, as well as its racial demography, are also highlighted to provide additional context for the study setting.

To accomplish the first objective, the total populations of older adults were compared across different wards of DC. The two wards with the greatest total numbers of older adult residents were found to be Wards 4 and 5, with older adults representing 17.14% and 15.9% of their respective populations (DC Health Matters Collaborative, 2022). After identifying the wards representing the greatest numbers of older adults, consideration of the second objective was based on a review of available data which related to older adults' access to public transportation, their average level of income, and the land-use diversity within each of these wards. In Chapter 2: Literature Review, each of these factors was found to have potential associations with older adults' utilization of active transportation. Discussion of these factors also provides additional background information about the older adult population in Ward 5 and provided useful context for understanding and interpreting data during analysis.

Access to Public Transit. A geospatial map published in 2020 shows the number of older adults within each census tract of DC with limited access to public transit (as defined by those who do and do not live within one mile of a Metrorail station and within 200 meters of a Metrobus station) (*The State of Older Adults in the District of Columbia*, 2020). According to the map, both Wards 4 and 5 contain several census tracts where significant numbers of older adults appear to live without access to public transit, more so than other wards in DC (though the majority of census tracts within each ward indicate that many older adults do live in proximity to public transit stations/stops) (*The State of Older Adults in the District of Columbia*, 2020). Walking and public transportation, however, has been reported to be more difficult in Ward 5 (and Wards 7 and 8) than in other wards (DC Hunger Solutions, 2020), which indicated potential for a sampling pool of individuals likely to discuss a range of perspectives and/or ongoing challenges in relation to walking and active transportation within this city sector.

Income. Since lower income older adults tend to have fewer opportunities and increased disadvantages and barriers to engaging in active transportation, namely in relation to access to public transit and the ability to access desirable destinations, average income was also a factor in considering study site selection (Choe et al., 2022; Rozynek & Lanzendorf, 2023). Compared to other wards, Ward 5 was found to contain the greatest number of lower-earning older adult households, though rates of poverty are comparable to older adults across the other Wards (*The State of Older Adults in the District of Columbia*, 2020). Nearly 20% of the lowest-earning households across DC live within Ward 5, and median income for these households is reported to be $20,980 (*The State of Older Adults in the District of Columbia*, 2020). Similar to the consideration of access to public transit, a sampling pool with a greater number of lower-income

households and individuals was expected to help create opportunities to highlight their unique experiences and challenges in relation to active transportation.

Built Environment and Land-Use Diversity. In terms of the built environment and zoning, Ward 4 is described as being primarily residential (Office of Planning, n.d.-a). In contrast, narrative descriptions of Ward 5 indicate that it contains a diverse mix of residential areas, mixed-use development neighborhoods, new high-rise development areas, industrial land, and open spaces (Office of Planning, n.d.-b). This variety in land use and built environment across Ward 5 was expected to contribute to a range of rich and unique perspectives from participants who live and travel within different types of neighborhood environments. Additionally, a number of public works and mixed-use development projects have been implemented across various neighborhoods of Ward 5 in recent years to improve public spaces, streetscapes, and connectivity, which was expected to illuminate study participants' perceptions of successes, failures, or remaining gaps in policy and implementation (Office of Planning, n.d.-b).

Within this context of recent mixed-used development and infrastructure projects in Ward 5, however, potentially negative side effects have also been reported. Researchers and reporters have pointed to Ward 5 for example cases of gentrification in DC, with new infrastructure and an influx of working-age adults resulting in many older residents being displaced due to increased rent and costs of living (Burkly, 2020; Crewe, 2017). In response, some local leaders have attempted to support lower-income older adults by challenging the placement of new housing developments (Weil & Brice-Saddler, 2021). However, for long-term residents who have been able to remain, another potential effect has been the loss of social

capital and ties to familiar community establishments which can exacerbate social isolation among older adults (Burkly, 2020; Crewe, 2017).

Though the object of the study was focused on experiences related to active transportation, data collection and analysis were approached with an understanding of the changing and developing urban context of Ward 5 and that its effects within the study setting could impact participants' perceptions and attitudes towards the development of walking and bicycling infrastructure and other aspects of active transportation within their environments.

Race. Demographic data showing the racial composition of older adult populations within each ward in DC were not available, therefore, it was not a primary factor in selecting the study setting. However, some background about the racial history and characteristics of Ward 5 and DC as a whole helps to provide additional, important context about this study setting and potential participants.

The racial composition of DC has fluctuated throughout its history, but by the 1970s the Black population made up approximately 70% of the total population (Kijakazi et al., 2016). This majority has gradually declined—in part due to negative impacts of gentrification—and Black and African American residents currently represent approximately 40% of DC's total population (DC Health Matters Collaborative, 2022; Kijakazi et al., 2016; King et al., 2022). Within Ward 5, however, Black and African American residents still remain the majority racial group, representing nearly 46% of the population (DC Health Matters Collaborative, 2023). White residents comprise 34% of the ward's population and 9% identify with two or more races (DC Health Matters Collaborative, 2023).

The racial demographics of the study setting—particularly in relation to the Black and African American population— are especially important to note given the history of early

American slavery and the ongoing effects of structural racism within DC, which have often impacted many social determinants of health among the Black population (King et al., 2022). Many practices and policies—both federal and local—have disproportionately impacted Black residents and their neighborhoods, including within Ward 5. Such practices have included zoning practices which limited investments in predominantly Black neighborhoods (King et al., 2022). Additionally, many policies have historically led to inequitable access to education, housing, and healthcare for Black residents, limiting opportunities to build generational wealth and thus often contributing to disproportionate impacts of gentrification for Black residents (Kijakazi et al., 2016; King et al., 2022).

While the aim of this particular study was not to investigate racial inequities or the impacts of structural racism, a basic understanding of this history and background in relation to the racial demographics of the study population served to contextualize and deepen understanding of participants' perspectives and attitudes towards active transport and the built environment within their neighborhoods. This awareness provided valuable context during data analysis and interpretation.

Summary. When comparing demographics of the older adult population across DC, both Wards 4 and 5 were found to have the greatest numbers of older adult residents (DC Health Matters Collaborative, 2022). In terms of public transit access, a factor with potential associations to the use of active transportation, both Wards 4 and 5 also appear to show a mix of older adult residents with and without proximate access to public transit, though Ward 5 has been cited as one where residents may experience greater challenges with walking and public transit (DC Hunger Solutions, 2020; *The State of Older Adults in the District of Columbia*, 2020). When considering additional factors (land-use diversity and recent development within the built

environment and average income levels), Ward 5 appears to be unique from Ward 4 in that it contains a broader mix of land-use types and greater numbers of lower-income and disadvantaged older adult residents (Office of Planning, n.d.-b; *The State of Older Adults in the District of Columbia*, 2020). In addition to containing a large population of older adult residents, these demographic and environmental characteristics within Ward 5 are expected to help maximize the potential for diverse experiences and perspectives, which may help to represent the range of typical experiences of the broader older adult population in DC. Additionally, knowledge of the racial demographics of Ward 5, as well as awareness of history and impacts of inequities for the majority Black community within this study setting provides valuable context for a deeper, more comprehensive understanding of the environments in which participants perceived and discussed the research topics.

Data Collection

Overview. The primary method of data collection for this research involved walking interviews with study participants. The walking interview method in social sciences has been attributed to Jean-Paul Thibaud (Thibaud & Grosjean, 2001) and has also been known in the literature as "go-along interviews," "walk-along interviews," "commented routes," "parcour commentée," or "marche commentée." The method was initially developed within the context of sociology research but has since become an increasingly recognized and popular qualitative method of research across multiple fields, including public health, transportation, and urban planning (Thibaud & Grosjean, 2001).

Walking interviews typically consist of an interview conducted with at least one interviewer and one study participant as they walk together along a route. This method combines interviewing and observational methods and creates an opportunity for the participant to describe

their thoughts and experiences as they actively move through an environment (e.g., neighborhood or other local area of research interest) (Amaya, Chardon, et al., 2022; Carpiano, 2009). This strategy is believed to elicit themes and feedback about neighborhood environments during the time of exposure that might not be achieved during traditional sit-down interviews (Carpiano, 2009; Van Cauwenberg, Van Holle, et al., 2012).

For the researcher, the walking interview method is also an opportunity to collect observational data about neighborhood environments, as well as how participants process and navigate their environments (Carpiano, 2009). Observations can be documented through photograph or video recording of environmental factors that may be discussed by participants as being facilitators or barriers to walking for transportation (Amaya, Moulaert, et al., 2022). Additional observations that are non-visual or difficult to capture in photograph or video can also be recorded through descriptive and reflective field notes (Amaya, Chardon, et al., 2022).

Walking interviews are recognized as a valuable qualitative method of research on active transportation in the published literature, including among the older adult population. However, very few studies using this method have been published within a North American setting. Among studies that were identified in a systematic review by Amaya et al. (2022) using this method with older adults to study active transportation behavior, eight studies were found to have been conducted in North America. Of those studies, however, all were conducted in Canada, meaning there appears to be no published study of this kind and about this topic among an older adult population within the context of a US city. Despite the lack of literature on this method with similar study populations within a US context, other studies from urban environments in Belgium, Toronto, the United Kingdom and elsewhere provided useful

examples to help inform and guide this method of data collection (Lee & Dean, 2018; Van Cauwenberg, Van Holle, et al., 2012; Zandieh et al., 2017).

Study Participants. Walking interviews were conducted with 15 older adults, aged 65 years and older, who were current residents of Ward 5 of Washington, DC for at least six months, which ensured they had some familiarity and experience within their neighborhood and community environment. For the purposes of this research—which aimed to understand the factors that influence older adults' active transportation behavior—, the study focused on a sample of older adults who reported to *at least occasionally* engage in active transport. This was to ensure that data reflected the current neighborhood environments in which participants live. Therefore, inclusion criteria included individuals who reported to at least occasionally walk or bike for transportation within the community.

Additional inclusion criteria included those who confirmed they were able and willing to walk outdoors independently for at least 30 minutes at a time and were able to converse in English. Given that the walking interview method is a low-impact activity and does not involve any exercise component or intervention, no additional physical activity/exercise readiness screening were used as criteria for eligibility. This decision was in line with other similar studies using this particular method and avoided unnecessarily restricting the potential sampling pool of participants (Amaya, Chardon, et al., 2022). Participants were excluded from the study if they declined to provide informed consent or otherwise indicated that they were not able to safely participate in the interview. A summary of inclusion and exclusion criteria for the walking interviews can be found in Table 2.

Table 2

Inclusion and Exclusion Criteria for Walking Interview Study Participants

Inclusion Criteria	Exclusion Criteria
Older adults (65+ years) who report to being: 1. A current resident of six months or longer in Ward 5 of Washington, DC 2. Able and willing to walk outdoors independently for at least 30 minutes 3. At least occasionally walk, bike, and/or use public transportation within the community 4. Able to converse in English	Individuals who: 1. Indicate inability to safely participate in the interview

The study set out to recruit and interview at least 12 and up to 15 participants. This objective was based on prior research indicating that sufficient data can be achieved with 12 interviews but should be a value judgment based on the researcher's understanding of the study sample and context of the research (Cober & Adams, 2020; Guest et al., 2006). Given that study participants were expected to be relatively homogenous in terms of age demographics and study environment, it was expected that 12-15 interviews would strike a balance between what was likely to provide sufficient data for analysis and what was feasible to achieve with the study. This was also in line with the range of sample sizes of several other similar studies (Amaya, Chardon, et al., 2022).

Study participants were recruited through both convenience and snowball sampling strategies, and occurred through the following methods:

1. In-person recruitment at Model Cities Senior Wellness Center by invitation,
2. Distribution of printed flyers at Model Cities Senior Wellness Center and Woodbridge Neighborhood Library by permission,
3. Email distribution of flyers via the Greater Brookland Intergenerational Village, and
4. Participants' word of mouth.

Recruitment messaging was developed to target the defined study sample, i.e., older adult residents of DC's Ward 5 who engage in active transportation—at least occasionally—within their neighborhood and community. Messaging avoided technical language or jargon that may have been unfamiliar to many people, such as the use of the term "active transportation." In order to be inclusive of individuals with a range of experience with active transportation, messaging was simple (e.g., "Do you ever walk or bike places?") to help ensure that potential participants who only engage in active transport occasionally still felt eligible to participate. The recruitment flyer used can be seen in Appendix D.

Ultimately, 15 older adults participated in the study, ranging in age from 65 to 84 years old. Fourteen participants identified as female and one as male. Nearly half of participants (n = 7) reported walking or biking almost every time they needed to go somewhere, while the remaining reported doing so "occasionally/sometimes" (n = 8). The majority also reported using public transportation at least occasionally when they needed to go places (n = 14). Additional demographic details, transportation usage, and other characteristics are detailed in Chapter 5.

Data Collection. Screening: Recruitment materials (flyers and email messaging) included a link for interested participants to complete an initial pre-screening eligibility survey and/or to contact the researcher directly through email or phone. In addition to other eligibility questions, the pre-screening survey included a Likert-scale question to gather information about the frequency of using active modes of transportation. This question helped to determine eligibility, as only individuals who reported to "at least occasionally" use active forms of transportation were considered for inclusion, while individuals who reported to "never" or "almost never" engage in active transport were not considered eligible for the study.

Following the prescreening eligibility questions, additional questions collected information about participants' use of public transit, given that it is commonly linked to active transportation behavior (Herbolsheimer et al., 2020). A Likert-scale question gauged the frequency of participants' use of public transit, with a follow-up question to clarify the type(s) most frequently used, i.e., bus, rail (Metrorail or DC Streetcar), or door-to-door shared ride services (MetroAccess). Responses to these questions were intended to enable additional analysis into potential patterns between subgroups of participants, such as differences in experiences between frequent versus occasional users of active modes of transportation or patterns among participants who may frequently rely on door-to-door transportation service compared to other public transportation options (which are more likely to incorporate some walking or bicycling activity). The survey also included questions to collect basic demographic information (age, race, gender, education level, and household income). Information collected from these questions also enabled the data to be stratified during later analysis to analyze potential trends and patterns among different demographic subgroups. (See Appendix E for the Prescreening Survey and Questionnaire.)

Potential participants who indicated interest were contacted by phone to 1) provide further introduction to the study and the interview method and process, 2) confirm eligibility, 3) obtain verbal informed consent, and 4) collect other basic demographic information and transportation usage information (if not already collected through the online survey option). Screening eligibility data, demographic data, and other survey information were collected and managed using GW's REDCap, hosted at Vanderbilt University, which is a secure, web-based application designed to support data capture for research studies (Harris et al., 2009).

Given the importance of negotiating productive relationships and connections with participants, all opportunities for communication and interaction were approached with intentionality to progressively build an ongoing research relationship with each participant (Maxwell, 2013). Therefore, in addition to the purpose of determining eligibility and providing information about the study, the screening, introductory, and other follow-up phone calls and email communications were approached as an opportunity for me, as the researcher, to engage in informal conversations and create social connections to establish trust and rapport. It was also an opportunity to inform participants of the additional research assistant that would be joining interviews and indirectly support their relationship to them as well.

Walking Routes: During the initial screening call, participants were asked to identify a destination within a 10–12-minute walk of their home (or another nearby meeting place, if preferred) that they are likely to visit on a regular basis, e.g., grocery store, pharmacy, public transit station and to consider their preferred route for walking to the destination. Interview times were also scheduled with eligible participants. Follow-up emails were sent to confirm times, invite questions, and served as additional opportunities to re-engage in informal conversations to continue developing productive relationships with participants.

Complete walking routes were determined prior to interviewing. After participants identified a destination and preferred route to the destination themselves, the researcher identified a second route to travel back from the destination to the origin, based on availability and feasibility of alternative route options. The use of two different routes was intended to increase the number of environmental stimuli for the participant to experience and discuss (Amaya, Chardon, et al., 2022). The full planned route was then shared with participants prior to the interviews, which helped to ensure participants felt prepared and comfortable with the route.

Additionally, predetermined walking routes helped to ensure that interviews did not extend beyond a reasonable length of time. Interviews were planned to be approximately 30 minutes; however, some interviews went longer if participants chose to take breaks during the walk or conversed longer than expected.

Predetermined walking routes were mapped using Google Maps. Mapped routes served as a guide, if needed, during the walking interviews to remind the interview team and participant of the predetermined route.

Interview Team: The interview team included myself (GSM) and four student assistants, though only one student assistant was present during each interview. Interviews were conducted by GSM and followed a semi-structured interview protocol. Interviews were audio recorded to ensure data and discussions were fully and accurately captured for analysis. Each interview began with some time for informal conversations, "icebreaker" questions, introductions to the research assistant, and to obtain participants' written consent.

Observational methods and visual data collection were also integrated within the walking interviews and involved GSM as "participant as observer" and who completed descriptive and reflective field notes following each interview (Creswell, 2013). During the interviews, the accompanying research assistant—acting primarily in an "observer as participant" role—assisted with visual data collection by carrying the camera and taking pictures as directed by the participants. Following completion of each interview, GSM completed descriptive and reflective field notes to supplement the data and to capture non-visual information or other information that could not be well-documented otherwise (see Appendix G for the Observational Protocol).

Research Assistants: Given the multiple components and logistics of the walking interviews, student research assistants were recruited to provide support during the walking

interviews. Only one of the research assistants was present for each interview. The assistant's availability during interviews was expected to help minimize potential distractions to both the participant and interviewer, and to help provide functional support to the participant as an added measure of safety during the walk. Specific roles during the interviews included:

1. Carrying the camera and assisting participants with taking images/videos (or taking images/videos per direction of the participant), and
2. Providing directions according to the predetermined walking route,
3. Being prepared to offer functional support or assistance to participants, if needed.

As the primary researcher, I provided the assistants with training and preparation for their participation in the interviews. Training included an orientation meeting to provide background about the study topic, a detailed explanation about the study and research methods, and context about the study setting and population. Research assistants were also invited to consider their own subjectivity and positionality towards the research, particularly since none resided in or were previously familiar with the study setting. Student assistants also participated in multiple rounds of pilot testing of the interview guide and protocol.

The research assistants were recruited from among Master of Public Health (MPH) students at GW. In addition to their role during the walking interviews, research assistants provided support with conducting supplemental walkability audits following the same routes used for the walking interviews. Walkability audits provided an objective measure and evaluation of the built environment for walkability, offering an additional, valuable source of data to compare and analyze together with aspects of the perceived environment reported by study participants (*All About Walk Audits*, 2023).

Although the walk audits and supplemental study is outside the scope of this dissertation, I provided additional guidance and training to the student assistants for this supplemental research. Discussion about the participation and role of the research assistants, their anticipated access to confidential data, and participation in the supplemental walk audits was included within the IRB submission for this dissertation.

Recording and Devices: Interviews were recorded using a portable audio recorder, purchased with funding awarded from the GW School of Public Health's Office of Research Excellence. A lavalier microphone was used with the audio recorder, which was also purchased with the same funds. The lavalier microphone was small and discrete but helped to minimize background noise and improve the audio quality for transcriptions. The audio recorder and microphone were managed by the interviewer (GSM) to ensure proximity to the study participant for adequate audio levels in the recording.

Photographs and videos were recorded using a small digital camera. The research assistants managed the camera in order to limit distraction to the interviewer and participant. At the beginning of the interview, however, the study participant was invited to feel empowered to pause at any point during the interview to take photos or videos themselves. The research assistant was able to provide any support with demonstrating how to do so. A participant-driven approach to photo and video documentation helped to ensure that data focused on the participants' perspectives as opposed to the researcher's (Cleland & MacLeod, 2021).

Following interviews, audio recordings were imported to Otter.ai for automatic transcription, after which they were manually reviewed and cleaned, then shared with participants for edits, clarifications, or additional thoughts (*Otter.Ai*, n.d.). All data was saved to

a dedicated folder in Box with restricted access through GW's institutional account and later uploaded to ATLAS.ti for analysis.

Pilot Testing: Interview guides and observational protocols were pilot tested on four occasions prior to interviews with study participants. Each member of the interview team (GSM and the research assistants) was involved in pilot testing. Testing met several objectives, including:

1. To ensure that interview guides and questions were appropriate for the planned duration of the interviews,
2. To become familiar with use of the cameras,
3. To check that audio recording devices picked up audio without excessive background noise,
4. To confirm that the audio transcription platform was able to transcribe the recordings to a satisfactory level, and
5. To identify any other unanticipated or potential challenges that might arise during the interviews.

Minor adjustments to the interview guide and protocol were made based on insights gained during the pilot testing.

Incentives: Study participants received a "thank you" gift for their time and participation in the screening process and walking interview. Gifts consisted of a $25 Visa gift card and a digital pedometer.

Data Validation: Member checks are an important method of data validation and can help to minimize the risk of misinterpretation or misunderstanding of the data (Maxwell, 2013). Following each interview, complete transcripts and corresponding photos, videos, and field notes

were shared with participants. Each participant was invited to review the data and share back any clarifications, additional thoughts, or feedback. An additional opportunity for member checking was to provide participants with a summary of general themes and findings after preliminary data analysis was completed. Participants were also invited to share any additional thoughts, reflections, or feedback. With participants' consent, notes documented additional comments that were received. This also helped to promote ongoing contact and further emphasize the desire to engage in meaningful research relationships with participants.

Domains of Inquiry. A key advantage of walking interviews is the opportunity to elicit deeper understanding of the environment, therefore, a primary domain of inquiry during the interviews focused on environmental factors related to active transportation. Interviews followed a semi-structured protocol. In this semi-structured format, questions were meant to guide the interview but also allow flexibility to adjust according to participants' responses and ideas (Merriam & Tisdell, 2015). Therefore, interview questions did not follow an exact order but were rather based on the flow of conversation and responses.

Domains of inquiry were informed by the ecological layers of influence outlined within the study's theoretical framework, one of which aimed to focus on understanding participants' experiences and perceptions with elements of their behavior settings, i.e., their neighborhood and community environments, that may influence active transportation behavior. The interviews began with broad, open-ended questions that invited participants to describe their neighborhoods, discuss frequent destinations, and factors that influence their transportation decisions. Based on responses, probing and follow-up questions sought to further explore factors that may be experienced as facilitators or barriers to walking, bicycling, or using public transit, such as elements of the built environment, e.g., sidewalks, crosswalks, proximity to desirable

destinations, streetscapes and aesthetics, traffic, etc. “Feeling” questions about walking or biking for transport also created space to discuss additional perceptions of the environment, such as safety, crime, aesthetics, etc.

Additional domains of inquiry focused on other layers of influence that acted as either facilitators or barriers to active transportation. Based on findings from the literature review, these were expected to include intrapersonal factors (e.g., safety concerns, self-efficacy, mental health), social-cultural factors (e.g., social support or opportunities for socialization), and factors related to the natural environment (e.g., adverse weather conditions). Therefore, additional questions guided conversations to further explore how these (or other) factors impacted decision-making and experiences with active transit and how they could interact to influence decisions. Lastly, a domain of inquiry focused on the policy environment to explore how certain community policies and actions were perceived to impact the built environment or influence active transportation behavior in other ways. Development of questions and topics within the final interview guide and observational protocol—particularly related to the policy environment—were informed by findings from **Study 1** about specific policies, strategies, and interventions that have been implemented to modify the built environment and support active transportation within DC. Questions also invited participants to consider what suggestions they would have to make active transportation a more appealing or comfortable option within the community. (See Appendix F for the interview guide.)

Observations also documented in field notes and other specific aspects of the environment that were identified by the participant, whether positive or negative, were documented with photographs. (See Appendix G for the observation guide.)

Data Analysis

Following completion of each walking interview, audio recordings were transcribed using Otter.ai, an online platform that provides audio to text transcription (*Otter.Ai*, n.d.). Following the initial automatic transcription, they were manually reviewed and cleaned by the researcher (GSM) in preparation for analysis. Complete transcripts were sent to each participant for their review and to share any edits, clarifications, or additional thoughts that may not have been captured during the interview. Revisions or clarifications, when received, were used in place of original transcripts for analysis. Additional comments that participants wanted to share were included as supplemental data.

Data analysis included review and analysis of textual data compiled from interview transcripts, field notes, and memos, followed by visual data analysis of photographs and video recordings taken during walking interviews. While research assistants provided support during the data collection phase, data analysis and coding were completed independently.

Textual Data Analysis. Textual data analysis of interview transcripts and field notes followed an iterative process of First and Second Cycle coding. As guided by Saldaña (2013), the First Cycle of coding used direct and straightforward coding methods, while the Second Cycle of coding identified additional topics, further refined codes, and prepared for the integration and synthesis of data to begin building a narrative of findings (Saldaña, 2013). A thematic analysis approach was used with combined methods of deductive coding during the First Cycle of coding and inductive coding during the Second Cycle of coding.

Specific coding methods during the First Cycle of coding included the following:

1. Attribute coding: Given the different types and multiple sources of data that were collected, attribute coding was used as a first step to organize data according to type

(interview transcript, field note, photo/video) and according to the participant which each piece of data corresponded (using anonymized participant ID numbers). In addition to being useful for data management and organization, attribute coding also organized data according to participant demographics (age, gender, race, education level, and interview location) which provided an opportunity to analyze potential trends or themes between demographic or other subgroups.

2. Provisional coding: This research was developed around an a priori theoretical model; therefore, the primary domains of the model were used to create an initial coding list (Coffey & Atkinson, 1996; Saldaña, 2013). Based on the constructs of the model, predetermined codes included "intrapersonal factors," "perceived environment," "social-cultural environment," "natural environment," "behavior settings (built environment)," and "policy environment." Prior to coding, codes were defined and clarified within a codebook, after which deductive coding was done to review and categorize data accordingly. This coding strategy also served to refamiliarize myself with the data.
3. Structural coding: a structural coding method was also used to further organize data according to corresponding research questions. This approach helped to distinguish data that related primarily to specific or singular influencing factors (Research Question #1) as opposed to data that highlighted potential interactions between different factors (Research Question #2).

A Second Cycle of coding served to identify more specific topics and ideas discussed within the context of the broad provisional codes applied during the First Cycle. An inductive coding approach allowed flexibility to identify additional topics that were more specific and

unique to study participants' experiences and perceptions of active transportation. Primary coding methods during this cycle included descriptive coding and process coding.

1. Descriptive coding: An inductive, descriptive coding approach identified specific topics within the context of the ecological domains identified during the previous cycle of coding. Descriptive codes helped to summarize factors or barriers that were specific to these participants' experiences with active transportation.
2. Process coding: This coding method is appropriate for observational data, which was collected through field notes and visual data (Saldaña, 2013). Process codes helped to identify and illuminate observations of participants' actions and interactions within their neighborhood environments as they moved through them, which were documented in field notes.

Additional, iterative cycles of coding served to further define, combine, and revise codes. Codes were then categorized by similarities to identify and define emerging themes and subthemes of influences and experiences that were reported by participants. Memos were written to document decisions and reflections on coding and theming throughout the analytic process.

Emerging themes and subthemes were also analyzed according to demographic variables (age, gender, race, education level, and income) and transportation usage variables (frequency of active transportation and public transit usage), which data was collected during the initial screening survey. While this did not reveal any notable differences between demographic subgroups of participants, it did highlight differences in experiences between neighborhood locations which provided greater insight into future research directions.

Interview transcripts, field notes, and other textual data were coded independently. While this was a limitation of the research, analytic memos were written throughout data collection and

analysis to document the decisions made throughout the process (Saldaña, 2013). Review and debriefing with advisors and dissertation committee members, as well as member checking strategies, provided additional external checks and served to further support the validity and trustworthiness of the research and analysis.

Coding and analyses of qualitative textual data were performed using ATLAS.ti 25.0.1 for Mac.

Visual Data Analysis. In preparation for visual analysis of images and videos collected during walking interviews, a preliminary review was done to ensure images did not include identifiable individuals, especially of participants themselves. In cases where identifiable individuals were found, photo-editing software was used to blur or crop pieces of the image to ensure that participants' anonymity and confidentiality was preserved. Images that were edited for this purpose only used the edited version for analysis and reporting. Duplicate images or images that were nearly-identical only used one image for analysis, while duplicates were deleted.

After this preparation phase, analysis of the visual data followed the framework for Textual-Visual Thematic Analysis (TVTA) developed by Trombeta and Cox (2022). The framework was developed to provide guidance for analyzing visual data in conjunction with textual data. Since the visual data collected during walking interviews was intended to complement and correspond to the textual data collected through interviews and field notes, as opposed to being an independent source of data, the TVTA approach was a fitting and appropriate method of analysis. This method helped to ensure visual analysis remained in line with participants' experiences and remained focused on aspects that were relevant to the research questions (Trombeta & Cox, 2022).

The Textual-Visual Thematic Analysis outlined three phases of analysis, the first of which was to complete analysis of textual data (which was completed according to the methods described in the previous section). Second, visual data analysis analyzed images and videos and integrated them with textual data from corresponding interviews. Logistically, this integration involved compiling all data from each field experience—interview transcripts, field notes, images, and videos—together into a single file/folder within the analysis software. This not only helped with data management but also helped to facilitate the analysis of visual data directly next to the corresponding transcripts and field notes.

Once compiled together, visual data was coded using the same codes and definitions generated during textual data analysis. During the process of coding and analysis, Trombeta & Cox (2022) also suggest several guiding questions to help facilitate comparisons between textual and visual data. These questions include:

1. What is in the images that supports or reinforces what was learned from the interview data?
2. What is in the images that contradicts what was learned from the interview data?
3. What is in the images that is not in the interview?
4. What is in the interviews that is not in the images?

During this process, notes for each image were written to provide thoughts and responses to these guiding questions.

The third phase of visual analysis further integrated findings from the visual analysis with results from the discussions collected during the walking interviews. As suggested by Trombeta & Cox (2022), this process involve reviewing notes and memos for each image to provide a higher level review and analysis of overarching patterns or findings about the general

relationships identified between textual and visual data. Interview data was generally more reflective of the participants' perceived environment, while visual data helped to better capture aspects of the objective environment (behavior settings). Thus, analysis considered whether specific themes reflected in the images tend to either reinforce or contradict the interview data. Similarly, this phase of analysis considered any general themes about topics discussed during interviews that were *not* easily observed within the built environment or vice versa (any topics within the visual data that were *not* discussed or observed during interviews).

This pattern analysis of relationships between textual and visual data support identification and categorization of factors that appeared to be most salient and important (or unimportant) to older adults when engaging in active transportation. This process of visual analysis contributed to the discussion of findings gathered from interviews and other textual data.

Coding and analyses of qualitative visual data were performed in conjunction with textual data using ATLAS.ti 25.0.1 for Mac.

Ethical Considerations

Several ethical considerations were addressed throughout the recruitment, data collection, and analytic process. First, ongoing participant consent was provided prior to any study procedures. The study purpose and interview procedures were presented to participants both verbally and in writing. Verbal consent was obtained prior to collecting sensitive information and written consent was obtained before interviews. Participation was voluntary and participants were informed they could withdraw at any time. Second, the nature of walking interviews presented potential—though minimal—risk of harm due to injury. Eligibility screening limited participation to individuals who confirmed they were able and willing to participate in this type of interview. Third, participant confidentiality and anonymity were maintained throughout the

research process. All data was managed using secure, password-protected devices and servers. Participants were assigned an ID number and all data (audio, transcripts, photos, etc.) used ID numbers in place of names. Results have been reviewed to ensure no identifying information is or will be contained within reports, presentations, or publications created from the study. All study and data management procedures were implemented with approval of the George Washington University Office of Human Research Institutional Review Board.

Trustworthiness

Several strategies were used to enhance the trustworthiness of this study, including member checking strategies and triangulation from multiple data sources. Interviews were initially transcribed through Otter.ai, an automatic transcription software, after which the researcher manually reviewed, cleaned, and cross-checked them with the audio recordings. They were then shared with participants and invited to review, make edits and clarifications, or provide additional thoughts. This strategy minimized the risk of misinterpretation or misunderstanding the audio recordings and enhanced the validity of the transcribed data (Maxwell, 2013). Additionally, after initial analysis, a summary of general themes and findings were shared with participants for their review and feedback before finalizing reports. The trustworthiness of the study is also enhanced by the triangulation of data. The study incorporated multiple sources of data—interviews, observations, and photos—which contributed to the richness of data and helped to provide validity to the findings (Creswell, 2013). Results of the study were written to provide context for participants' comments and to preserve their voices, lending additional richness and accuracy to the study.

Researcher Subjectivity

In qualitative research, it is important for a researcher to be conscious of personal biases, beliefs, and values which may influence the study (Creswell, 2013). Clarifying and explaining researcher biases also contributes to the validity of the study and its conclusions (Maxwell, 2013). Therefore, it is important to acknowledge how my prior experiences, identify, and values may influence the ways I approach and understand this research.

My undergraduate studies first introduced to me a basic understanding of the economic and healthcare burdens that NCDs create across populations in the US and worldwide, as well as the physical, psychological, social, and financial burdens that NCDs create for individuals and families. Both professional and personal experiences have also exposed me to the realization that physical activity behavior may be one of the most impactful modifiable lifestyle factors for disease prevention and general wellbeing. In past professional experiences, I have worked on projects focused on researching and highlighting community efforts to promote active living and active transportation, which included a landscape review of policies, strategies, stakeholders relevant to these topics within the Washington, DC Metropolitan area. In my personal experiences—as is the case with many others—the impact of NCDs (cardiovascular disease, cancers, hypertension, and cognitive disorders) has been prevalent within my family. These experiences have further contributed to my understanding of some of the challenges and burdens that NCDs bring to families and communities and have reinforced my interest and commitment to contribute to this field of health.

In addition to my own experiences—both personal and professional—, I recognize the importance of acknowledging that I have approached this topic and research as a young, White male researcher. While I have lived in a community adjacent to Washington, DC for several years, I have never lived within the city of Washington, DC. Specific to Study 2, the study

setting in Ward 5 is a majority Black/African American community and I am aware that the effects of historical and systemic racism have impacted this community over generations. As an outsider to the community, I know that my background and identity severely limit my ability to understand these experiences and their full impact. I committed myself to ensuring that my limited understanding and experience in these regards contributed to a genuine curiosity and openness to listening to participants' voices and experiences attentively, to affirming that they are the true experts of their own community, and to engaging with them with humility and sensitivity. I was also cognizant of the need to build trust and authentic relationships with study participants, ensuring that they were fully informed of the intended purposes of the research and that they felt included and engaged in the research process.

Furthermore, I am aware that my personal experiences and the value that I ascribe to active living also limit my understanding of others who live in different environments, have different abilities, or hold different attitudes and values towards physical activity and active transport. For example, I have had the desire, financial means, and ability to choose to live in a neighborhood and environment that has well-maintained pedestrian, bicycling, and public transportation infrastructure. Because of where I live, I am able to very easily walk or bike to grocery stores, restaurants, and retail stores; to visit nearby friends; and to reach public transit stations, etc.—all without significant safety concerns or other barriers. It is sometimes easy for me to take for granted the active transportation opportunities that I am able to access, but which many people are not able to or may not value in the way that I do.

Lastly, I recognize that my younger age limits my understanding of older adults' experiences, challenges, perspectives, etc. However, given that I anticipate someday being an 'older adult' myself, I do have a personally vested interest in supporting community policies and

infrastructure that support their needs knowing that they may also benefit my generation and others that follow as we too grow older.

Therefore, as I have conducted research in this area, I made efforts to remain conscious of my own background, identity, values, and access and to be continually self-reflective about how they may have shaped my understanding and interpretations. Several approaches were taken to manage this subjectivity. First, these reflections about my social position and perspectives towards the research were documented prior to initiating either of the two studies. For Study 1, the use of a systematic process and documentation of procedures and decision-making help to minimize subjectivity and bias. In relation to Study 2, inserting myself within the field to build authentic relationships, engage with participants, and apply member checking strategies helped to deepen understanding of participants' lived experiences and environments and to limit my own subjective lens. Additionally, field notes and memos following each interview identified notable distinctions between participants' perspectives and my own. This was useful during data analysis and writing to ensure that written findings amplified participants' experiences and perspectives, rather than my own.

Chapter 4: Age-Friendly Active Transportation in Washington, DC: A Review of DC's Policy Environment

Abstract

Background: Physical activity is critical for health and wellbeing, particularly for older adults, yet many do not meet recommended activity levels. Active transportation—human-powered modes of travel, such as walking, bicycling, and rolling—provides a feasible and acceptable opportunity to increase physical activity within this population. Based on ecological frameworks that emphasize the role of the policy environment in influencing behavior, this study examines Washington, DC's policy environment to assess its alignment with evidence-based recommendations for promoting active transportation that accommodates older adults' needs.

Methods: A systematic review of expert opinion and policy was conducted following JBI protocol, which identified 101 recommendations for age-friendly active transportation. A subsequent content analysis was completed to review existing policies, strategies, and priorities contained within seven strategic and policy documents from DC's transportation, urban planning, health, and aging/age-friendly sectors.

Results: Findings revealed numerous instances of alignment between recommendations and current DC policies and strategies, such as the adoption of Complete Streets frameworks and integration of pedestrian-friendly design features. However, gaps remain, particularly in relation to monitoring and evaluation activities, certain infrastructure design features, and transit accommodations for older adults.

Conclusions: This study emphasizes the opportunity to integrate age-friendly and active transportation efforts as a strategy for supporting older adults' health and wellbeing. Findings

provide a menu of policy recommendations for supporting age-friendly active transportation, as well as actionable insights for policymakers and practitioners in Washington, DC.

Background

Physical activity is one of the most important behaviors for improving health and wellbeing, particularly for older adults (U.S. Department of Health and Human Services, 2023). In addition to chronic disease prevention and management, regular physical activity can support older adults' social, mental, and cognitive health (Cerin et al., 2017; U.S. Department of Health and Human Services, 2018).Within the United States, however, less than 15% of the older adult population is estimated to meet national physical activity guidelines for both aerobic and muscle-strengthening activities (U.S. Department of Health and Human Services, 2023). Levels of physical activity also tend to decline with increasing age, contributing to reduced mobility and the development or exacerbation of chronic conditions and cognitive disorders (Anderson & Durstine, 2019; Keadle et al., 2016; Suryadinata et al., 2020; Thompson & Chen, 2023).

As demographic shifts lead to a growing population of older adults, communities face significant health and economic imperatives to engage in efforts that support prolonged health, functioning and mobility, independence, and quality of life for older adults (Keadle et al., 2016; McAuliff et al., 2014). In response to this challenge, many communities have adopted the World Health Organization's initiative to build age-friendly communities, which aims to adapt policies, structures, and services that support healthy and active aging (World Health Organization, 2007). As communities also consider strategies for supporting older adults' physical activity, an important opportunity may to promote active transportation in tandem with age-friendly initiatives.

Active transportation is defined as any human-powered form of transportation or travel, which can include walking, bicycling, or using a wheelchair or mobility device (U.S. Department of Health and Human Services, 2023). The use of public transit is also closely linked to active transportation, as it typically requires individuals to actively travel to, from, or between transit stops to their destinations (Herbolsheimer et al., 2020). Older adults often consider active transportation—particularly walking for transportation—to be more accessible, feasible, and inexpensive than other forms of physical activity (Mertens et al., 2019; Nguyen & Mertens, 2021; Van Cauwenberg et al., 2013). Previous studies have also demonstrated that active transportation positively contributes to overall physical activity levels in older adults (Cerin et al., 2017). Utilization of active modes of transportation, however, depends on various influences that range from individual-level perceptions to various aspects of communities' built and policy environments (Brüchert et al., 2020; Cerin et al., 2017; Hoehner et al., 2005; Van Cauwenberg, Van Holle, et al., 2012).

Literature and Policy Gaps

Ecological models have been widely used as theoretical frameworks to understand physical activity behavior, including physical activity that occurs by means of active transportation. These models are characterized by the assumption that a range of factors across multiple levels—such as at intrapersonal, social environment, and built environment levels—exert influence on behavioral outcomes such as physical activity or active transportation behavior (Sallis et al., 2006). Notably, a distinguishing feature of ecological models is how the root causes of behavior may be attributed to the policy environment, which largely governs how the built environment and other levels are developed to support active transportation (Sallis et al., 2006).

Previous studies have identified individual, social, and environmental factors associated with active transportation behavior for older adults, such as low self-efficacy, concerns for personal safety, social opportunities, and lack of desirable destinations within proximity of their residences (Brüchert et al., 2020; Cerin et al., 2017; Hoehner et al., 2005; Mertens et al., 2019; Nguyen & Mertens, 2021; Van Cauwenberg, Clarys, et al., 2012). However, little of this research appears to be contextualized with an understanding of the existing policy environment in the communities where these factors have been explored. This may limit understanding of specific policy gaps or opportunities for local policymakers and practitioners to support active transportation in ways that accommodate older adults' needs and desires. Additionally, while the World Health Organization has promoted policy frameworks and guidelines for creating age-friendly communities, there is limited consideration for integrating active transportation considerations within these efforts. Broadly speaking, little guidance or research appears to be available for implementing "age-friendly active transportation" policies and practices, i.e., active transportation policies and interventions that integrate considerations specifically for the needs and desires of older adults (Klicnik & Dogra, 2019).

Setting

Washington, DC (DC) is an example of a community that has made strides in recent decades to support active transportation through strategic planning, policy, and infrastructural investments. The city also became a member of the World Health Organization Global Network for Age-Friendly Cities and Communities in 2012 (Age-Friendly DC, n.d.) and has since implemented strategic plans to guide efforts that support healthy aging, aging-in-place, and older adults' ability to access essential services (Age-Friendly DC 2023 Strategic Plan, 2018).

However, it is unclear how active transportation policies and strategies within the current policy environment in DC are aligned with concurrent age-friendly initiatives. Similarly, the degree to which active transportation-related policies integrate evidence-based considerations for older adults has not been studied.

Purpose

The primary aim of this study is to describe the policy environment around active transportation and physical activity within Washington, DC, understand how it addresses the needs of aging and older adults, and inform policymakers of opportunities to support age-friendly active transportation. Primary research questions include:

1. What are the policies and strategies in place within Washington, DC's current citywide health, transportation, and urban design strategic plans that reflect active transportation for older adults within the built environment?
2. How are these policies and strategies aligned with active transportation-related elements of the Age-Friendly DC 2023 Strategic Plan?
3. How do these policies and strategies align with current recommendations and best available evidence for community-level, age-friendly active transportation policies and interventions?

Through investigation of these questions, this study provides 1) a compilation of evidence-based policy recommendations for age-friendly active transportation, and 2) a deepened understanding of the policy environment in Washington, DC, as it relates to supporting active transportation for older adults within the community. Findings provide evidence, insights, and policy directions for policymakers and practitioners in DC and other communities to promote active transportation and physical activity within older adult populations.

Methods

Study Design and Rationale

No previous study, to the researcher's knowledge, has compiled best practices and policy recommendations for active transportation specific to the needs and desires of older adults. Therefore, to achieve this study's aim to analyze DC's active transportation policy environment for older adults, methods occurred in two phases: 1) a systematic review of expert opinion and policy recommendations for age-friendly active transportation, and 2) a content analysis of strategic planning and policy documents. The sections that follow provide further description of these methods.

Systematic Expert Opinion and Policy Review

Description of Method. An expert opinion and policy review is a type of systematic review that complements peer-reviewed literature with the inclusion and synthesis of policy, expert opinion, and other credible text about a given topic (Munn et al., 2018; Sutton et al., 2019). Methods for this systematic review followed protocol outlined by the Joanna Briggs Institute (JBI) to identify current best available evidence for community-level policies, interventions, and practices that address the needs of aging and older adults within active transportation systems and policies.

Inclusion Criteria. Table 3 shows the inclusion criteria for the systematic search with respect to the population, intervention/phenomena of interest, and context (PICo) of the review.

Table 3

Inclusion Criteria for Retrieving Best Practices and Policy Recommendations

	Criteria
Population of interest	Inclusive of older adults, defined as those aged 65 years and older, who live within cities or urban settings
Intervention/phenomena of interest	Policies, guidelines, and recommendations that describe opportunities or evidence for promoting active transportation within older adult populations
Context	Policies, guidelines, and recommendations that are appropriate for urban-dwelling older adults and relevant to the community level (i.e., actions that can be taken and implemented at the level of local jurisdictions)
Types of publications	Published, peer-reviewed literature (systematic reviews, literature reviews) Policy reports and policy statements Literature reviews Expert consensus documents Other reports and sources from web pages of professional organizations
Additional criteria	Published in English Published since 2015

Search Strategy. Search terms were developed and tested based on keywords ("active transport*") AND (policies) AND ("older adults"). Iterative searches were first conducted in PubMed to identify relevant synonyms and index terms, refine the search syntax, and confirm the relevance of results. The final search syntax was then adapted for Web of Science and Google Scholar. Results were filtered by those published in English and after January 2015, through the time of the search in May 2024. A similar syntax was also used to conduct Google searches to identify other sources of grey literature. Final search syntax can be seen in Appendix H.

Search results from PubMed and Web of Science were uploaded directly to Covidence for screening. Results from Google Scholar and Google searches were first screened externally, then relevant citations were uploaded to Covidence for additional screening (given the vast number of results from Google Scholar and Google, only the first 1000 results and first 50 results were screened from each database, respectively) (Godin et al., 2015). Reference lists of identified papers and articles were also reviewed to identify additional sources, which were also

uploaded to Covidence for further screening and review (*Covidence Systematic Review Software*, 2024).

Eligibility for inclusion in the review was determined by title and abstract screening to ensure relevance, followed by full-text review of remaining articles to ensure they met inclusion criteria. All articles, statements, and sources were then assessed for quality using the JBI Critical Appraisal Checklist for Text and Opinion Papers (McArthur et al., 2020). Screening, review, and quality assessment was conducted by a single author.

Data Extraction. Data extracted from each text included recommendations, guidelines, or other statements for policies and actions for active transportation relevant to older adult populations. Verbatim conclusions were extracted from each reference, then summarized into singular phrases or statements for each recommendation. Conclusions were then categorized according to scale of intervention as described by Young et al. (2020) (i.e., macroscale, mesoscale, and microscale), and finally condensed to remove duplicate recommendations and to combine similar recommendations. Policy recommendations were then organized further into subcategories within each scale and annotated to indicate the mode of active transportation with which the policy recommendations were associated. This list was then used as a benchmark of best practices and policy recommendations for age-friendly active transportation with which to review and analyze the policy environment in Washington, DC. See Appendix I for these annotations and a full list of sources for each policy recommendation.

A codebook was derived from this list in preparation for the policy content analysis phase of the study.

Policy Content Analysis

Document Selection. Content analysis is a research method that systematically interprets written, verbal, or visual data to describe a phenomenon (Bengtsson, 2016). Specific to written text, it facilitates an examination of data to create organized categories of information (Kleinheksel et al., 2020). The method has been used previously by Randazza et al. (2023) and Singleton & Clifton (2017) to systematically review and examine planning and policy documents. Following these examples, this study applied a similar approach to analyze purposively selected citywide strategic and action planning documents that contain organizational policies and strategies, distinct from legislative policies that carry legal authority.

Document selection was informed by a literature review that identified transportation, urban planning, and health sectors as those most relevant for supporting active transportation within communities (Giles-Corti et al., 2016), as well as the role of the aging and age-friendly sector for their relevance to supporting older adult populations. Additional criteria included: 1) having a citywide focus, 2) being the most recent and active versions publicly available, and 3) pertaining to the agencies or departments corresponding to the urban planning, transportation, health, and aging/age-friendly sectors in DC. Additionally, subplans explicitly referenced but not detailed in depth within strategic planning documents were considered for review.

Coding and Analysis. In preparation for document analysis, a coding framework was developed by creating individual codes and subcodes for policy recommendations that were identified through the systematic review. Codes were used to develop a codebook, which also included definitions and directions for use (see Appendix J).

A deductive coding method was used to review and code the strategic and action planning documents. Coding aimed to identify specific guidelines, policies, strategies, and other

instances that reflected age-friendly active transportation policy recommendations. After coding, a data matrix was developed to indicate instances where policy recommendations were observed to either be 1) explicitly stated, or 2) not explicitly stated, but partially addressed or inferred by the language of the document. Organization within this matrix facilitated visualization and analysis of the policy environment in DC related to active transportation, the needs of older adults, and potential gaps and opportunities to further support age-friendly active transportation within the community.

Documents were coded independently using ATLAS.ti 24.2.1 for Mac.

Results

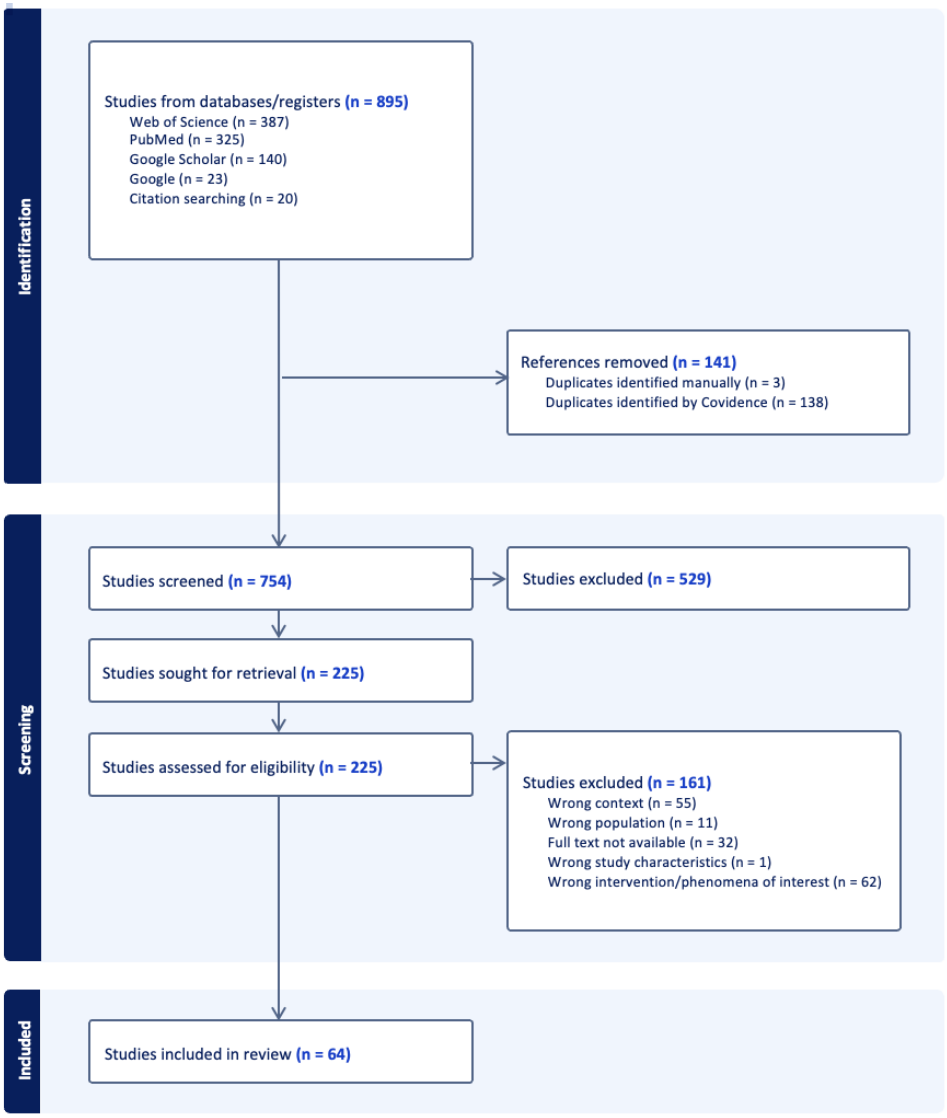
Systematic Expert Opinion and Policy Review

Search Results. In total, 895 articles and sources were identified from database and citation searches, of which 141 duplicates were removed. After title and abstract screening, 225 sources were retrieved for full-text review. After applying eligibility criteria and completing quality assessment of each source, 64 were included for data extraction. A PRISMA flowchart of search results can be seen in Figure 4.

Sources included 36 studies from published, peer-reviewed literature, including cross-sectional studies (n = 15), systematic, scoping, and umbrella reviews (n = 8), qualitative studies (n = 6), non-randomized experimental study (n = 1), and others (n = 6). Other sources of textual evidence and grey literature included consensus guidelines (n = 7), policy reports (n = 6), expert opinion articles (n = 4), narrative articles (n = 8), and other reports or articles from web pages of professional organizations (n = 3).

Figure 4

PRISMA Flowchart of Systemic Expert Opinion and Policy Review



Overview of Policy Recommendations. Previous research has described different levels at which active transportation policies and interventions might be considered: the macroscale (high-level planning and zoning processes), the mesoscale (networks, facilities, and programs that support active transportation), and the microscale (design and functional details that impact safety, accessibility, conveniences, and aesthetics) (Young et al., 2020). Extracted conclusions,

i.e., policy recommendations, from the systematic review were grouped according to these scales. Within each scale, policy recommendations were further organized thematically. Similar recommendations were combined and summarized as singular statements while retaining original meaning.

In all, 101 unique policy recommendations and best practices for supporting active transportation for older adults within communities were identified from the systematic review and grouped into 19 categories across the different scales of intervention. The following sections summarize these policy recommendations, beginning with those corresponding to the macroscale, followed by mesoscale, and lastly, microscale level of intervention.

Macroscale Policy Recommendations. Macroscale policy recommendations for age-friendly active transportation included the integration of certain considerations within community policy and strategic planning, such as considering multiple modes of transportation, adopting Complete Streets and similar policy frameworks, applying age-friendly and active transportation lenses within all planning efforts, and prioritizing equitable practices that consider the diversity of older adults' needs.

Other policy recommendations centered around land use and zoning (e.g., promoting mixed land use zoning, increasing housing density, and ensuring developments include access to transit and desirable destinations); collaborative governance and community engagement (e.g., promoting multisectoral collaboration and involving older adults in planning, implementation and decision-making processes); and monitoring and evaluation activities (e.g., identifying context-specific issues, such as through walkability audits, and evaluation planning documents to ensure consideration of older adults).

Mesoscale Policy Recommendations. Policy recommendations at the mesoscale included building and developing safe transportation systems that emphasize neighborhood walkability, bicycle networks that connect residential areas to common destinations, and accessible public transit networks. Additional recommendations emphasized traffic regulations to ensure older adults' safety, education and outreach to promote active transportation knowledge and skills and fostering a supportive social environment to increase opportunities for active transportation.

Microscale Policy Recommendations. The majority of microscale policy recommendations were related to the design of safe, pedestrian-friendly crossings and intersections (e.g., curb ramps that lead directly into sidewalks, high-visibility paint, extended crossing signal times, etc.). They also included aesthetic and functional enhancements for community and neighborhood environments (e.g., street trees and greenery; resting points with benches, shelters, and public toilets; and cleanliness of streets, sidewalks, and public transit). Additional recommendations centered around safe and adequate sidewalk infrastructure, bicycling infrastructure, lighting and signage, and accessibility features of public transit.

Policy Content Analysis

The following sections describe results pertaining to the content analysis of DC policy and planning documents. The documents selected for analysis are described. Findings about each category of policies identified within policy documents are then presented beginning with macroscale policies, then mesoscale policies, followed by microscale policies.

Document Selection. A review of DC department and agency websites corresponding to each previously identified sector (urban planning, transportation, health, and aging/age-friendly) resulted in the identification of three strategic plans, two corresponding action plans, and two state plans. The jurisdictional population covered by each plan included the general population of

Washington, DC, with the exception of the aging/age-friendly sector which targets the citywide older adult demographic. Details about the documents selected can be seen in Table 4, and a data matrix of findings can be seen in Table 5.

Table 4

Washington, DC Strategic, Action, and State Plans

Document	Description	Type	Publication Date
Transportation Sector			
moveDC 2021	Current version of moveDC, a long-range transportation plan that outlines goals, policies, strategies, and metrics to guide transportation planning and decisions over 25-year period. Implementation time frame: 2021–2045	Strategic plan	December 2021
Vision Zero: A Plan of Action	Action plan developed to support DC commitment to the Vision Zero philosophy—achieve zero road fatalities or serious injuries through safe street design for all users. Plan outlines specific strategies and identifies stakeholders to aid implementation. Implementation time frame: 2015–2024	Action plan	December 2015
Vision Zero Update	An interim update to supplement Vision Zero Action Plan, pending an anticipated comprehensive refresh of the plan in 2024. Identifies additional activities and action commitments for city agencies. Implementation time frame: 2022–2024	Action plan supplement (interim update)	October 2022
Health Sector			
District of Columbia Health Systems Plan	Guide for implementation of initiatives to strengthen DC health systems, outlines key strategic recommendations for improving community health and promoting health equity. Implementation timeframe: unspecified	State plan	July 2017
Urban Planning Sector			
The Comprehensive Plan for the National Capital: District Elements	Central plan that guides policies, actions, priorities for land use, public services, infrastructure, and capital investments within the District; provides overall direction for all other physical plans. Implementation timeframe: unspecified	Strategic plan	August 2021
Aging/Age-Friendly Sector			
Age-Friendly DC 2023 Strategic Plan	Strategic plan developed as part of interagency initiative to coordinate efforts in support of healthy aging. Outlines key priorities and actions related to the built, social environment, and general health and security.	Strategic plan	October 2018

	Implementation timeframe: 2018–2023		
DC State Plan on Aging	State plan developed by DC Department of Aging and Community Living to guide service and program delivery for older adults and adults with disabilities. Outlines overarching goals, objectives and strategies to support aging. Implementation timeframe: 2024-2027	State plan	October 2023

Table 5

Data Matrix of Policy Recommendations Reflected within Strategic, Action, and State Planning Documents

	Transportation Sector			Health Sector	Urban Planning Sector	Aging/Age-Friendly Sector	
	moveDC, 2021	Vision Zero Action Plan, 2015	Vision Zero Action Plan, Update 2022	DC Health Systems Plan, 2017	The Comprehensive Plan for the National Capital, 2021	Age-Friendly DC 2023 Strategic Plan	DC State Plan on Aging, 2024-2027
MACROSCALE (MA)							
Policy Integration and Strategic Planning							
MA 1: Ensure that policies and planning documents address the needs of all travelers, including older adults, using multiple modes of transport	✓				~		
MA 1.1: Adopt Complete Streets and/or other similar policy frameworks (e.g., Vision Zero, Safe Streets, and Roads for All) to ensure roads serve multiple functions	✓	✓	✓		✓	✓	
MA 1.2: Implement multi-level policies and interventions to include the built environment, social environment, and political environment	~	~			~	~	
MA 1.3: Older adults in All Policies: Consider and apply an age-friendly and accessibility lens to current and future municipal policy and planning	~				✓		
MA 1.4: Explicitly incorporate active transportation considerations within age-friendly, master transportation, or other strategic policy and planning documents	✓				✓		
MA 1.5: Prioritize equitable policies and practices that consider diverse needs and desires of older adults	✓		~	~	~		✓
MA 1.6 Earmark funding for sidewalk construction and maintenance in municipal budgeting					✓	✓	
Land Use, Zoning, and Infrastructure							
MA 2: Adopt land use and zoning policies that support physical activity for all ages	✓				✓		
MA 2.1: Promote mixed land use zoning that includes proximity and access to everyday destinations, services, and parks and green spaces					✓		
MA 2.2: Increase residential and housing density					✓	✓	
MA 2.3: Improve street connectivity, such as through grid-like design	✓				✓		
MA 2.4: Ensure new developments include multiple access routes for pedestrians and cyclists to ensure proximity and access to services					✓		
MA 2.5: Develop and locate older adult-serving facilities and housing in places with proximity to transit and other desirable destinations					✓		
Collaborative Governance and Community Engagement							
MA 3: Promote multisectoral collaboration between local governments, community stakeholders, and older adults	✓	~		✓	✓		✓
MA 3.1: Address walkability and safety through intersectoral collaboration across multiple government agencies, e.g., urban planning, transportation, parks, health providers, housing, etc.			✓		~		

MA 3.2: Empower older adults with decision-making authority and representation on advisory boards and committees				~		
MA 3.3: Promote inclusive citizen engagement by involving older adults and persons with disability in planning and implementation processes, such as pedestrian infrastructure improvements	~	~	~	✓		✓
Monitoring and Evaluation						
MA 4: Conduct evaluation, outreach and assessment activities to identify context-specific issues, locations, and impact, with emphasis on older adults' needs for active transportation	~			~		
MA 4.1: Conduct walkability audits and other built environment assessments in collaboration with older adults to identify hyperlocal issues, such as broken or incomplete sidewalks						
MA 4.2: Regularly evaluate planning documents to ensure they adequately account for the needs of older adults						~
MESOSCALE (ME)						
Active Transportation Systems						
ME 1: Integrate and maintain safe, convenient, and activity-friendly routes with improved pedestrian, bicycling, and public transit infrastructure	✓	✓		✓	✓	
ME 1.1: Prioritize separate paths for different modes of transportation, i.e., routes for pedestrians and cyclists that are separate from each other and from vehicles				✓		
Pedestrian Network and Neighborhood Walkability						
ME 2: Improve overall neighborhood walkability and safety	✓			✓		
ME 2.1: Provide adequate pedestrian infrastructure with improved sidewalk connectivity and increased route options	~					
ME 2.2: Make a variety of everyday destinations available and accessible, e.g., grocery stores, shops, parks, restaurants, recreational facilities				✓		
ME 2.3: Locate essential services like schools, worksite, businesses, parks, and other destinations within walking distance of one another				✓		
ME 2.4: Ensure pedestrian infrastructure connects and supports walking to and from public transportation				✓		
Bicycle Network						
ME 3: Create routes with improved bicycle networks, infrastructure, and facilities that provide access between residential areas and common destinations	✓			✓		
ME 3.1: Provide well-connected bike tracks, cycling trails, and shortcuts for cyclists within street networks	✓			✓		
Public Transit						
ME 4: Create or expand public transit networks to ensure availability, access, and convenience of public transit options	✓			✓	~	
ME 4.1: Ensure that public transit options are available when needed and operate at high frequency				✓		
ME 4.2: Ensure sufficient transit stops are located near residential locations and connect to common destinations				~		
ME 4.3: Minimize distances between transit stops						
ME 4.4: Offer subsidies, vouchers, or discounts to ensure affordability, including for low-income individuals				~	~	~

Traffic Safety							
ME 5: Ensure that traffic safety regulations and measures prioritize the protection of older adult road users	~	~			~		
ME 5.1: Implement lower speed limits, slow zones, and traffic calming measures for vehicle traffic in areas with high older adult populations (e.g., older adult housing, senior centers, other frequently visited locations)	~	✓	✓		~		
ME 5.2: Consider the effects of street congestion when planning locations of retail and services, as well as the routes and pathways to access them							
ME 5.3: Ensure pedestrian safety from traffic, particularly at street crossings and near bus stops	~				✓		
ME 5.4: Enforce traffic laws to enhance both real and perceived safety for older adults	✓	✓	✓				
Education and Awareness							
ME 6: Develop public education and outreach programs to promote active transportation and improve safety skills	✓	✓		~		✓	✓
ME 6.1: Provide education about benefits of active transportation						~	
ME 6.2: Improve awareness of neighborhood enhancements and amenities						~	
ME 6.3: Promote training programs to boost older adults' self-efficacy to engage in active transportation, including walking skills, crossing safety, and other pedestrian safety strategies				~			
ME 6.4: Conduct education and outreach focused on safe bicycling for older adults		~					
Social Environment							
ME 7: Foster a supportive social environment to increase the opportunities and appeal of active transportation	~				✓	✓	
ME 7.1: Provide services and activities that offer social support, connectedness, and/or arrange companionship	~				✓	✓	✓
ME 7.2: Promote respect and courtesy toward older adults within the broader community						✓	~
Natural Environment							
ME 8: Address air pollution to make places more suitable and comfortable for walking	~				✓		
MICROSCALE (MI)							
Intersection and Crosswalk Safety							
MI 1: Prioritize well-designed, pedestrian-friendly crossings that promote safety and comfort, particularly in densely populated areas	✓				✓		
MI 1.1: Design intersections with raised curbs							
MI 1.2: Reduce crossing distances via curb extensions, bulb-outs, and median/pedestrian refuge islands					✓		
MI 1.3: Install pedestrian curb ramps that lead directly into crosswalks on both sides of the crossing							
MI 1.4: Include tactile treatments on pedestrian curb ramps							
MI 1.5: Provide adequate lighting in intersections							
MI 1.6: Use high-visibility paint for crosswalks that aligns with older adults' perception and sensory levels					~		
MI 1.7: Remove parking close to crosswalks to increase visibility		~					

MI 1.8: Provide countdown signal buttons that can be accessible from a wheelchair				✓	
MI 1.9: Use countdown signals that include both audio and visual cues					
MI 1.10: Extend crossing signal times for pedestrians according to older adults' walking speed and/or limitations, especially in areas with high older adult density				✓	
MI 1.11: Integrate people-detectors with crossing signals to automatically match walking speed of pedestrians					
MI 1.12: Provide Leading Pedestrian Intervals for crossing signals	✓			✓	
MI 1.13: Utilize crossing guards in neighborhoods with large concentrations of older adults					
MI 1.14: Install dedicated light signals for bicyclists at intersections					
Sidewalk Infrastructure and Maintenance					
MI 2: Provide safe and adequate sidewalk infrastructure	✓			✓	
MI 2.1: Ensure sidewalk infrastructure is both present and continuous to minimize difficulty navigating changes in surface level				~	
MI 2.2: Use quality pavement materials that are smooth, strong, and non-slip (e.g., concrete or asphalt instead of bricks or cobblestones)					
MI 2.3: Ensure sidewalk width accommodates wheelchair-users, allows for sociable walking, and provides space for awnings, benches, etc.				~	
MI 2.4: Provide tactile guidance and warning paths					
MI 2.5: Incorporate accessible pathways with ramps and minimal steep slopes				✓	
MI 2.6: Maintain sidewalks to be free of obstructions, barriers or tripping hazards, including heaves, uplifting, and unnecessary clutter	~	✓		✓	~
MI 2.7: Clear priority walking paths of snow, ice, other weather-related hazards as needed					
Bicycling Infrastructure					
MI 3: Develop safe and accessible bicycling infrastructure and facilities that support diverse riding needs	✓	✓		✓	
MI 3.1: Include protected bike paths with physical barriers from traffic	✓			✓	
MI 3.2: Use painted lanes to enhance perceived safety					
MI 3.3: Develop one-way cycling lanes					
MI 3.4: Design cycling lanes wide enough to accommodate riding at different speeds					
MI 3.5: Implement self-service bike sharing systems with stations in safe and accessible areas	✓			✓	~
MI 3.6: Provide adaptive, tricycle, and electric bike (e-bike) options through bike/trike libraries or by integrating them into existing bike share systems	✓				
Lighting					
MI 4: Provide proper lighting in public spaces to promote safety and address fear of crime	✓			✓	✓
MI 4.1: Install adequate lighting along sidewalks, crosswalks, transit stops, and shopping areas				~	
MI 4.2: Ensure lighting is oriented towards sidewalks and paths				✓	
Aesthetics and Function					

MI 5: Incorporate aesthetic and functional features within community and neighborhood environments				✓	
MI 5.1: Enhance neighborhood aesthetics through attractive buildings, parks, trees and greenery, and water				✓	~
MI 5.2: Provide adequate street trees for shade and to buffer between roadways and sidewalks	✓			✓	
MI 5.3: Plant trees along slow zones and routes frequented by older adults					
MI 5.4: Incorporate greenery and landscape elements to soften hardscapes and minimize noise pollution		✓		✓	
MI 5.5: Ensure pedestrian routes have resting points (benches, shelters, public toilets) and places of interest (parks, game tables, etc.)				✓	
MI 5.6: Install benches, handrails, fences, and poles strategically along routes for functional support, especially where slopes are unmodifiable					
MI 5.7: Design benches with armrests and backrests for comfort and functional support				~	
MI 5.8: Provide public restrooms and drinking fountains along pedestrian routes at regular intervals				✓	
MI 5.9: Ensure cleanliness of streets, sidewalks, and public transit facilities (stations, stops, vehicles)					
MI 5.10: Minimize presence of abandoned properties, graffiti, and litter				✓	
Signage and Wayfinding					
MI 6: Create standardized and easily understood wayfinding signage systems for all road users	~	~		✓	~
MI 6.1: Ensure signage is visible and clear for all road users (pedestrians, cyclists, and vehicles)				✓	
MI 6.2: Ensure signage and information at bus and transit stops is available, accessible, and readable				✓	
Public Transit Accessibility					
MI 7: Ensure transit facilities, vehicles, and stops are accessible, clean, safe, and user-friendly		✓		~	✓
MI 7.1: Equip vehicles with low-floor boarding, comfortable seating, and adequate space for special needs (e.g., wheelchairs, grocery carts, strollers)					
MI 7.2: Allow sufficient time for older adults to board, stand, sit down, and disembark vehicles safely					
MI 7.3: Ensure transit stops are fully accessible and include benches and shelters to enhance comfort and usability				✓	✓

Note. ✓ = Policy recommendation is explicitly stated or referenced within the document; ~ = Policy recommendation is not explicitly stated but may be partially addressed, encompassed, or inferred within the document

Macroscale Policies. At the macroscale level, all strategic and action planning documents analyzed included policies, guidelines, or statements that either explicitly aligned with or partially encompassed the policy recommendations that were derived from the systematic review within each category: policy integration and strategic planning; land use, zoning, and infrastructure; collaborative governance and community engagement; and monitoring and evaluation.

Policy Integration and Strategic Planning. All documents reflected adoption of policy frameworks addressing road safety, such as Complete Streets and Vision Zero. For example, a key strategy identified in *moveDC* is to "use Complete Streets principles to make streets and sidewalks safer for all users" (District of Columbia Department of Transportation, 2021). The development of the *Vision Zero Action Plan* and its supplemental update are also evidence of alignment with the policy recommendation. The *Age-Friendly DC 2023 Strategic Plan* (*Age-Friendly Plan*) plan identifies a strategy to "build on the Vision Zero program" and the *Comprehensive Plan for the National Capital: District Elements* (*Comprehensive Plan*) references both compliance with Complete Streets policies and directions for implementation of the *Vision Zero Action Plan* (Age-Friendly DC 2023 Strategic Plan, 2018; District of Columbia Office of Planning, 2021; Government of the District of Columbia, 2015, 2022).

Multiple documents referenced equitable practices, which could be inferred to be inclusive of older adults, e.g., "growth must be managed equitably to support all District residents, including vulnerable communities…" (District of Columbia Office of Planning, 2021, p2:40). In its equity statement, *moveDC* explicitly named older adults as one of multiple priority groups (District of Columbia Department of Transportation, 2021, p. 12). The *District of Columbia State Plan on Aging* (*State Plan on Aging)* also emphasized efforts to identify and

include underrepresented groups when seeking community feedback (Department of Aging and Community Living, 2023, p. 26).

In terms of applying an "age-friendly lens," policies and strategies within both *moveDC* and the *Comprehensive Plan* specify consideration and inclusion of older adults and individuals with disability during the design of neighborhood spaces, as well as the provision of accessible and multimodal transportation options for them (District of Columbia Department of Transportation, 2021; District of Columbia Office of Planning, 2021, pp. 4:8, 4:38, 9:38).

Earmarked funding specifically for sidewalk construction and maintenance was also mentioned in both the *Comprehensive Plan* and *Age-Friendly Plan* (Age-Friendly DC 2023 Strategic Plan, 2018; District of Columbia Office of Planning, 2021).

Land Use, Zoning, and Infrastructure. Policy recommendations related to land use, zoning, and infrastructure were frequently reflected within the *Comprehensive Plan*. Policies and strategies emphasized mixed land use and development that prioritizes proximity to a variety of destinations (pp. 3:15, 3:24, 5:19, 9:33), connected street grids (p. 3:21), and access routes to destinations for pedestrians and cyclists (pp. 3:27, 3:42, 9:28). Additional guiding policies related to locating older adult-serving facilities and housing near transit and desirable destinations (p. 5:40). For example, one policy states: "Build housing adjacent to Metrorail stations that serves a mix of incomes and household types, including…older adults, and persons with disabilities" (District of Columbia Office of Planning, 2021, p. 3:26).

Collaborative Governance and Community Engagement. Multiple documents, including *moveDC*, the *Comprehensive Plan*, and the *District of Columbia Health Systems Plan (Health Systems Plan)*, referenced multisectoral collaboration with various DC departments and agencies to advance their respective goals and priorities (Department of Health, 2017; District of

Columbia Department of Transportation, 2021; District of Columbia Office of Planning, 2021). *Vision Zero* was the only document to mention intersectoral collaboration specifically within the context of promoting safety for people who walk, wheel, or use mobility devices (Government of the District of Columbia, 2015, p. 13).

Most documents referenced inclusive community and citizen engagement in planning and implementation processes, which may infer engagement and inclusion of older adults. However, the *Comprehensive Plan* contained the only reference that explicitly mentions inclusion of older adults in the design process of public spaces (District of Columbia Office of Planning, 2021, p. 9:39).

Monitoring and Evaluation. References to the monitoring and evaluation-related policy recommendations were limited across policy documents. Only *moveDC* and the *Comprehensive Plan* contained references to evaluation activities that are not specific to, but broad enough that they may include, identification of context-specific issues for older adults to engage in active transportation.

Mesoscale Policies.

Active Transportation Systems. With the exception of the health sector, policy documents contained references emphasizing the integration of safe pedestrian, bicycling, and public transit infrastructure with the city's transportation system. The *Comprehensive Plan* noted a key goal to "[provide] transportation choices that are more efficient and environmentally friendly than driving—such as walking, bicycling…and public transit" (District of Columbia Office of Planning, 2021, p. 4:14). Similarly, policy statements from transportation documents explicitly referenced the integration and expansion of safe and connected bicycle and pedestrian networks (District of Columbia Department of Transportation, 2021, p. 32). The *Age-Friendly*

Plan also described a vision for a city that supports various "transportation modes, including walking, biking, and scooters" (Age-Friendly DC 2023 Strategic Plan, 2018, p. 8). Notably, no references within the *Health Systems Plan* related to the development of active transportation systems.

Pedestrian Network and Neighborhood Walkability. References to improving general walkability and safety were identified within transportation and urban planning documents. *MoveDC* stated their goal for safe, connected sidewalks on every street in the city, with another strategy to "improve walkability and pedestrian amenities with more car free zones and plazas" (District of Columbia Department of Transportation, 2021) The *Comprehensive Plan* included various policies and actions that aligned with specific recommendations that contribute to neighborhood walkability, such as ensuring neighborhoods have access to a variety of destinations, shops, and services, as well as parks and other public spaces (District of Columbia Office of Planning, 2021, pp. 3:32, 8:11, 8:16). One policy also stated that development projects should strengthen safe pedestrian and bicycle infrastructure leading to transit stops, aligning with the policy recommendation to ensure pedestrian infrastructure connects to public transportation (District of Columbia Office of Planning, 2021, p. 4:7).

Bicycle Network. Transportation and urban planning documents contained explicit language in support of bicycle networks. The *Comprehensive Plan*, in particular, contained multiple policies relating to bicycle access, and facilities, e.g.,

> *Policy T-2.3.2 Bicycle Network: Provide and maintain a safe, direct, and comprehensive bicycle network connecting neighborhoods, employment locations, public facilities, transit stations, parks, and other key destinations. Eliminate system gaps to provide*

continuous bicycle facilities. Increase the amount of protected bike lanes, wayfinding signage, and Capital Bikeshare stations.

Additional policies and actions referenced development of bicycle lanes and trails and included quantified goals and metrics (District of Columbia Department of Transportation, 2021, p. 44; District of Columbia Office of Planning, 2021, p. 8:42).

Public Transit. Transportation, urban planning, and age-friendly documents each contained policies and strategies expanding public transit networks. While the *Age-Friendly Plan* had broad goal of ensuring safe, affordable, and accessible transportation, it was only implicit in how it encompassed policy recommendations related to the expansion of public transit networks.

Transportation and urban planning documents contained multiple policies and strategies referencing the expansion of public transit networks, including provision of transit to areas currently without it (District of Columbia Department of Transportation, 2021, p. 49). The *Comprehensive Plan* also identified transit frequency as a policy priority (District of Columbia Office of Planning, 2021, p. 4:19). Other policies and actions referenced affordability, but did not specify mechanisms for doing so, e.g., subsidies, vouchers, discounts (Department of Aging and Community Living, 2023; District of Columbia Office of Planning, 2021, p. 4:19).

Traffic Safety. References in policy documents aligned with recommendations for traffic safety in relation to traffic calming measures, traffic law enforcement, and pedestrian safety. One notable strategy within the *Vision Zero Action Plan* was to create safe zones with reduced speed limits of 15 miles per hour, including areas with "high concentrations of seniors" (Government of the District of Columbia, 2015, p. 51). Other policies and actions within *moveDC* and the *Comprehensive Plan* referenced considerations for broadly implementing traffic calming

measures and prioritizing pedestrian safety from traffic (District of Columbia Department of Transportation, 2021, p. 41; District of Columbia Office of Planning, 2021, pp. 4:37, 9:28).

Transportation documents also included strategies focused on enforcing traffic laws to protect pedestrians and bicyclists, namely via automated traffic enforcement but also by police enforcement (District of Columbia Department of Transportation, 2021, p. 39; Government of the District of Columbia, 2015, pp. 43, 52).

Education and Awareness. Policies and strategies within health, transportation, and aging/age-friendly documents referenced education and awareness campaigns, classes, and other programs that may include support for active transportation and safety skills. Strategies specific to active transportation included: special events that "promote use and awareness of bicycles, and bicycle education" (Government of the District of Columbia, 2015, p. 45), and fostering community partnerships to encourage sustainable transportation (District of Columbia Department of Transportation, 2021, p. 52). These strategies, however, were not explicitly targeted to older adults.

Other policies and strategies included: supporting active living through classes in community settings (Department of Aging and Community Living, 2023), education and awareness campaigns to foster healthy aging and independent living (Department of Health, 2017, p. 108), programs to address leading health issues (Department of Health, 2017, p. 108), and distribution of information about safe transportation options and to help older adults make informed choices about their health (Age-Friendly DC 2023 Strategic Plan, 2018, pp. 6, 10, 14). These strategies and policies are directed towards older adult groups but were not explicit about opportunities to promote active transportation and safety skills.

Social Environment. The policy recommendation to foster a supportive social environment for older adults aims to increase opportunities and the appeal of active transportation. Documents from the aging and age-friendly sector included multiple policies and strategies to emphasize social connectedness through supports, services, and programs for socially-isolated older adults, as well as efforts to reach underserved groups. For example, the *Age-Friendly Plan* named the promotion of physical activity and nutrition programs by leveraging bike sharing, parks prescription, and recreational fitness programs—which may directly support opportunities for active transportation (Age-Friendly DC 2023 Strategic Plan, 2018, p. 6).

Efforts to foster respect and courtesy toward older adults in the broader community are addressed within objectives to conduct public campaigns for mitigating negative attitudes and biases towards aging adults, as well as training for community service providers (Age-Friendly DC 2023 Strategic Plan, 2018, pp. 12, 28).

Transportation and urban planning documents aligned with these policy recommendations by supporting public events that encourage walking and bicycling (District of Columbia Department of Transportation, 2021, p. 43; District of Columbia Office of Planning, 2021, p. 4:32). Urban planning policies also emphasized placemaking to enable social connectedness and interaction within the community, e.g., guidelines for developing public spaces and residential designs that enable social activity and interactions along sidewalks and within neighborhoods (District of Columbia Office of Planning, 2021, pp. 9:47-48, 57 9:48).

Natural Environment. Policies and strategies addressing air pollution were limited. A guiding principle within the *Comprehensive Plan* states: “Planning decisions should improve the health of District residents by…encouraging land-use patterns and land uses that reduce air

pollution and facilitate pedestrian and bicycle travel" (District of Columbia Office of Planning, 2021, p. 2:47). *MoveDC* noted improved air quality as a potential benefit of increased tree coverage, though it was referenced as a possible outcome rather than a key strategy (District of Columbia Department of Transportation, 2021, p. 42).

Microscale Policies.

Intersection and Crosswalk Safety. Numerous microscale policy recommendations centered on the design of safe, pedestrian-friendly intersections and crosswalks. Policies and strategies within *moveDC* and the *Comprehensive Plan* aligned with some of these recommendations by referencing safety improvements at neighborhood intersections and street crossings to enhance pedestrian and bicyclist safety and improve access to destinations (District of Columbia Department of Transportation, 2021; District of Columbia Office of Planning, 2021).

MoveDC included a high-level strategy to make intersections safer for pedestrians, including a specific action to implement Leading Pedestrian Intervals (LPIs) (District of Columbia Department of Transportation, 2021, p. 41). Similarly, the *Comprehensive Plan's* policy for improving pedestrian safety at pedestrian "nodes" and crossings included integration of LPIs, as well as textured, marked, or raised crossings; countdown signals; accessible signal push buttons; and curb bump outs (which can reduce crossing distances and increase visibility of pedestrians) (District of Columbia Office of Planning, 2021, pp. 4:30-31, 9:38). The *Comprehensive Plan* also identified a key action to review pedestrian signal timing to ensure adequate crossing time, particularly in areas with large older adult populations (District of Columbia Office of Planning, 2021, pp. 4:31). The *Vision Zero Action Plan* targeted commercial

vehicle parking within crosswalks, partially addressing a broader policy recommendation to remove all parking near crossings (Government of the District of Columbia, 2015, p. 42).

Sidewalk Infrastructure and Maintenance. Policies and strategies referencing microscale features of safe and adequate sidewalk infrastructure were primarily contained within transportation and urban planning documents. The *Comprehensive Plan* included an overarching policy to design for safety by maintaining sidewalks in a good state of repair (District of Columbia Office of Planning, 2021, p. 9:50) and a *Vision Zero Action Plan* strategy references filling in sidewalk gaps and expanding sidewalk maintenance efforts (Government of the District of Columbia, 2015, p. 42). Strategies for sidewalk maintenance efforts also appeared in *moveDC* and the *Vision Zero Action Plan*, such as improving data collection to better support routine maintenance and sidewalk safety (District of Columbia Department of Transportation, 2021, p. 38; Government of the District of Columbia, 2015, p. 42). Similarly, the *Age-Friendly Plan* aimed to improve access to real-time data of service reports and prioritization of repairs for pathways (Age-Friendly DC 2023 Strategic Plan, 2018, p. 6).

The *Comprehensive Plan* also included policies to address sidewalk obstructions, such as unnecessary curb cuts, and to continually monitor and maintain surfaces and elevations throughout the city to ensure safety for older adults and individuals with disabilities (District of Columbia Office of Planning, 2021, pp. 4:31, 9:28). Other policies that explicitly referenced older adults and individuals with disabilities included a policy to ensure sidewalks are compliant with Americans with Disabilities Act (ADA) accessibility guidelines (p4-31), and making safety improvements to sidewalks and paths for older adults (District of Columbia Office of Planning, 2021, pp. 4:31, 11:35).

Notably, documents did not specifically address sidewalk width, though the *Comprehensive Plan* mentioned investigating opportunities for widening sidewalks (District of Columbia Office of Planning, 2021, p. 9:29). Additionally, there were no references to pavement quality or strategies for maintenance during inclement weather.

Bicycling Infrastructure. Microscale policies addressing safe and accessible bicycling infrastructures were primarily found in transportation and urban planning documents. The *Comprehensive Plan* broadly referenced the inclusion of bicycling facilities within streetscape design (District of Columbia Office of Planning, 2021, p. 9:27), with specific policies to increase the number of separated facilities and protected bike lanes (District of Columbia Office of Planning, 2021, p. 4:28). Similarly, the *Vision Zero Action Plan* set measurable goals to install and update 20 miles of on-street bicycling facilities, including five miles of protected bike lanes (Government of the District of Columbia, 2015, p. 42). Strategies within *moveDC* updated this goal to install 20 miles of protected bike lanes by FY2022 and continue adding five additional miles each year (District of Columbia Department of Transportation, 2021, p. 44).

The *Comprehensive Plan*, *moveDC*, and *Age-Friendly Plan* contained policies and strategies referencing expansion of the Capital Bikeshare program, including installation of more accessible bikeshare stations to achieve 90% of residents living within a quarter-mile of a station (Age-Friendly DC 2023 Strategic Plan, 2018; District of Columbia Office of Planning, 2021). Additionally, *moveDC* outlined implementation steps for an adaptive bicycling program to include electric bicycling options (District of Columbia Department of Transportation, 2021). Other types of adaptive bicycles or tricycles were not mentioned.

Aesthetics and Function. Policies and strategies to promote aesthetic and functional features within community and neighborhood environments were contained within the

Comprehensive Plan. One of its overarching goals was to enhance the beauty and livability of the city by "improving the vitality, appearance and function of streets and public spaces" (District of Columbia Office of Planning, 2021, p. 9:2). Guidance for neighborhood design emphasized a sense of place and distinctive character through aesthetically pleasing architecture, landmarks, and public spaces (District of Columbia Office of Planning, 2021, p. 3:32). Multiple policies and actions emphasized the incorporation of greenery within public spaces and neighborhoods, such as gardens, landscaping, and street trees (Age-Friendly DC 2023 Strategic Plan, 2018; District of Columbia Office of Planning, 2021; Government of the District of Columbia, 2015). *MoveDC* included a strategy to expand street tree coverage for improved walkability (District of Columbia Department of Transportation, 2021).

The *Comprehensive Plan* also referenced the creation of places for resting and lingering by installing benches and points of interest, as well as public restrooms and drinking fountains to support the frequency and duration of walking (District of Columbia Office of Planning, 2021, pp. 4:13, 9:28, 37, 48). Additionally, policies addressed minimizing the presence of vacant lots, graffiti, and litter (District of Columbia Office of Planning, 2021, p. 3:36). One policy action was to define standards for street furniture, such as benches (District of Columbia Office of Planning, 2021, p. 9:29).

Lighting. References to providing proper lighting in public spaces were encompassed within broader policy and action statements in the *Comprehensive Plan*, such as creating safe streets, parks, plazas, transit stops, and other public spaces (District of Columbia Office of Planning, 2021, pp. 3:27, 4:22, 9:47, 50). Similarly, the *Age-Friendly Plan* mentioned improved lighting along roads, sidewalks, and recreational paths within its broader goals and strategies for improving the built environment (Age-Friendly DC 2023 Strategic Plan, 2018, p. 6). The

Comprehensive Plan contained the only explicit reference to "pedestrian-oriented lighting," aligning with a policy recommendation to specifically orient lighting towards sidewalks and paths (District of Columbia Office of Planning, 2021, p. 9:28).

Signage and Wayfinding. Policies and strategies referencing signage and wayfinding for all road users were largely found in the *Comprehensive Plan*, with additional inferences in the *Vision Zero Action Plan* and *Age-Friendly Plan*. One strategy outlined in the *Vision Zero Action Plan* was to conduct a comprehensive inventory and analysis of signage, focusing on areas with high concentrations of vulnerable travelers. The *Comprehensive Plan* also proposed standardized wayfinding and signage templates as a strategy for designing more accessible neighborhoods and implied improvements should be made to signage and schedule information at bus stops (District of Columbia Office of Planning, 2021, p. 4:22, 9:39).

Other references to signage and wayfinding appeared, though they were brief and unspecific. For example, the *Age-Friendly Plan* mentioned improving "lighting, *signage,* and accessibility" (Age-Friendly DC 2023 Strategic Plan, 2018, p. 6), and other references in the *Comprehensive Plan* mentioned improvements near transit to include "sidewalks, bicycle lanes, lightings, *signage*, landscaping, and security measures (District of Columbia Office of Planning, 2021, p. 3:27).

Public Transit Accessibility. Policies and strategies that align with policy recommendations for public transit accessibility are focused on ensuring transit stops are accessible and user-friendly. The *Vision Zero Action Plan* identified a strategy and objective to prioritize and update at least 10 bus stops per year to meet accessibility requirements (Government of the District of Columbia, 2015, p. 43). Similarly, the *Age-Friendly Plan*

included an action to “ensure transit stops are compliant with accessibility guidelines” (Age-Friendly DC 2023 Strategic Plan, 2018, p. 8).

The *Comprehensive Plan* emphasized improving accessibility of bus stops and the surrounding infrastructure, e.g., sidewalks and crossings (District of Columbia Office of Planning, 2021, p. 4:22). A separate policy aimed to guide the design of pedestrian-friendly bus stops equipped with shelters and seating (District of Columbia Office of Planning, 2021, p. 9:47).

Discussion

This study’s systematic expert opinion and policy review identified and compiled the best available evidence and policy recommendations for age-friendly transportation. The subsequent content analysis of local strategic, action, and state planning documents provided a greater understanding of how the current policy landscape in Washington, DC reflects and aligns with policy recommendations for promoting active transportation among older adults.

The following sections summarize key findings from each of these study components, discuss gaps and opportunities that may exist for DC’s policy landscape, note study limitations, and highlight implications for future policy and practice.

Findings from Systematic Expert Opinion and Policy Review

The systematic expert opinion and policy review identified a wide range of policy recommendations for age-friendly active transportation, spanning macroscale, mesoscale, and microscale levels of intervention. Many policy recommendations, particularly those at the macroscale level, focus on how policies should be developed and operationalized to incorporate considerations for older adults.

Most recommendations also reflect opportunities within the built environment to support active transportation, e.g., policies that promote mixed land use, the development of sidewalk

and bicycling infrastructure, or the design of safe crosswalks and intersections. Some recommendations, however, address the social environment, highlighting the importance of social connectedness and its interconnection with the physical built environment in supporting and enabling opportunities for active transportation. Additionally, one unique policy recommendation relates to the natural environment and its role in creating walkable environments.

This variety in recommendations reinforces the relevance of the theoretical framework which guides the study, emphasizing how the policy environment governs multiple layers of factors that may influence active transportation for older adults. Thus, community strategies and interventions should adopt multi-layered approaches that address these interconnected influences. Within the context of age-friendly efforts, the systematic review's findings also present many options for integrating active transportation efforts within age-friendly planning and vice versa.

Findings from Content Analysis

DC Policy Landscape. Analysis of DC urban planning, transportation, health, and aging policy and planning documents revealed numerous ways the policy landscape supports and prioritizes active modes of transportation within the city. Several policies and strategies were identified that align with best practices and policy recommendations for ensuring that active transportation efforts are age-friendly. Although active transportation policies and strategies in DC are largely intended for a general population, many are inclusive of age-friendly recommendations. Although fewer, some DC policies demonstrate specific consideration for older adults' needs.

The following sections summarize key observations of how the current policy environment in DC aligns with macroscale, mesoscale, and microscale policy recommendations derived from the systematic review for supporting age-friendly active transportation. This discussion also highlights the alignment between age-friendly efforts and active transportation efforts.

Summary of Macroscale Policies. Policies and guidelines in Washington, DC indicate the adoption of high-level priorities that broadly support and enable active transportation across the general population. As the city's central guiding document for land use and physical infrastructure planning, the *Comprehensive Plan* outlines overarching principles for planning and development that emphasize sustainable transportation and transit, including pedestrian and bicycle travel (District of Columbia Office of Planning, 2021). The adoption of Complete Streets policies, the *Vision Zero Action Plan*, and other land use and zoning policies align with key recommendations for promoting active transportation.

Many polices and strategies reflected in DC's policy documents highlight multisectoral collaboration and community engagement as critical strategies, which align with policy recommendations to work across multiple government agencies and involve older adults in planning and implementation processes (Brüchert et al., 2020; Chudyk AM et al., 2015; Engaging Older Adults in Transportation Planning, n.d.).

While many macroscale policy recommendations support active transportation for general populations (inclusive of older adults), other recommendations are more specific to older adults' unique needs. For example, best practice and policy recommendations emphasize involving older adults in planning and implementation processes, empowering older adults with decision-making authority on advisory boards and committees, and locating older adult-serving

housing and facilities near transit and other destinations (*8 Municipal Policies to Help Older Adults Age in Community*, n.d.; Engaging Older Adults in Transportation Planning, n.d.; Lin & Cui, 2021). In line with these recommendations, the *Comprehensive Plan* explicitly references inclusion and consideration of older adults within certain policy statements and guidelines, such as references to citizen engagement opportunities and locating older adult-serving facilities near transit (District of Columbia Office of Planning, 2021). However, other older adult-specific recommendations, such as empowering them with decision-making authority, are only partially or implicitly addressed. These findings suggest that while the DC policy environment may align with many policy recommendations at the macroscale level, greater inclusion and specificity regarding older adults remain areas for improvement.

Summary of Mesoscale Policies. Policy documents contained policies and strategies aligning with nearly all mesoscale policy recommendations identified in the systematic review for supporting age-friendly active transportation. While the term "active transportation" was never used, urban planning, transportation, and age-friendly documents each included policies or strategies for integrating safe pedestrian, bicycling, and public transit networks within DC's transportation systems and infrastructure. The *Comprehensive Plan* also contains policies and strategies that largely align with policy recommendations relating to neighborhood walkability and the development of pedestrian and bicycle networks.

Transportation documents emphasize multiple aspects of traffic safety, including strategies related to traffic calming, slow zones, and traffic law enforcement. Notably, the *Vision Zero Action Plans* prioritize traffic calming policies in areas with high concentrations of older adults, indicating particular consideration for their safety (Government of the District of Columbia, 2015, 2022).

Public education, awareness, and outreach strategies appear in documents from all sectors, though often indirectly related to active transportation. Examples include special events to promote walking and bicycling or classes for older adults to support active living. While these efforts may not explicitly address active transportation, they may still offer opportunities to build knowledge and skills for engaging in active modes of transportation.

Additionally, recognition of the importance of a supportive social environment—developed through both the built environment and social programming—is clearly demonstrated through various policies. Urban planning policies emphasize the design of public spaces to foster social interaction and walkability within neighborhoods, while policies within the *Age-Friendly Plan* and the *State Plan on Aging* promote social connections through programs, classes, and other activities (Age-Friendly DC 2023 Strategic Plan, 2018; Department of Aging and Community Living, 2023). These policies align with recommendations for fostering a supportive social environment (Laddu et al., 2021; Levasseur et al., 2015; McMillan et al., 2018). While these efforts may be intended primarily to reduce social isolation of older adults, they may simultaneously create opportunities to engage in and feel comfortable engaging in active transportation.

Summary of Microscale Policies. The content analysis revealed significant alignment with many microscale policy recommendations for age-friendly active transportation derived from the systematic review. These policies and strategies were found primarily within urban planning documents, though transportation documents also addressed several of these recommendations. Policies related to intersection and crosswalk safety improvements closely aligned with several related policy recommendations, such as installing Leading Pedestrian Intervals, countdown signals with accessible push buttons, and curb bump-outs to increase

visibility (McMillan et al., 2018). Notably, the *Comprehensive Plan* makes special consideration for older adults within its policy statement to review the timing of pedestrian signals in areas with large older adult populations (District of Columbia Office of Planning, 2021). These strategies align with recommendations for supporting older adults' safety, visibility, and accessibility at crossings and intersections. However, certain recommendations are not addressed, such as providing tactile treatments on curb ramps, countdown signals with audio and visual cues, or crossing guards at key locations. These recommendations should be considered or clarified in future planning.

Sidewalk infrastructure and maintenance policies include efforts to address gaps and obstructions and limit elevation changes along sidewalk surfaces, which is stated as a key action to ensure safety for older adults and individuals with disabilities. Maintenance efforts are supported by data collection initiatives to monitor sidewalk conditions, prioritize repairs, and track updates.

Policies within both urban planning and transportation documents also demonstrate a commitment to expanding protected bicycle lanes. Other priorities emphasize expansion of the Capital Bikeshare program, including integrating electric bike options. However, integrating other types of adaptive bikes or trikes is not mentioned.

Providing proper lighting within public spaces promotes safety and mitigates fear of crime (Cairncross, 2016; Mehegan, 2022). The importance of lighting along with signage, wayfinding systems, and other aesthetic and functional features throughout the community are well-addressed within the *Comprehensive Plan*, though very limited in other documents.

The *Comprehensive Plan* promotes aesthetically-pleasing infrastructure, greenery, street trees, and implementation of resting points and places of interest along pedestrian routes (District

of Columbia Office of Planning, 2021). Some actions, such as strategically-placed elements for functional support along routes (e.g., benches, handrails, and fences) are not addressed. The inclusion of such recommendations within policy and planning could strengthen efforts to support the comfort and appeal of active transportation for older adults.

While policies related to public transit accessibility emphasize improvements to bus stops and general accessibility, the policy documents analyzed did not address accessibility features of transit vehicles or accommodations for older adults while boarding and disembarking.

Alignment with Age-Friendly DC Strategic Plan. Document analysis identified several policies and strategies within the *Age-Friendly Plan* that align with active transportation policy recommendations for older adults. One key pillar of the strategic plan focuses on the built environment, which includes an objective to support funding for Vision Zero initiatives that support safe pedestrian and bicycling infrastructure. Other specific strategies address improved lighting and signage along pedestrian routes.

Although the plan does not explicitly use the term "active transportation," it includes a transportation domain in which it envisions walking, biking, and scooters to be safe and affordable modes of transportation for all ages. Another transportation objective is to focus on public transit accessibility, particularly the accessibility of transit stops.

In addition to the built environment and transportation domains, the plan also highlights priorities around promoting social connectedness and implementing education and awareness campaigns. These elements also align with policy recommendations by creating a supportive social environment that can create opportunities for active transportation.

Nearly all of the policies and strategies identified in the plan that align with previously identified policy recommendations are also reflected within urban planning or transportation

planning documents. Furthermore, the *Comprehensive Plan* highlights the *Age-Friendly Plan* and outlines a policy specifically to support advancement of its built environment strategies. *MoveDC* also describes how its review of existing plans, including the *Age-Friendly Plan*, supported efforts to align its current plan with other District goals (District of Columbia Department of Transportation, 2021). This speaks to existing areas of alignment across sectors that support age-friendly active transportation.

Several policies and strategies within the *Age-Friendly Plan* align with key policy recommendations for age-friendly active transportation, such as funding for pedestrian and bicycling infrastructure and prioritizing fully accessible transit stops. However, given the number of existing policies and strategies within DC's urban planning and transportation documents that already align with age-friendly transportation recommendations, future age-friendly planning should consider additional policy recommendations to further integrate active transportation within age-friendly efforts.

Limitations

Systematic Expert Opinion and Policy Review

While the systematic expert opinion and policy review followed the established protocol outlined by JBI, some limitations should be noted. First, in addition to peer-reviewed literature, the review included sources from grey literature which may lack empirical evidence for the conclusions extracted. A critical appraisal tool was used to document each source's credibility to help mitigate potential bias introduced by the sources themselves. Second, searches, eligibility screening, and data extraction were completed by an independent reviewer. Lastly, the summarization and synthesis of conclusions from other sources was based on subjective interpretations of data, which may have introduced researcher bias.

Policy Content Analysis

Additional limitations to the study's content analysis should be noted as well. The description of the policy environment was based on a limited selection of policy and planning documents. While document selection aimed to identify those most relevant to active transportation and age-friendly efforts, other relevant documents may have been excluded. Analysis of a more broad, comprehensive selection of documents may provide a more holistic perspective. Second, a focus within the context of Washington, DC, limits generalizability to other communities, though the study may provide a framework for conducting similar policy reviews in different settings. Third, while the study describes the current policy environment in relation to age-friendly active transportation, the policies and strategies analyzed represent organizational goals and directions rather than legislative policies which are more likely to be binding and enforceable. Therefore, the extent to which these policies and strategies have been implemented is not known. However, they still provide valuable insight into current and long-term priorities and actions within the community.

Lastly, the content analysis and independent coding of documents was a result of personal understanding of the language used and informed by the researcher's own experiences. The coding process involved subjective judgements due to differences in verbiage between policy recommendations and plans themselves. Therefore, other researchers may come to slightly different conclusions. However, instances where language explicitly aligned versus partially aligned with the codes were noted. Documentation of the analytic process and decision-making help to support trustworthiness and validity.

Implications for Policy and Practice

The integration of age-friendly and active transportation efforts presents an opportunity for communities to promote increased physical activity behavior among older adults. Local policy environments play a significant role in shaping community and neighborhood environments in ways that are likely to influence the safety, comfort, and utilization of active transport (Sallis et al., 2006).

This study indicates that the DC policy environment already addresses a majority of the policy recommendations for age-friendly active transportation, either explicitly or partially. At the macroscale level, policy recommendations not addressed were related to monitoring and evaluation efforts to identify context specific issues for older adults and their active transportation needs. Specifically, these included 1) conducting walkability audits and assessments in collaboration with older adults and 2) regular evaluation of planning documents to ensure older adults' needs are adequately considered. These represent existing gaps that policymakers and practitioners in DC should consider to more fully understand older adults' needs and perspectives, and to ensure they are adequately reflected within current and future planning efforts.

Other existing gaps concern actions at the microscale level, such as pavement quality, tactile treatments on curb ramps and sidewalks, and countdown signals with both audio and visual cues. Policies related to accommodations within public transit vehicles, such as ensuring adequate time for boarding and disembarking, were also not addressed. While these recommendations may be covered within guidelines or manuals that were not part of this study, they represent opportunities that policymakers and practitioners should review and consider.

Although age-friendly active transportation behavior connects to health outcomes, the *Health Systems Plan* contained very few strategies or actions directly related to physical activity

or active transportation. This suggests an opportunity for public health practitioners to strengthen the health sector's leadership and involvement in this space. Similarly, the *State Plan on Aging* largely focused on programs and services with little attention to actions supporting physical activity or active transportation. These gaps highlight potential opportunities to integrate active transportation priorities within future health and aging-related strategic planning.

Conclusion

As cities and communities consider ways to address the health needs of growing older adult populations, prioritizing the promotion of physical activity is an important way to support overall health, mobility, independence, and quality of life. Integrating age-friendly initiatives and active transportation efforts presents an opportunity to achieve greater levels of physical activity and its associated benefits.

This study set out to understand the current policy environment related to active transportation in Washington, DC, and how it may address the needs of older adults. It also aims to inform local policymakers of opportunities to support age-friendly active transportation as a key strategy for improving physical activity levels within a growing older adult population.

Through a systematic expert opinion and policy review, 101 policy recommendations for supporting age-friendly active transportation were identified. To the researcher's knowledge, no previous study has conducted a similar review of best practices and policy recommendations for this topic. Findings indicated a range of recommendations across macroscale, mesoscale, and microscale levels of intervention. Using these policy recommendations as a benchmark, content analysis of selected planning and policy documents revealed existing policies and strategies that aligned with many best practices and policy recommendations. Opportunities remain, however, to 1) enhance inclusion of older adults within monitoring and evaluation activities, 2) ensure that

design features within infrastructure and practices on public transit accommodate older adults' needs, and 3) further integrate active transportation considerations within all aging, age-friendly, and health planning and policy frameworks.

Although findings are specific to Washington, DC, this study also provides a comprehensive menu of best practices and policy recommendations for active transportation systems that accommodate older adults' needs and a potential model for other local communities and settings to examine their own policy environments in relation to age-friendly active transportation.

Chapter 5: "Don't Forget About Us": Older Adults' Experiences and Perspectives with Active Transportation in Washington, DC

Abstract

Background: Active transportation is an important strategy for promoting physical activity among older adults (≥ 65 years). For communities to more effectively support older adults' active transportation behavior, it is important to build context-specific evidence that seeks to understand their unique perceptions and experiences. Relatively few studies have used qualitative approaches to explore these experiences. This study aimed to use qualitative methods to understand how intrapersonal, social-cultural, and other environmental factors influence older adults' active transportation decisions and experiences.

Methods: Convenience sampling was used to recruit 15 older adults residing within Ward 5 of Washington, DC. Walking interviews to and from a destination near participants' homes were conducted between June and August 2024. Thematic analysis was performed using ATLAS.ti 25.0.1 for Mac. A combined approach of deductive and inductive coding was used to derive overarching themes and subthemes within the context of an ecological model of behavior.

Results: Data were organized within the following themes: safety, social environment, pedestrian and bicycling infrastructure, public transit, nearby destinations, neighborhood development and characteristics, appearance and attractiveness, natural environment, community policy and responsibility, and individual characteristics.

Conclusions: Findings indicate that safety concerns, nearby destinations, access to public transit, weather, and local parking and traffic regulations influenced decisions about active transportation. Other aspects of the environment, including aesthetics, sidewalk quality, and social activities impacted experiences. Policymakers and planners should include older adults in

decision-making processes. Future quantitative studies should explore the strength of associations between these factors and older adults' active transportation behavior.

Background

Physical activity is one of the most important behaviors for improving health and wellbeing, particularly for older adults (U.S. Department of Health and Human Services, 2023). Regular physical activity can help prevent and manage multiple chronic conditions, including cardiovascular diseases, type 2 diabetes, obesity, stroke, and certain forms of cancer. Among older adults, it supports social, mental, and cognitive health, such as through lower incidence of depression, anxiety, and dementia (Cerin et al., 2017; U.S. Department of Health and Human Services, 2018). For older adults, levels of physical activity tend to decline with increasing age, contributing to reduced mobility, as well as the development or exacerbation of chronic conditions and cognitive disorders (Anderson & Durstine, 2019; Keadle et al., 2016; Suryadinata et al., 2020; Thompson & Chen, 2023).

As community policymakers and practitioners explore strategies to promote physical activity in older adult populations, an important strategy is through active transportation. Active transportation is any human-powered form of transportation, which includes walking, bicycling, or using a wheelchair or mobility device (U.S. Department of Health and Human Services, 2023). The use of public transportation is also closely linked to active transportation as it typically requires individuals to actively travel to, from, or between transit stops and destinations (Herbolsheimer et al., 2020).

Active transportation behavior positively contributes to overall physical activity levels in older adults (Cerin et al., 2017). They often consider active transportation—particularly walking for transportation—to be more accessible, feasible, and inexpensive than other forms of physical

activity (Mertens et al., 2019; Nguyen & Mertens, 2021; Van Cauwenberg et al., 2013). For this population, however, constraints and concerns about engaging in active modes of transportation may be unique from other age groups (Klicnik & Dogra, 2019; U.S. Department of Health and Human Services, 2023). Therefore, to effectively promote active transportation as a means of improving physical activity levels among older adults, we must better understand their unique perceptions and experiences. Research that engages directly with older adults is critical to understanding and highlighting their concerns, needs, and desires (Lin & Cui, 2021; World Health Organization, 2023). Given the natural variance in environments and population needs from city to city, it is also important for communities to build context-specific evidence to ensure that findings and recommendations for policy and practice are relevant to their particular settings (Dodson et al., 2024; Lin & Cui, 2021; World Health Organization, 2023).

Theoretical Framework

Ecological models are often used to explain physical activity and active transportation behavior. These models theorize that behavior is influenced by a range of factors across multiple levels of influence, such as individual, social, cultural, environmental, and policy levels. A core principle of ecological models is that there may also be interactions between factors across different levels of influence (Glanz et al., 2015; Sallis et al., 2006). Ecological models have been cited as being especially useful for explaining physical activity behavior, including physical activity that may occur through active transportation (Sallis et al., 2006).

A theoretical framework for this study was based on an Ecological Model of Active Transportation for Older Adults, adapted from the Ecological Model of Four Domains of Active Living (Sallis et al., 2006) and social ecological models presented by Mark Fenton (2015) (Figure 1). Previous studies have identified a range of factors that influence active transportation

behavior for older adults, such as individual factors (e.g., self-efficacy), social factors (e.g., safety and social opportunities), and environmental factors (e.g., desirable destinations within close proximity of their residences) (Brüchert et al., 2020; Cerin et al., 2017; Hoehner et al., 2005; Van Cauwenberg, Van Holle, et al., 2012). These findings are consistent with ecological perspectives on active transportation behavior. However, relatively few studies have used qualitative approaches to understand the unique perspectives and challenges of older adults when engaging in active transportation (Klicnik & Dogra, 2019).

Therefore, the purpose of this study was to use qualitative methods to understand how intrapersonal, social-cultural, and other environmental factors influence older adults' active transportation decisions. Research questions included:

1. What are the intrapersonal, social-cultural, and environmental factors that older adults perceive and experience in relation to active transportation?
2. How do these factors interact to influence older adults' active transportation behavior?

Based on a literature review, the study assumed that perceived safety, lack of self-efficacy, and lack of proximity to destinations would be reported as barriers, while desires for social connectivity would be a key facilitator of active transportation behavior. It also assumed that social support could mitigate the challenges of perceived safety and low self-efficacy.

A key aspect of this approach was engaging directly with older adults to explore the various experiences and perceptions that they may report across different levels of influence in relation to active transportation. Understanding these experiences in relation to older adults' active transportation decisions contributes to the general literature about factors that may influence their active transportation behavior. This study also helps to build context-specific

evidence for the needs and desires of older adults when engaging in active transportation within the study setting of Washington, DC. Ultimately, these findings can provide additional evidence and guidance for supporting active transportation as a key strategy for promoting physical activity and achieving improved health outcomes in older adult populations.

Methods

Study Design

This research is based on epistemological assumptions that knowledge and understanding can be developed through the subjective experiences of individuals (Creswell, 2013). It was approached primarily through a postpositivist interpretive framework, which applied a scientific and systematic approach to the research plan, data collection, and analysis. This position resulted in research aims and methods well suited to qualitative methods using a basic interpretive study design.

This interpretive framework also emphasized understanding multiple perspectives from participants and utilizing multiple methods of data collection and analysis (Creswell, 2013; Niebauer et al., 2020). A combination of interviewing, observation, and visual data collection provided data for analysis and interpretation. Interviewing strategies included "walking interviews," which combine interviewing and observation methods and create opportunities for participants to discuss their thoughts while actively moving through their neighborhood environments (Amaya, Chardon, et al., 2022; Carpiano, 2009). This method also provides opportunities to simultaneously collect visual data through photo or video recording. Previous studies using this method to explore active transportation behavior provided models for this data collection method (Lee & Dean, 2018; Van Cauwenberg, Van Holle, et al., 2012; Zandieh et al., 2017).

Study Setting

The study was conducted within Ward 5 of Washington, District of Columbia (DC)—an urban setting within the northeast quadrant of DC. This setting was selected due to the high proportion of older adults living within this area, as well as a review of other demographic and environmental factors expected to illuminate a range of experiences typical of the broader older adult population across the city.

Participants

Participants were recruited through convenience and snowball sampling, which included: 1) in-person recruitment by invitation to a local senior center, 2) physical distribution of flyers at the same senior center and a nearby neighborhood library, 3) email distribution of flyers via the Greater Brookland Intergenerational Village (an intergenerational service organization located within the study setting), and 4) participants' word of mouth.

Inclusion criteria for the study were older adults (65 years and older) who reported to: 1) be a current resident of Ward 5 in Washington, DC, for at least six months, 2) be able and willing to walk outdoors for at least 30 minutes, 3) at least occasionally walk, bike, and/or use public transportation within the community, and 4) be able to converse in English.

After initial eligibility screening—completed either online or by phone—the study purpose and methodology were explained to potential participants by phone. After obtaining verbal informed consent, participants were asked about basic demographic information and public transit use. They were also asked to identify a destination within a 10-15 minute walk of their home (or a nearby meeting place, if they preferred) and a preferred walking route to that destination. The researcher then identified and proposed a second route to walk back from the destination to the origin, which was intended to increase the number of environmental stimuli for

the participant to experience and discuss (Amaya, Chardon, et al., 2022). The full route was mapped using Google Maps and shared with participants for review prior to the interview. Adjustments to the planned route were made if requested.

Interview and Observational Guides

The purpose of the walking interviews was to explore the factors that influence older adults' experiences and decisions related to active transportation behavior. An interview guide was developed with open-ended questions corresponding to the different ecological levels of influence. Probing and follow-up questions aimed to further explore factors discussed, including how different factors might interact to influence decisions and behavior (see Appendix F). While questions were meant to guide the conversations, interviews followed a semi-structured protocol and were approached with flexibility to adjust according to participants' responses and ideas (Merriam & Tisdell, 2015). An observational protocol was also created, which the researcher used to document descriptive and reflective field notes following each interview (see Appendix G).

Pilot interviews were conducted with student assistants on four occasions prior to interviewing study participants to ensure that interview questions were appropriate for the planned interview duration and adequately captured data relevant to the study. Pilot interviews also served to test equipment (audio recorder, microphone, and camera) and to identify any other unanticipated or potential challenges.

Data Collection

All interviews were conducted in-person between June and August 2024. Meeting locations and walking routes were predetermined in collaboration with participants. Before beginning the interview, procedures were reviewed with participants, and they could ask

questions before providing written consent and participating. Interviews generally followed the predetermined walking routes but, in some cases, deviated slightly when participants invited researchers along a different path.

All interviews were conducted by the lead researcher (GSM) and followed a semi-structured interview protocol. With participants' consent, interviews were audio recorded with a portable recorder and lavalier microphone. Observational methods and visual data collection were also integrated as part of the walking interviews. The interviewer also acted in a "participant as observer" role and completed descriptive and reflective fields notes following each interview to supplement the data and to capture non-visual or other information that could not be well-documented otherwise (Creswell, 2013).

A participant-driven approach to photo documentation was emphasized to ensure data focused on participants' rather than the researcher's perspective (Cleland & MacLeod, 2021). However, to limit distraction to the interviewer and participant during the interviews, one of four student research assistants—recruited among Master of Public Health students at the George Washington University—also joined each interview to carry a small digital camera and assist with photo documentation. At the beginning of the interview, participants were invited to point out anything they felt was important to photograph during the walk. Water and snacks were available for participants, and they were invited to pause or take breaks as needed.

A total of 15 interviews were conducted which was in line with the range of sample sizes of several similar studies (Amaya, Chardon, et al., 2022) and which other researchers have indicated to provide sufficient data for analysis (Guest et al., 2006). As a "thank you," participants received a digital pedometer and a $25 Visa gift card.

Data Validation

Member checks are an important data validation method and help minimize the risk of misinterpretation or misunderstanding the data (Maxwell, 2013). Following each interview, audio recordings were transcribed verbatim and complete transcripts were shared with each participant. They were invited to review the transcripts and share edits, clarifications, or additional thoughts. Nine participants responded confirming the accuracy of the transcripts, with four providing additional clarifications, minor edits, or redactions. Revised transcripts, when received, were used in place of original transcripts for analysis.

During the analysis phase, a summary of preliminary themes and findings were also shared with participants for their review and feedback. They were also invited to have an informal follow-up conversation to share additional thoughts or reflections. Seven participants responded via email, four of whom stated they felt the summary of themes thoroughly captured their thoughts. Other respondents only expressed appreciation for the summary of findings. As no additional comments were received, further revisions to the overarching themes and findings were minimal within the final reporting.

Data Analysis

Data was analyzed using thematic analysis, which comprised the following steps. Interview recordings were transcribed verbatim using Otter.ai, an online platform that provides audio to text transcription (*Otter.Ai*, n.d.). Following initial transcription, the researcher manually reviewed and cleaned each transcription in preparation for member checking and subsequent analysis.

Analysis began with textual data analysis of interview transcripts, supplemental responses received from participants, and field note observations. The first cycle of coding

focused on deductive coding using provisional and structural coding methods. An initial coding list consisted of provisional codes based on the constructs of the a priori theoretical model used to guide the research (Coffey & Atkinson, 1996; Saldaña, 2013). Structural codes were used to organize data according to corresponding research questions. Once codes were defined within a codebook, all textual documents were reviewed and coded accordingly (see Appendix K).

A second cycle of coding applied an inductive approach using descriptive and process coding methods. Descriptive coding helped to summarize specific determinants, barriers, or other factors found within the context of each ecological domain. This method helped to highlight topics relevant to participants' experiences and perceptions of active transportation. Process coding is appropriate for observational data and was used to illuminate observations of participants' interactions with the neighborhood environment as they moved through it (Saldaña, 2013). Additional, iterative cycles of coding and review served to refine codes further and clarify specific topics and factors that were discussed and observed. Codes were added to the existing codebook.

Prior to visual data analysis, all collected photos were reviewed to ensure they did not feature identifiable images. In cases where photos included images or partial images of individuals, photo-editing software was used to crop or blur the image to ensure anonymity and confidentiality. Images edited for this purpose only included the edited versions during analysis and reporting. In cases of duplicate or nearly identical images, only one image was included for analysis.

Visual data analysis followed the Textual-Visual Thematic Analysis (TVTA) framework developed by Trombeta and Cox (2022). This framework guided the analysis of visual data in conjunction with textual data. Steps of TVTA include: 1) completion of textual data analysis, 2)

analysis of photos next to interview transcripts using the same codebook generated during textual analysis, and 3) identification of overarching patterns about relationships between textual and visual data.

Following textual and visual coding, additional reviews organized codes by overarching themes and subthemes. Constructs of the ecological model, which were used as provisional codes, provided context for understanding and categorizing the various subthemes participants discussed.

All textual and visual data were coded and analyzed independently using ATLAS.ti 25.0.1 for Mac (*ATLAS.Ti Scientific Software Development GmbH*, 2023). Analytic memos were written throughout the analytic process to document reflections and decision-making.

Reflexivity and Validity

This study was conducted as part of my dissertation research as a Doctor of Public Health candidate at the George Washington University. Many of my educational and professional experiences have emphasized learning and understanding health behavior, particularly in relation to physical activity and its role in disease prevention and overall wellbeing. These experiences, along with personal values, biases, and identity, may have influenced how I approached and analyzed this research. Several steps were taken to enhance the study's validity and conclusions. Before beginning the study, I completed a reflexivity statement that acknowledged my personal and professional experiences, age, race, gender, and positionality in relation to the study setting and community.

Meetings with advisors and dissertation committee members provided opportunities for external checks to discuss challenges and receive feedback on study design, data collection, and analysis during various stages of the research. Member checking strategies also served to support

the validation of data (Maxwell, 2013). Analytic memos and reflections were kept throughout the research process to document observations, insights, challenges, and decision-making to support transparency and validity (Saldaña, 2013).

Ethics

Several ethical considerations were addressed throughout the study. First, ongoing consent was a priority. The study purpose and interview process were explained to participants both verbally and in writing. Verbal consent was obtained prior to collecting sensitive information during recruitment and written consent was secured before conducting interviews. Participants were invited to ask questions and were informed that participation was voluntary. Second, the walking interviews posed a minimal risk of harm and injury. Eligibility screening and consent ensured participants were able and willing to take part in this type of interview. Third, confidentially and anonymity were maintained throughout the study process. Data was stored on secure, password-protected devices and services. All data used assigned ID numbers in place of participant names to prevent identification. Results were closely reviewed to ensure no identifying information was included within quotes, images, or narrative for future reports, presentations, or publications. All study procedures were reviewed and approved by the Institutional Review Board at the George Washington University.

Results

Participant Characteristics

Fifteen older adults participated in the study. Participants ranged in age from 65 to 84, with a mean age of 71.8 years. Fourteen participants identified as female, and one as male. Nearly all participants had lived within Ward 5 of Washington, DC for more than five years, and interviews took place across eight different neighborhoods (one interview took place in a

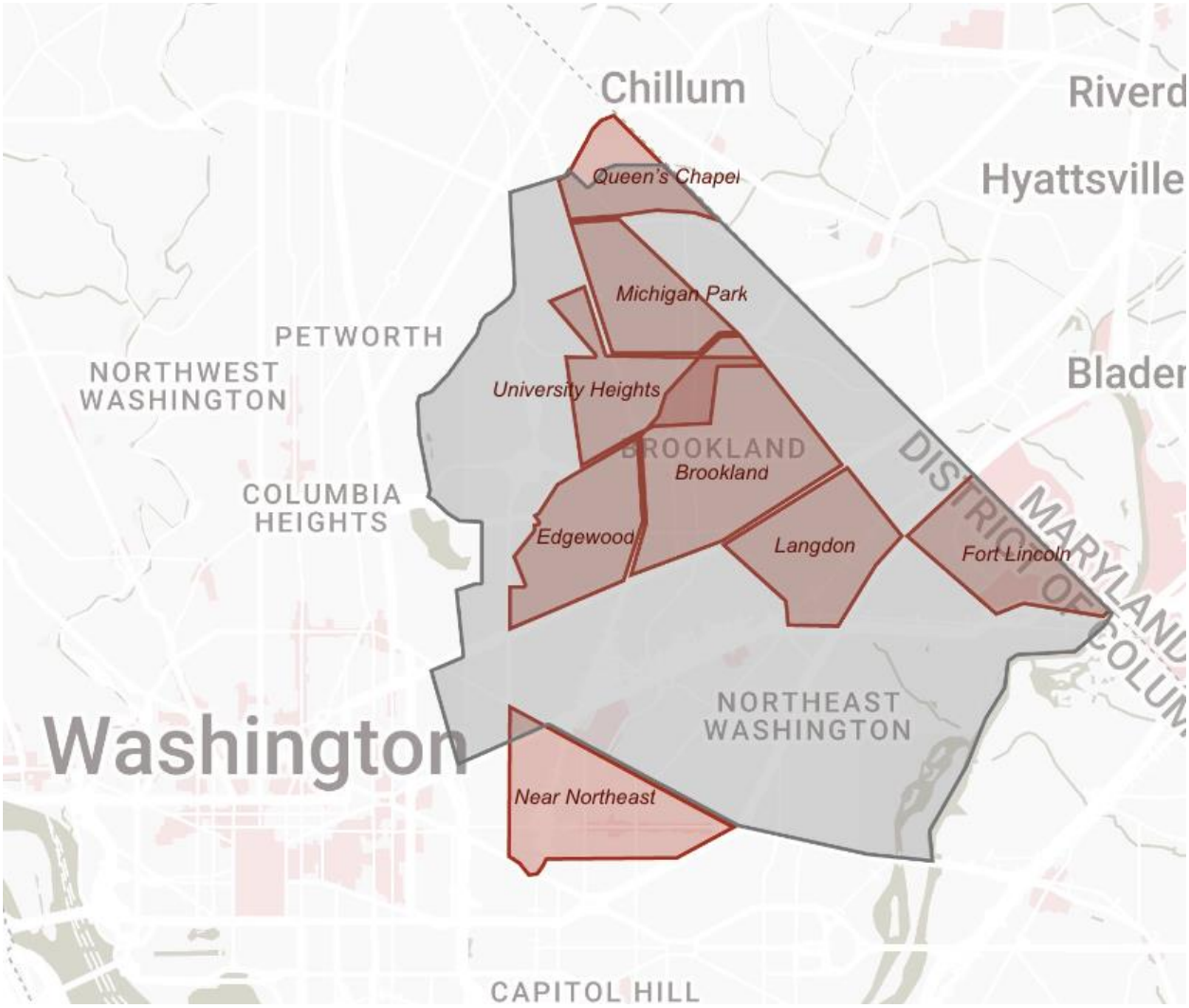
neighborhood just outside of Ward 5 per the participant's request) (see Figure 5). The duration of walking interviews ranged from 20 to 79 minutes, averaging 39 minutes. Distance walked during interviews averaged 0.97 miles, ranging between 0.6 and 1.3 miles.

All participants had at least some college education, with most having either a bachelor's degree (n = 5) or a graduate or professional degree (n = 5), representing a generally higher level of education within the sample compared to the estimated 40.7 percent of older adults across the city that hold at least a four-year degree (*The State of Older Adults in the District of Columbia*, 2020). Among the lowest earning 25% of older adult households in DC—a high concentration of which are within Ward 5—median income is reported to be about $21,000 (*The State of Older Adults in the District of Columbia*, 2020). However, among study participants who reported on household income all reported annual income greater than $25,000.

Almost half of the participants (n = 7) reported walking or biking almost every time they needed to go somewhere, while the remaining reported doing so occasionally (n = 8). A majority also reported using public transportation at least occasionally when they needed to go somewhere (n = 14). Additional demographic and interview characteristics are presented in Table 6 and additional responses to transportation usage are found in Table 7.

Figure 5

Ward 5 and Neighborhood Boundaries of Interview Locations



Note. Map reflects Ward 5 study setting boundaries (gray outline) and neighborhood boundaries where interviews took place (red outline) (Google Maps, 2024).

Table 6

Participant Demographics and Interview Characteristics; n = 15

Demographics and Characteristics	***n* (%) or** *mean* (range)
Age	71.8 (65–84)
Gender	
Female	14 (93.3%)
Male	1 (6.7%)
Race	
American Indian or Alaskan Native	0 (0.0%)
Asian American	0 (0.0%)
Black or African American	8 (53.3%)
Native Hawaiian/Pacific Islander	0 (0.0%)
White or Caucasian	5 (33.3%)
Prefer not to say	2 (13.3%)
Education	
Less than high school	0 (0.0%)
High school graduate or GED	0 (0.0%)
Some college or vocational training	3 (20.0%)
Associate's degree	1 (6.7%)
Bachelor's degree	5 (33.3%)
Graduate or professional degree	5 (33.3%)
Prefer not to say	1 (6.7%)
Annual Household Income	
Less than $25,000	0 (0.0%)
$25,000–$49,999	3 (20.0%)
$50,000–$74,999	3 (20.0%)
$75,000–$99,999	1 (6.6%)
$100,000–$149,999	2 (13.3%)
$150,000 or more	1 (6.7%)
Prefer not to say	5 (33.3%)
Years of Residency in Ward 5	
6 months to 1 year	0 (0.0%)
1 to 5 years	1 (6.7%)
More than 5 years	14 (93.3%)
Interview Location by Neighborhood	
Brookland	4 (26.7%)
Edgewood	2 (13.3%)
Queen's Chapel	1 (6.7%)
Fort Lincoln	3 (20.0%)
Michigan Park	1 (6.7%)
University Heights	1 (6.7%)
Langdon	2 (13.3%)
Near Northeast*	1 (6.7%)

Interview duration (minutes)	39 (20–79)
Walking distance (miles)	0.97 (0.6–1.3)

Note. *Near Northeast neighborhood was an interview location per participant request, though not contained within Ward 5.

Table 7

Perceived Walkability, Active Transportation Behavior, and Public Transportation Use Survey Items

Survey Responses	n (%)
Perceived Walkability	
In your opinion, how suitable is your neighborhood for walking, including for those who use wheelchairs and other mobility aids?	
Not at all suitable	0 (0.0%)
Slightly unsuitable	0 (0.0%)
Neutral	4 (26.6%)
Slightly suitable	8 (53.3%)
Very suitable	3 (20%)
Active Transportation Behavior	
How often do you walk or bike when you need to go somewhere?	
Occasionally or sometimes	8 (53.3%)
Almost every time	7 (46.6%)
Every time	0 (0.0%)
Public Transportation Usage	
How often do you use public transportation when you need to go somewhere? (E.g., Metrorail, bus, or ride services)	
Never	
Almost never	1 (6.6%)
Occasionally or sometimes	10 (66.6%)
Almost every time	2 (13.3%)
Every time	2 (13.3%)
When you use public transportation, what type of transportation are you most likely to use?	
Rail (Metrorail or DC Streetcar)	5 (33.3%)
Bus (Metro or other bus services)	9 (60%)
Door-to-door ride services (MetroAccess, Uber, Lyft, etc.)	1 (6.6%)
In your opinion, are public transportation stops too far from your home?	
Yes	0 (0.0%)
No	15 (100.0%)

Themes

Thematic analysis revealed ten overarching themes that impacted participants' experiences and decisions about active transportation. Thirty subthemes were also identified, which manifested across the six levels of ecological influence, including intrapersonal factors, perceived environment, social-cultural environment, natural environment, behavior settings, and policy environment. Table 8 outlines connections between overarching themes, subthemes, and ecological domains.

Table 8

Themes, Subthemes, and Corresponding Ecological Domains

Themes	Subthemes	Ecological Level(s)
Safety	*Perceived safety*	Perceived Environment
	Crime	Social-Cultural Environment, Behavior Settings
	Dogs	Social-Cultural Environment, Behavior Settings
	Police presence	Social-Cultural Environment, Perceived Environment
	Safety precautions	Intrapersonal
Social Environment	*Programs, activities, and events*	Social-Cultural Environment, Behavior Settings
	Social protection	Social-Cultural Environment, Behavior Settings
	Social support	Social-Cultural Environment, Behavior Settings
	Courtesy and respect	Social-Cultural Environment, Behavior Settings
Pedestrian and Bicycling Infrastructure	*Pedestrian infrastructure*	Behavior Settings
	Bicycling infrastructure	Behavior Settings
Public Transit	*Access to transit*	Behavior Settings
	Affordable transit	Behavior Settings, Policy Environment
	Frequency of service	Behavior Settings
	Accessible facilities	Behavior Settings
Nearby Destinations	*Retail and service destinations*	Behavior Settings
	Community amenities and resources	Behavior Settings
	Parks and greenspaces	Behavior Settings
Neighborhood Development and Characteristics	*Neighborhood development*	Behavior Settings
	Neighborhood identity	Behavior Settings

Appearance and Attractiveness	*Aesthetics*	Perceived Environment
	Greenery and trees	Behavior Settings
	Trash and litter	Behavior Settings
Natural Environment	*Weather*	Natural Environment, Behavior Settings
	Topography	Natural Environment, Behavior Settings
Community Policy and Responsibility	*Traffic and parking regulations*	Policy Environment
	Community engagement and advocacy	Social-Cultural Environment, Policy Environment
Individual Characteristics	*Biological factors*	Intrapersonal
	Psychological factors	Intrapersonal
	Vehicle ownership	Intrapersonal

Safety

Perceived safety. Every participant commented to some degree about how they perceived their own safety when walking around their neighborhoods and community. The majority of comments related to perceived safety from crime. Two participants from adjacent neighborhoods explicitly mentioned that the threat of crime influences their decisions to drive to stores instead of walking. One participant shared: "The Walmart is like a block and a half for me. So I could walk to the Walmart, but I'm afraid to walk to the Walmart." Another said, "I used to walk… but because the crime has just increased […] throughout the city, I just—I just think it's safer just to hop in the car, get where I'm going and get back." The same participant later added:

> I just think that the main thing is that we have to feel safe walking our communities and living in our communities. So whatever it takes to make us feel safer in our communities and be safer... that's what we want so that we can walk, so that we can bike, so that we can run, whatever…That's the bottom line for me.

Several other participants, however, reported that they generally "feel safe" while walking in their respective neighborhoods and a male participant perceived general concerns about crime to be largely exaggerated. Notably, those who reported feeling safe lived in

different—but sometimes adjacent—neighborhoods than those more concerned about feeling safe from crime.

Other significant safety concerns included feeling threatened by dogs—whether leashed or not. Some also voiced concerns about vehicle traffic while walking or bicycling due to aggressive, impatient, or negligent drivers. Two participants, though, reported feeling that vehicles were generally respectful of pedestrians at intersections and crosswalks.

Crime. In connection to perceptions of safety, there were several instances where participants referenced or pointed out observable instances of crime. One participant discussed the crime alerts she receives on her phone and commented that there had been robberies and carjackings in her neighborhood the day before the interview. In a different neighborhood, another participant pointed out where a CVS Pharmacy had boarded up windows due to recent criminal activity.

Police presence. During several interviews, participants pointed out the visible presence of police within their neighborhood. Nearly all instances occurred within the same neighborhood—though interviews took place on different days and times. Participants spoke favorably of their presence and commented on how it contributed to their sense of safety. Two participants from other neighborhoods commented on their desire for more police presence, which they also said would contribute to their feelings of safety from both crime and traffic.

Dogs. While several participants had mentioned their concerns about dogs ("too many dogs!" as one participant said), I also observed the presence of dogs during several interviews. In most cases, the dogs I observed were leashed and appeared non-threatening. However, during one interview we encountered a barking dog that was unleashed in a yard with a short fence. In

another case, I observed a very large dog with a muzzle over its mouth. These observations offered some indication of how they might contribute to participants' perceived sense of safety.

Safety Precautions. In response to safety concerns and threats that people perceived—and some of which were also observed—several participants discussed the behaviors and actions they take to protect themselves while walking, biking, or using public transportation. During one interview, a participant carried a large wooden stick, which she said she carried everywhere to protect herself from aggressive dogs. In response to seeing dogs, I observed other participants sidestep into a street or step off a sidewalk to maintain as much distance from them as possible.

Several participants mentioned they avoid walking outside at night as precautions from crime. Others said that while they don't necessarily avoid going out at night, they are intentional about the routes they choose, e.g., routes that are well-lit and populated. One commented that she avoids carrying a wallet and another always "travels light" so that "I can run, if I have to."

Social Environment

Social protection. The presence of other people in and around the community was seen favorably and provided a sense of social protection when walking and biking. One participant said: "There's definitely a lot more people walking around the neighborhood these days, so the eyes on the street concept is helpful." Another shared: "…being older, the concern is that you want to be someplace where there's activity around." Others similarly commented that seeing people walking around helped it feel safe to walk. Several participants favored walking near major roads and traffic because, as one stated, "I know that if I needed to yell out or something like that, there would be someone around."

Participants in the Brookland and Edgewood neighborhoods commented on how familiarity with their neighbors also contributed to feeling safe and comfortable while being out.

One participant commented that her neighbors are very supportive and look out for her, and another said, "…people tend to look out for people in the neighborhood, even if you don't know someone."

Social support. For some participants, having a friend or partner to walk with contributed to feelings of safety. One participant responded that one of the most important things older adults can do to feel safe when going out is to have a partner go with them. However, opinions varied about the feasibility and necessity of walking with a partner. One participant felt that the logistical challenge of coordinating with someone else was not worthwhile. Another commented that while it would be "great" to walk with a friend or partner, "so many of [them] are like my age and they're not into walking." Another said, "I'm not deterred from walking if I don't have a partner to walk with."

Courtesy and respect. A lack of courtesy and respect within the broader community, as well as towards older adults in particular, was a concern for some participants and contributed to negative experiences when walking or using public transportation. Comments emphasized issues with people riding scooters and bikes on sidewalks, often not slowing or yielding to pedestrians. One participant called the behavior "unsettling" and worried about getting "knocked over."

Another participant noted an issue of young people not giving up seats allocated for seniors on public transportation, saying: "…young people, they don't respect the elders like they used to." Someone also further emphasized concerns about poor and disruptive behavior on public transportation, saying: "I haven't been directly threatened but have felt very uncomfortable… The drivers usually do nothing to curb this behavior."

Programs, activities, and events. Neighborhood events and other organized programs and activities provided participants with many opportunities for social connection. Some

commented on the availability of exercise classes and activities organized by a local senior center and recreation centers. Participants from the Brookland neighborhood, in particular, mentioned a gardening club, regular neighborhood cleanup events, and the presence of the Greater Brookland Intergenerational Village. One participant from the same neighborhood highlighted a community bulletin board to promote awareness of local events and services and to support social connections (Figure 6). Some participants commented on the interconnected relationship between these "opportunities for people to get out and interact," and mental health, physical health, and wellbeing.

Figure 6

Neighborhood Bulletin Board

Note. Image reflects a well-maintained neighborhood bulletin board with flyers and business cards to advertise social events and services.

Pedestrian and Bicycling Infrastructure

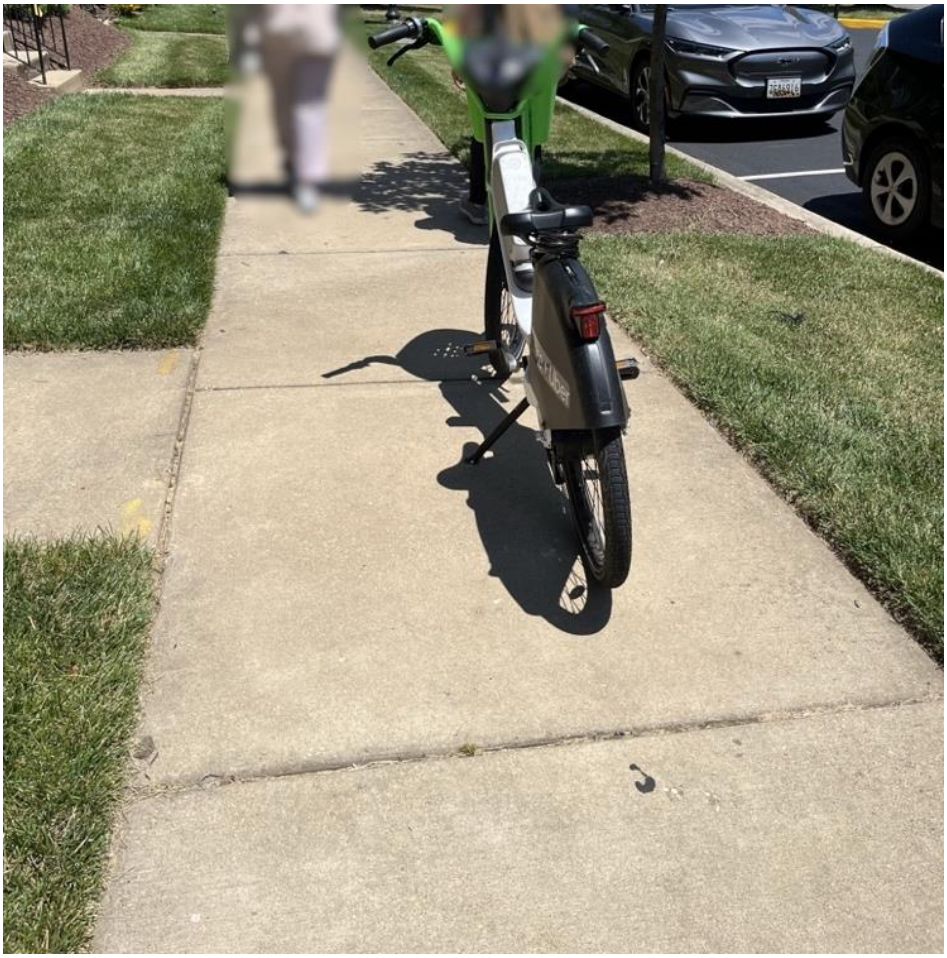
Pedestrian infrastructure. Nearly every participant discussed sidewalks, frequently commenting on and pointing out instances of cracks, heaves, and bumps. These issues caused concerns about tripping and stumbling. On three separate occasions, I witnessed participants stumble over sidewalk cracks during interviews.

Several participants noted tree roots as the cause of broken sidewalks; while some had been covered with rubberized asphalt, they left noticeable bumps to navigate. Participants also commented on the need for "ongoing maintenance" and "to do a better job of maintaining neighborhoods, you know, sidewalks…" Apart from broken sidewalks, other common obstructions and hazards that participants pointed out included overgrown grass, weeds, and bikes left abandoned on the sidewalk, which I frequently observed as well. One participant also commented on instances of steep drop-offs and sudden changes in width along sidewalks. Examples of such obstructions and hazards were pointed out by participants and documented in photos, which reinforce these comments (see Figures 7, 8).

While many participants pointed out potential hazards, sidewalk infrastructure was observed to be both present and continuous throughout each route (with two exceptions where segments of sidewalk were closed off for construction). One participant shared, "The sidewalks in my neighborhood are well-maintained, so there are no impediments in terms of uneven or dangerous walking surfaces." Another commented of her neighborhood: "It's amazing how good the sidewalks are."

Figure 7

Bicycle in Sidewalk



Note. A dockless bicycle is left standing within the sidewalk, creating an obstruction for pedestrians.

Figure 8

Sidewalk Changes Width

Note. Image shows example of a sudden change in width of the sidewalk, with a steep drop-off along the sidewalk edge.

Some participants suggested that pedestrian routes and infrastructure should include more benches and strategic placement of handrails in areas where older adults live—an example of which one participant pointed out in her own neighborhood, adding that it served as both functional support and an additional barrier from traffic (Figure 9).

Figure 9

Handrails Along Sidewalk

Note. Image reflects handrails lining both edges of a sidewalk.

Bicycling infrastructure. Participants who indicated they were bicyclists commented positively about the development of bike lanes, including a nearby multi-use trail that connected their neighborhood to downtown areas. One participant commented: "When I'm driving around, almost every street, it seems like a bike lane, it's terrific! And they're protected." Another noted that the development of bike paths "made it a lot safer to bike around" and "a lot faster often to bike somewhere" instead of driving. The availability of bikeshare was also an asset for one participant, who preferred using it over her personal bike.

Several other participants, speaking primarily of their experiences when driving for transportation, spoke less favorably of the development of bicycling infrastructure throughout the

community. Some indicated that the placement of bike lanes contributed to parking and safety issues, commenting: “The bike lanes took up all our parking too on, on the street, so we have limited parking space there,” and “I certainly understand for people who are…older than me, you want to be able to park close to their homes or close to where they’re going.” Others emphasized the need for greater public engagement and consideration of older adults during the development of bicycling infrastructure.

Public Transit

Access to transit. Convenient access to public transit was important to participants, who also indicated they typically walked to reach nearby stops and stations. Regardless of neighborhood location, most participants commented on the availability of nearby bus stops and frequent use of bus transit. These were frequently observed along the walking routes as participants pointed them out. One participant expounded:

> When I come out of my house, all I have to do is go across the street and walk a block. I’m at a bus stop. So all this easy access to transportation is good for especially seniors, because as we get older, some of us don’t always want to drive, you know, so to have the ease and availability of transportation…that’s important.

Participants living in neighborhoods near rail transit—Brookland, Edgewood, Michigan Park/University Heights, and Queen’s Chapel—also valued access to the Metro. Speaking of it, one participant said: “I love this area. I love where I am because I don’t have to drive. I got buses, I got Metro.”

Affordable transit. Discussions about accessible transit also referenced the importance of affordability. One participant’s suggestion for supporting older adults was summed up this way: “Adequate public transportation, bottom line…and lower fees!” Participants, however,

expressed concern about the affordability of alternative options for their peers who cannot access public transportation. For them, participants discussed the importance of affordable door-to-door options, which rely on funding and support from the city.

Frequency of service. While participants valued the availability of public transit, some shared their experiences and frustration with infrequent service. One participant, who frequently uses the bus for transport, shared a recent experience: "So when I came out the bank, I was gonna go to Palisades Library… And I had to wait more than an hour for a bus again, the same bus line." Another participant said the challenge she experiences is: "Just waiting. Sometimes just waiting and being patient and not getting upset."

Accessible facilities. Participants appreciated that buses were well-equipped and accessible, noting features like ramps and folding seats to accommodate wheelchair users. However, they desired improvements to public transit stops and facilities. Participants from multiple neighborhoods commented on a lack of benches and shelters at many stops, which I also observed to be the case. One said: "I've noticed that benches are placed at certain points. It would be great if there were more benches. Additional covered bus stops would also be welcome." Referencing an exception I noticed along one particular route, I noted: "The bus stop had a bench and covered shelter, which I imagined was very much valued by residents of the senior apartment building. But it was also the only bus stop I noticed along our route that had a bench and shelter."

Nearby Destinations

Retail and service destinations. Several types of retail and service destinations, including grocery stores, restaurants, pharmacies, and banks, were mentioned as typical destinations for participants. One participant said of the convenience of walking or biking to

some of these places: "…you can really get to most things." For those within walking distance of a grocery store, most said they would walk to pick up groceries. One participant said that since the grocery store was so close she committed herself to walking every time, taking a grocery cart for larger items if necessary. Another participant who did not live near a grocery store said she would take the bus to get groceries.

Community amenities and resources. Participants frequently mentioned the availability and proximity of several community amenities and resources, which they viewed as an asset. In four different neighborhoods, participants pointed out recreation centers and facilities along our walking routes. Participants discussed exercise and fitness classes, walking tracks, and community gardens that were easily accessible to them. Participants also commented on the proximity—either by walking or by public transport—to public libraries. One participant said, "I like that my library is right down the street," and another said their library is "fantastic and tremendously utilized."

Parks and greenspaces. In addition to the presence of greenery and trees throughout their neighborhoods, participants valued the presence of dedicated parks, greenspaces, and gardens. One participant commented that she "enjoy[s] park-like areas with trees and benches that allow me to sit and people-watch during my walk" (see Figure 10). For another participant, nearby parks provided an outdoor space to bring her grandkids while caring for them. One participant commented on the value of having such spaces nearby: "it's peaceful and beautiful..." Other participants valued just being able to walk through the greenspaces, also using words such as "pleasant," "peaceful," and "beautiful" to describe them.

Figure 10

Benches in Park

Note. Image of several benches lining a walking path within a park; mature trees, grass, and landscaping are visible.

Neighborhood Development and Characteristics

Neighborhood development. Development of the built environment—particularly related to commercial development and housing density —within participants' neighborhoods brought mixed feelings for participants living in the Brookland and Edgewood neighborhoods. Some participants commented positively on the approximation of new destinations and services, which provided additional opportunities to walk and bike places or to connect to public transit. While pointing out examples of newer development, one participant shared:

> So, see that kind of stuff has happened in the neighborhood, and…it encroached on our neighborhood, and we had to just adapt. I mean, but it brings, markets. It brought a theater…I mean, there's places like that that we didn't have before.

Another said, "…for me, I think it's nice because there are more restaurants and more places."

Opinions were mixed on the new construction and impacts of increased housing density near and within their neighborhoods. One participant voiced support for the transit-oriented development—which meant fewer car-dependent people—, while another opposed the loss of single-family housing and neighborhood character.

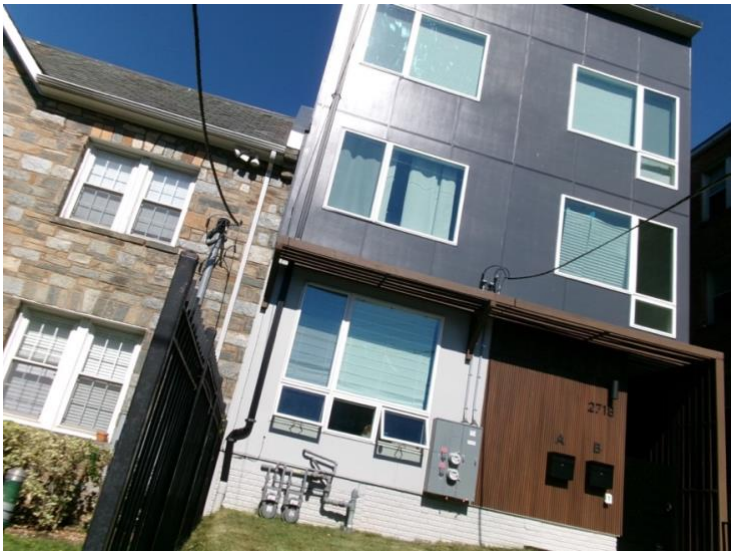
Multiple participants from the Brookland and Edgewood neighborhoods acknowledged the social impact of recent gentrification, specifically noting increased property values and significant shifts in racial demographics as a result.

Neighborhood identity. Additional comments spoke to the attention given by developers—or lack thereof—to preserve the neighborhood's historical character and identity within new construction. Two participants from adjacent neighborhoods commented on the "ugly" architecture of some new residential buildings. One participant said, "I love it if they maintain the integrity, that's what I call it, of the neighborhood." The contrast between older and new buildings was often apparent during my observations as well. (See Figure 11.)

Apart from architectural design, participants found pride and value in microscale features of their neighborhoods that reflected local history and culture. Within the Edgewood neighborhood, a participant led us to a large, mosaic mural left on the side of a large commercial building, saying, "This is kind of what we have here representing Edgewood," and "…it's just gorgeous. I just love to admire it. I'm so glad it's still here." (See Figure 12.)

Figure 11

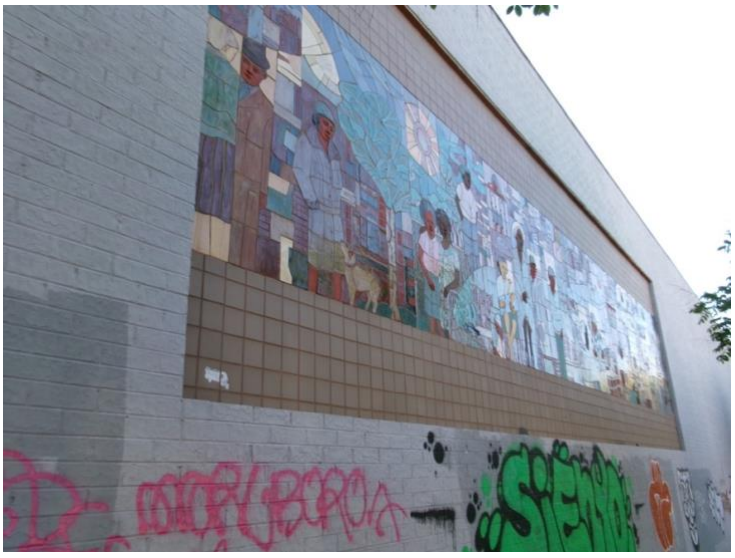
Contrasting Architectural Styles



Note. Image reflects new residential development adjacent to older residence, representing contrasts in architectural style between newer and older developments.

Figure 12

Edgewood Neighborhood Mural



Note. A large mosaic-type mural is preserved on the side of a commercial building; historical scenes and figures are depicted.

In the Langdon neighborhood, participants highlighted a sculpture representing Chuck Brown—a musician known for DC's iconic "go-go" music—at a park's entrance, saying: "Well, it makes people feel somewhat proud…"

Appearance and Attractiveness

Aesthetics. Participants valued aesthetically-pleasing aspects and features of their neighborhoods. Two participants said their neighborhoods were "quiet," which they appreciated. Other participants pointed out vistas showcasing greenery and interesting architectural features, which they viewed favorably. One participant commented on several occasions—pointing out different vistas, clean alleyways, and public amenities—, "isn't this beautiful?" In reference to how similar features impacted her experiences, another participant said it is "just more pleasant for me" and "there's a value to nature and aesthetics… but it's hard to quantify it, you know?"

Greenery and trees. Nearly all participants mentioned the presence of greenery and trees throughout neighborhoods. When discussing the walkability of her neighborhood, a participant said: "Well, I love the green. I just love the green." Others expressed similar sentiments about the beauty of trees, bushes, and landscaping along their routes. Trees also served a functional purpose for participants by providing shade from sun and heat—which one participant commented was a deterrent to walking outside. Along many routes, I also observed buffers between the sidewalks and streets which were often filled with grass and street trees.

In several instances, however, low-hanging branches and overgrowth created inconveniences and potential hazards for participants. On multiple occasions, I observed participants ducking and weaving in order to avoid the foliage. One participant commented on the need for better maintenance but also noted that it did not necessarily impact her experiences while walking. (See Figure 13.)

Dense greenery contributed to safety concerns for some participants. One participant pointed out a location where dense trees and shrubs bordering a sidewalk had been removed because it created a potential hiding space for muggers to apprehend people—which had once happened to her family member. While walking past an area with dense trees and landscaping, another participant also expressed concerns: "So, like, I would never walk on this side of the street by myself, you know, with the woods right there." Referencing an undeveloped federal park within the Brookland neighborhood, a third participant said: "…it's pretty, but it's an unattended block or two of trees and woods…I would just feel creepy there, you know?"

Figure 13

Low Hanging Branches

Note: Foliage is seen hanging above the sidewalk.

Trash and litter. Participants were not deterred from walking by the presence of trash and litter, though it impacted their experience while doing so. Although certain areas within some neighborhoods were noticeably more littered than others, one participant noted that while "litter doesn't hurt someone per se," it was seen as "ugly, disrespectful, sometimes smells." In response to the litter, one participant paused several times to pick up and throw away pieces of plastic trash into a garbage can along the route. "I can't leave a plastic bottle on the street, I just can't." In some instances, public trash cans were observed to be overflowing, which elicited comments about needing to empty trash cans more frequently and the problems it can cause with smells and rats. (See Figure 14.)

Figure 14

Litter Along Sidewalk

Note: Image shows several pieces of trash littered along a sidewalk.

Natural Environment

Several participants indicated that weather conditions are likely to influence their decisions about walking or biking. Snowy and icy conditions, in particular, were likely to deter active transportation behavior. One participant said: "Oh well, if it's snowing and icy, you can forget me walking around," and another said: "Definitely as I've gotten older, I'm more phobic about biking in ice, ice or snow." Hot and rainy weather also deterred active transportation for some participants, one saying that in rainy conditions, "I would be more prone to drive…" Another said: "If it's too hot or wet or whatever, forget it," but also added that she would still take public transportation in those instances.

Several interviews took place during warm weather, and I frequently observed participants seek areas along routes that were shaded in response to the sun and warmth. In one of those instances, a participant said: "…we're on this side of the street cause it's a little cooler." Another clarified that inclement weather conditions, such as hot weather, do not influence *if* she walks, but rather it impacts *when* she goes.

Participants across Brookland, Edgewood, and Fort Lincoln neighborhoods commented on the presence of hills within their neighborhoods. Several participants indicated they appreciated the "great workout" going up the hills. One participant, however, commented on the potential challenge it could be for other older adults to walk or bike in the area. Referencing a family member's experience while visiting, she said "…I think for her the hills are quite daunting." As a solution for people challenged by the topography, she emphasized the importance of good transit in the area.

Community Policy and Responsibility

Traffic and parking regulations. For several participants, parking regulations deterred driving for transportation around the city due to limited parking spaces, confusing signage, and fees. One participant said: "All the signs are so hard to understand…when you can park, when you can't park," and added that she doesn't have cell phone data to be able to reserve parking spots ahead of time. Others agreed that "trying to park on the other end is a big challenge." The high cost of parking and speeding tickets also influenced one participant's decisions about taking public transportation instead of driving to certain places.

Community engagement and advocacy. Several participants emphasized their desire for public engagement, inclusion, and participation in decision-making about land and transportation development. Some participants emphasized the responsibility for local authorities to engage with and consider the needs of older adult residents. Speaking broadly, one participant said: "Just because we're older adults…don't forget about us, don't throw us away. We want to still be active." Referencing the impact of bike lanes on older adults, one participant suggested:

> Let's slow down on the bike lanes that you're trying to put into the city… come to us and ask us how do we feel about the bike lanes. We're the ones that's traveling those areas on a daily basis. Not you.

Another participant agreed: "I think it's important to listen to the community and not force something that a community doesn't want or do it in a way that works for everyone."

Others mentioned some successes in local advocacy efforts to influence their neighborhoods' development, e.g., preserving a park from being turned into a dog park, bargaining for space dedicated to arts and culture, and working with developers to create connections to transit and to expand a local trail network. Speaking of the importance of being

engaged in these efforts, one participant stated, "…I feel like it helps a lot to feel less helpless, more engaged, more empowered, if there are ways that you can connect and try to affect policies."

Individual Characteristics

Biological factors. Individual-level characteristics impacting walking and bicycling behavior included both physical abilities and limitations. Some participants mentioned surgeries or other mobility limitations, which impacted the frequency and extent to which they were able to walk. Due to a hip replacement, one participant said, "that's why I don't walk as much as I used to." Two participants mentioned other personal health reasons that impacted their desire and ability to drive a personal vehicle, resulting in greater necessity of walking and using public transit for transportation.

Psychological factors. For many participants, walking and bicycling behavior—including walking or biking specifically for transportation—was influenced by values towards health and wellbeing, as well as their skills and confidence to engage in these behaviors. When asked about reasons for walking places, one participant said, "Health!" Other participants expressed similar motivations, saying that walking "felt good," was "so heart healthy," and that the exercise was "good for every […] aspect of health. Mental health, physical health. It's like a treatment for every chronic condition." Two participants also said they were motivated by the known benefits to public health and the climate.

The skills and confidence to engage in active transportation behavior were also relevant factors. A few participants discussed fall prevention strategies that they learned and practiced. One of the older participants demonstrated her walking form while saying: "My exercise teacher says I shouldn't have to worry about stumbling because if you pick your feet up you don't have

to worry about it. That's why he teaches us to roll, you know…roll your feet." When discussing potential hazards while walking, another participant said: "If I didn't pay attention, it might provoke something. But…since I do pay attention, I should be okay." Another added that she "just [makes] it a point of looking at where [she's] walking."

My own observations noted most participants' skills and relative ease for walking—and biking, in the case of one participant—through portions of their neighborhood environments, including their ability to navigate curbs, cracks, and other obstructions.

Vehicle ownership. For some participants, not owning a private vehicle was a determinant of their day-to-day active transportation decisions. One participant shared that her car had been stolen, so complete dependence on walking and public transportation became a necessity. Two other participants shared that they chose not to own private vehicles. One shared: "…I've figured out ways to go where I need to go with public transportation…" When another participant had an opportunity to own a new car, she said: "…you know, I'd rather walk."

Discussion

This study contributes to the relatively few qualitative studies that have sought to understand older adults' unique needs and desires when using active modes of transportation (Klicnik & Dogra, 2019). It also used an ecological model of behavior to explore multiple levels of influence on older adults' decisions and experiences with active transportation. Results highlight the range of individual, social, and environmental factors—and how certain factors may interact with others—to shape active transportation behavior for this population. The following sections further describe the themes that encompass these various factors as well as the interplay that exists between them.

Safety

Findings from this study highlight the importance of *safety* in relation to participants' experiences and decisions about using active forms of transportation. Participants discussed multiple aspects of safety, including subjective perceptions and objective experiences that varied across their different neighborhood environments. In line with the study's key assumptions and previous research, results indicate that some aspects of the perceived environment—particularly perceived safety from crime—are significant barriers to active transportation behavior for some older adults (Brüchert et al., 2020; Van Cauwenberg, Van Holle, et al., 2012). Some participants shared that their decisions to drive certain places were largely influenced by their concerns about crime, which appeared mainly in response to objective reports and knowledge of criminal activity within their neighborhoods.

Previous qualitative studies have also identified traffic safety concerns as a major barrier to active travel for older adults (Brüchert et al., 2020; Van Cauwenberg, Van Holle, et al., 2012). While some participants indicated concerns about negligent drivers—which can negatively influence active transportation—traffic safety did not seem to be a major concern or a significant deterrent for most participants in this study (Van Cauwenberg, Van Holle, et al., 2012). This highlights how factors may differ across settings and may suggest some successes with local community efforts in DC to protect and prioritize the safety of pedestrians, bicyclists, and other road users.

Participants also reported favorable views about the presence of police within their neighborhoods, indicating that a reliable presence could interact with and mitigate concerns about perceived safety from both crime and traffic. Participants whose active transportation decisions were more likely to be influenced by perceptions of safety desired greater police

presence to help minimize the perceived threats. In contrast, in neighborhoods where a police presence was consistently observed, study participants reported feeling less concerned about safety. These findings provide valuable insight into the role the law enforcement sector may play in relation to the perceived environment for supporting active transportation behavior in older adults.

Results also identified the presence and perceived threat from dogs within neighborhood environments as a noteworthy factor related to some older adults' experiences and comfort while walking. However, it did not appear to influence their decisions about whether or not to engage in active transportation. Still, this appears to be a unique finding as no previous studies have been found to examine perceived safety from dogs in relation to active transportation behavior.

Overall, these findings underscore the significant role that safety plays in influencing older adults' decisions and experiences when engaging in active transportation. They show which aspects of safety were most salient among participants, namely perceived safety related to crime, traffic, and dogs. Perceived safety from crime—which was informed by participants' awareness of objective instances of neighborhood crime—can be a powerful determinant of active transportation behavior for some participants. While perceived safety from traffic and dogs were also concerns for some participants, they were not found to be major deterrents. Still, these factors impact participants' experiences and comfort while walking or engaging in active transport. Furthermore, the study highlights the potential role of law enforcement in supporting active transportation, which might occur through community policing or community-based crime prevention programs (e.g., Neighborhood Watch). Participants favor visible police presence, which can interact with and help mitigate both crime and traffic-related safety concerns. These findings contribute to an understanding of which aspects of safety are likely to influence active

transportation behavior, as well as certain dynamics that may help to mitigate safety-related barriers. In addition to the presence of police, the broader social context was also found to interact with participants' perceptions of safety, further contributing to this dynamic.

Social Environment

Based on participants' discussions about the presence of and interactions with other people within the community, the *social environment* was also found to be an important layer of influence on participants' experiences with active transportation. Previous research has found social norms to be an important influence on active transportation behavior for older adults (Hoehner et al., 2005). However, this study found that the presence of other people primarily played a role of providing feelings of safety and security while walking or bicycling, i.e., social protection, which is similar to findings by Van Cauwenberg et al. (2012). This finding about the social environment provides nuanced insight into why the presence of other people in the environment is important for older adults' active transportation behavior.

The study assumed that having social support, i.e., engaging in active transportation with a friend or partner, could minimize the influence of low self-efficacy as a barrier. While social support was found to have a potentially positive impact when walking, it was due to its interacting influence on feelings of safety from crime rather than its effect on low skills or confidence. However, having a friend or partner may not always be feasible or even desirable for some older adults; therefore, supporting individuals' sense of perceived safety should emphasize alternative strategies as well.

At the same time, some participants also discussed negative experiences and concerns about a lack of courtesy and respect from other people while walking and using public transit. While this didn't appear to deter their active transportation decisions, these concerns align with

previous research that identifies disrespectful behavior and lack of courtesy towards older adults as issues that can impact their experiences using active transport and engagement in the community (Kachadoorian, 2024; World Health Organization, 2007). This speaks to the importance of promoting courtesy, respect, and consideration towards older adults within the broader community, such as by encouraging individuals to honor priority seating for them on public transit.

This study assumed that desires for social connectivity would help to facilitate and motivate active transportation behavior. While participants did not explicitly discuss social opportunities as motivating factors, they did emphasize numerous types of neighborhood events, programs, and activities in which they participated. These social activities, particularly those located nearby or within neighborhood settings, may contribute to increased opportunities for engaging in active transportation when attending and participating. These findings affirm the role of the social environment in influencing active transportation behavior (Sallis et al., 2006), and contribute unique insights into how it might do so. The presence of other people around the community also creates a sense of social protection, which can enhance perceived safety and facilitate participants' willingness to engage in active transportation behavior. This reinforces the importance of neighborhood resources, programs, and activities to engage the broader community within outdoor spaces as well, which may involve both public and private sectors, such as parks and recreation departments or local business improvement districts.

Social support, such as walking with a partner (though it may not always be feasible), can also help to counteract safety concerns. While a general lack of courtesy and respect within the social environment may not independently deter active transportation behavior, it can negatively

impact experiences and underscores the importance of promoting a culture of respect and consideration towards older adults.

In addition to these influencing factors within the social environment, the design, quality, and features of the built environment where participants reside also play a critical role in facilitating active transportation. The following sections highlight the physical features that were found to impact older adults' active transportation decisions and experiences.

Pedestrian and Bicyclist Infrastructure

It is well-established that the availability of safe and convenient pedestrian and bicycling infrastructure within behavior settings is central to active transportation (Buehler et al., 2016; Van Cauwenberg, Van Holle, et al., 2012). Observations and field notes from the study indicated that sidewalks were present and continuous along each route in every interview location—with very few exceptions due to temporary construction. Notably, no participants spoke about a lack of sidewalk infrastructure and networks within their environments. However, participants did emphasize issues with the quality of the sidewalk infrastructure, frequently pointing out instances of cracks, heaves, and bumps and the risks they presented for tripping or falling. This aligns with other studies that have reported that these issues increase the difficulty of walking (Van Cauwenberg, Van Holle, et al., 2012). Participants indicated that frequent and adequate sidewalk maintenance to fix tripping hazards is important to feel comfortable while walking and to minimize risk of falls that could cause significant harm or injury. Some participants suggested a desire for more benches to rest while walking, which others have noted in previous research as well (Cerin et al., 2017). Another participant commented on the value of strategically-placed handrails along pedestrian routes, which could provide both functional support for older adults

and an additional barrier from traffic. Only few references in the literature have commented on handrails (Cairncross, 2016), but this feature may warrant further exploration.

While only a few participants indicated that they were bicyclists, recent developments of protected bike lanes and trails have improved perceptions of both safety and convenience when using bicycles for transportation. The development of bicycling infrastructure has led to challenges for many other older adults, however, who still need or want to drive for transportation and view the loss of parking spaces in favor of bike lanes as a significant challenge and safety issue. This appears to be an ongoing challenge within the study setting, as well as a common conflict in other urban settings with limited land and space (Kirschner, 2021; Welch, 2020). Increased public engagement and consideration of this population's views and needs during planning and implementation may help to identify compromises and address older adults' differing desires and concerns.

These findings reinforce the importance of pedestrian and bicycling infrastructure as important components for facilitating active transportation. While the presence of sidewalk infrastructure is critical, the quality of sidewalks is also an important factor. Cracks, bumps, and uneven surfaces along sidewalks create tripping hazards and can impact older adults' comfort and safety from injury while walking. This highlights the need for ongoing maintenance of sidewalk infrastructure to ensure safety. Additional features along walking routes, such as benches and handrails, can provide additional comfort and security. Protected bike lanes also enhance perceived safety while bicycling for transportation, but their development should balance considerations for the parking and driving needs of the broader older adult population.

While the quality and availability of pedestrian and bicycling infrastructure are important factors for supporting active transportation, the study also found that accessible and convenient public transit options can further facilitate opportunities for active transport.

Public Transit

Results found that convenient access to public transit, including bus and rail transit, helped facilitate its use in combination with walking for transport. This supports previous research, which has also found that long walking distances, limited or infrequent schedules, and inadequate facilities (e.g., shelters and comfortable seating) are common barriers to older adults' use of public transportation (Lin & Cui, 2021). These results contribute additional evidence of the role of each of these potential barriers. Within this study setting, nearby access to bus and rail stations was consistently identified and observed. Participants also reported buses to be well-equipped and accessible for older adults and wheelchair users, though other facilities typically lacked the benches and shelters that some older adults desired. Participants also experienced frustrations with infrequent service schedules. The affordability of public transit was identified as another important factor for older adults, in line with past research (Lin & Cui, 2021).

These findings highlight the role of public transit in supporting opportunities to incorporate walking during travel. Proximity to transit stops and stations and accessible buses—which were noted as strengths within the study setting—are factors that can help make public transit convenient and accessible. However, findings also highlight opportunities to address gaps that could ensure older adults' comfort and safety for using public transportation, such as improving bus stop facilities to include benches and shelters, improving the frequency of certain bus routes, or ensuring discount programs and options are available to them.

Along with pedestrian and bicycling infrastructure, public transit helps to facilitate older adults' mobility and active transportation behavior within the community, but their utility is based on connecting people to the destinations they want or need to access. The following section highlights the types of destinations that were found to be important and valuable to participants.

Nearby Destinations

Many participants referenced and pointed out the availability of various destinations—including retail and service destinations, as well as other community amenities and resources—within close proximity to their residences. Access and availability of these destinations helped to facilitate the feasibility of walking to different places. This builds on existing evidence about the importance of the proximity of destinations within behavior settings for walkability and active transportation (Brüchert et al., 2020; Cerin et al., 2017). Observations and field notes further validated the presence of multiple types of destinations, including grocery stores, restaurants, pharmacies, recreation centers, and libraries within many participants' neighborhoods, all of which have been previously identified as important places for older adults (Cerin et al., 2017; Van Cauwenberg, Van Holle, et al., 2012). Previous studies also identified parks and greenspaces as desirable destinations for older adults (Cerin et al., 2017). Participants in this study emphasized the value they find in having these spaces that are beautiful, peaceful, and enjoyable available to them.

These findings reinforce the importance of having proximity to different types of destinations—retail and commercial destinations, community amenities, and parks and greenspaces—as well as the role of the community in shaping the built environment in ways that make them accessible. While the availability of nearby destinations is important for supporting

active transportation, the development of commercial and residential spaces also introduces concerns about how residents perceive their neighborhood environments. These concerns and their impact on participants' experiences were made evident through the following theme: *neighborhood development and characteristics.*

Neighborhood Development and Characteristics

Some participants specifically referenced new commercial and residential developments in connection to their experiences while engaging in active transportation. Some spoke favorably of new commercial destinations and services and improved access to public transit, which likely create more opportunities to engage in active transportation. Others, however, expressed concerns about the losing their neighborhoods' historical character and identity, specifically highlighting the contrasting architectural designs between new and existing developments. In contrast, participants found pride and value in neighborhood features, such as murals and sculptures, that reflected local history and culture.

While neighborhood character and identity as discussed by participants may not directly influence their decisions about engaging in active transportation, they do appear to impact their general perceptions of and experiences within their neighborhood environments. These results also provide new insight into microscale features within architecture and design that may impact older adults' experiences. Given these insights, urban developers and planners should incorporate historical and cultural elements within new development that reflect and maintain what residents consider to be their neighborhood's character and identity.

The preservation of neighborhood character and identity within new developments is a unique and context-specific finding that may support residents' positive perceptions and connections to their neighborhood environment. More broadly, the general appearance and

cleanliness of neighborhood environments was also found to influence their experiences while engaging in active transportation.

Appearance and Attractiveness

Study participants highlighted various aspects of the appearance and attractiveness of their neighborhood environments. They valued the general aesthetics of the neighborhood, including cleanliness, attractive vistas, and interesting architecture. The presence of trash and litter in certain locations was not reported to be a barrier to active transportation behavior, though participants viewed it negatively and as a potential issue with smells and rats. This aligns with previous research that has found similar aspects of the perceived environment to have some influence on active transportation, though perhaps not significant determinants of it (Brüchert et al., 2020; Cerin et al., 2017; Hoehner et al., 2005).

Participants also appreciated the presence of greenery, trees, and landscaping, which was consistently observed throughout each neighborhood. This further contributed to positively-perceived aesthetics and experiences within their neighborhood environments, while also serving the functional purpose of providing shade and protection during hot and sunny days. Notably, however, greenery and trees were found to interact with perceptions of safety by eliciting concerns about potential hiding places for potential offenders. This aligns with a similar finding from Van Cauwenberg et al. (2012) and provides unique insight into the need for careful consideration when designing and maintaining greenery and landscaping within neighborhood environments and behavior settings.

Previous research has suggested that while neighborhood aesthetics may not be an essential determinant of active transportation, it may act as a "peripheral facilitator" (Cerin et al., 2017). Results relating to the themes of both *neighborhood development and characteristics* and

appearance and attractiveness support this idea in that neighborhood appearances and aesthetics can support positive associations with the experience of engaging in active transportation. Furthermore, trees and greenery serve a dual purpose of enhancing aesthetics while also providing protection from natural elements. This interacting effect highlights the additional, intersecting role of the *natural environment* on participants' decisions about active transport.

Natural Environment

Similar to previous research, this study found that inclement weather is a concern and a potential deterrent to active transportation behavior for older adults (Cao et al., 2019; Van Cauwenberg, Van Holle, et al., 2012). Snowy and icy weather, in particular, were noted as likely deterrents to both walking and biking due to concerns about injury. Hot and sunny weather was also found to be a potential deterrent. While weather may not be modifiable, some potential strategies can mitigate its influence on behavior. For example, the presence of trees and shade may interact with this factor by providing protection and reducing discomfort from sun and heat. Reliable cleaning and maintenance of pedestrian and bicycling infrastructure during snowy and icy conditions may also help address concerns about safety from injury.

In context of the ecological framework, these factors align with existing research about the role of the natural environment in relation to behavior (Sallis et al., 2006). The study also indicates how potential barriers to active transportation due to the natural environment—namely inclement weather conditions—could be counteracted by ensuring neighborhood environments have plenty of street trees and foliage for shade and protection or by providing adequate public services to ensure active transportation infrastructure remains clear and safe during snowy and icy weather. These counteractive measures highlight the role of the local policy environment, given that it largely governs how behavior settings are designed and what services are provided.

Community Policy and Responsibility

Ecological models identify the policy environment as the root cause of behavior (Sallis et al., 2006). While the policy environment often manifests through behavior settings and the built environment, this study found that the city's traffic and parking regulations in particular were relevant influences on older adults' active transportation decisions. For older adults who own a personal vehicle, the challenges associated with parking and traffic regulations (e.g., finding parking spaces, understanding parking laws, parking fees) were found to influence decisions about taking public transit, but only by creating barriers to driving. Notably, these challenges may be unique to urban settings (Payyanadan et al., 2018). While the use of public transit and active transportation may be a desirable outcome, policymakers should exercise caution about the unintended effects that may result from creating barriers to driving, particularly for those who may drive certain places out of necessity.

Results also highlighted the importance of public engagement and the involvement of older adults in decision-making about land and transportation development, e.g., the development and placement of bike lanes. Likewise, local and neighborhood advocacy efforts are important avenues for older adults to be engaged in decision-making about their own neighborhoods and the active transportation networks within them. These results emphasize the importance for policymakers and local advocacy groups to engage with and include older adults in shaping and influencing the policy environment in ways that can best suit their needs.

Community policies have a significant impact on shaping environments that enable active transportation behavior, especially when done with the engagement of older adults. However, the study also shows that their choices and decisions are further determined by individual characteristics that influence their abilities and motivations for engaging in active transportation.

Individual Characteristics

Results found that certain intrapersonal factors appeared to facilitate decisions and motivation to engage in active transportation behavior. Several participants placed value on their personal health and wellbeing, which motivated their decisions about walking. This psychological factor supports other quantitative research about the significance of perceived health benefits on active transportation behavior (Cusack, 2021). Others indicated that physical limitations due to surgeries or pain and inflammation sometimes limited how much they would walk, which is also consistent with previous findings about the role of biological factors on active transportation behavior (Cerin et al., 2017).

Contrary to findings in the literature and this study's assumptions, low self-efficacy was not discussed or identified as a barrier to engaging in active transportation (Cusack, 2021). Unexpectedly, some participants actually spoke confidently about their learned skills and abilities to avoid falling and injury. It is likely that this is a result of the study's sampling methods and criteria, given that participants who self-selected to participate were more likely to be confident and skilled in this behavior.

Whether by choice or circumstance, not owning a personal vehicle also facilitated some participants' use of active modes of transportation and public transit, mainly out of necessity. These participants also reported that they found it feasible to rely on walking and public transit for their needs.

Participants mentioned several examples of precautions they take on their own in response to concerns about safety from crime, dogs, and traffic. These included being selective about which routes they take, avoiding walking outdoors at night, and even carrying a stick to

guard against aggressive dogs. This suggests that many participants have identified their own strategies to overcome and mitigate certain barriers to active transportation.

These findings affirm the role of intrapersonal factors on active transportation behavior, including biological (e.g., physical limitations and abilities), psychological (e.g., self-efficacy), and other circumstantial factors (e.g., owning a vehicle) (Sallis et al., 2006). These influencing factors indicate the importance of promoting active transportation to older adults as a health promoting strategy. Increased awareness and understanding of how to access and use alternative transportation options, e.g., public transit, may also serve those who do not have or cannot use personal vehicles for transport. Notably, individual safety precautions are also important self-driven measures that may interact with and mitigate the effects of real or perceived safety concerns. This demonstrates an interconnection of individual characteristics and behavior to the larger theme of *safety* and its multilayered influence on active transportation behavior.

Insights from Key Themes

In addition to the themes that emerged from this study, findings also illuminate key insights, which include: 1) interaction of factors (i.e., how multiple factors interact with each other), 2) heterogeneity of perspectives (i.e., how opinions and experiences differ among older adults), and 3) hyperlocality of issues (i.e., how certain issues may be more or less prevalent within different neighborhood settings).

A core principle of ecological framing is that interactions occur between factors across different levels of influence (Glanz et al., 2015; Sallis et al., 2006). Findings from the study illustrate many of these interactions and how they may collectively influence older adults' decisions and experiences with active transportation. For example, perceptions about safety—even among those with fewer concerns—were informed by objective and contextual experiences

with crime, traffic, and dogs within their behavior settings. Likewise, aspects of the social environment (e.g., visible police presence, presence of other people around the community, and social support) as well as intrapersonal factors (e.g., individual behavioral precautions) were found to help mitigate perceived safety concerns. Even the density of trees and greenery within behavior settings was found to have a potential impact on some participants' perceptions of safety. These and other instances of interacting factors reinforce the importance of multidimensional considerations and approaches for supporting active transportation, including those which address infrastructure and social context.

The study also highlights several instances of heterogeneity among older adults regarding their perceptions and experiences with active transportation. This was particularly notable in relation to opinions about bicycling infrastructure throughout the community. While some participants valued the development of new and protected bike lanes, others felt it created more challenges and dismissed their needs when traveling by motor vehicle. Differences also varied when discussing the potential role of social support, i.e., walking with a friend or partner, for engaging in active transportation. While several participants agreed it could mitigate safety concerns, opinions varied about whether it was feasible or even desirable. Similarly, perceptions of safety varied widely. While some felt comfortable and safe walking around their neighborhoods, the perceived threat of crime within other participants' neighborhoods was a determining factor for driving instead of walking for transport. Individual characteristics, including both biological and psychological factors that either facilitate or limit behavior, also varied between participants. These findings demonstrate that active transportation interventions should acknowledge and consider diverse experiences, perspectives, and abilities within older adult populations.

Furthermore, the concept of hyperlocality emerged as a third insight from the study, as some observations and patterns of opinion appeared to differ based on neighborhood location. While some participants highlighted the well-maintained sidewalks, cleanliness, and pleasing aesthetics around their neighborhoods, others in nearby neighborhoods commented more frequently about litter, cracks, and tripping hazards along the pedestrian infrastructure. Differences between neighborhood settings in terms of the availability and proximity to different types of destinations were also observed and documented. The preservation of cultural and historical identity within neighborhood environments was also more specific to areas experiencing significant commercial and residential development. These differences across neighborhoods—and their effect on participants' perceptions and experiences within them—underscore the importance of neighborhood-specific assessments when developing and implementing interventions. Understanding the particularities of different settings, even within adjacent neighborhoods, is important to ensure strategies to support active transportation are relevant for the older adults that live within those settings.

The themes that emerged from this study shed light on factors most relevant to older adults' experiences, needs, and desires in relation to active transportation within Ward 5 of Washington, DC. Additional lessons learned through these themes underscore the importance of recognizing and understanding interactions between these factors, the diversity of experiences and opinions within older adult populations, and the hyperlocal nature of certain issues that may influence individuals' experiences depending on the neighborhood in which they live. These lessons likely extend beyond this particular study setting and may be relevant considerations for approaching and understanding the needs of older adult populations in rural and other settings as well.

Strengths and Limitations

This study's use of qualitative methods provided space for participants to discuss topics they consider important in greater depth and detail than has been possible with previous quantitative research. The use of walking interviews is also an innovative and under-utilized method for exploring this topic, enabling participants to discuss and highlight specific aspects of their neighborhoods while experiencing them in real time. This contributed to 1) a richness of data that may not have been possible through traditional sit-down interviews or focus groups, 2) multiple types of data including interview, observational, and visual data that supported both triangulation and external validation, and 3) context-specific evidence for factors that are important to residents, which is important for influencing local policy actions (Dodson et al., 2024).

Despite strengths, several limitations should be considered. Due to time and feasibility constraints, the study was limited 15 older adults within a relatively small, urban area of Washington, DC. In addition to the limited sample size, geographic location, and other inclusion criteria, the purposeful, non-random sampling contributes to self-selection bias and further limits the generalizability of findings to other age groups and settings for several reasons. First, results may not reflect the perspectives of individuals who are less mobile, less socially connected, or who do not engage in active transportation for any other reasons. The participants who self-selected for the study were sufficiently mobile and able to comfortably engage in outdoor walking. Therefore, findings are limited in understanding the perspectives and experiences of older adults who do not currently engage in active transportation or may have mobility limitations. Second, all but one participant identified as female, limiting the ability to interpret potential gender differences in experiences and barriers. For example, discussion about safety

and crime was less prominent for the sole male participant, but the limited data from male perspectives was insufficient to identify clear patterns compared to female perspectives. Third, while participants reflected diverse income and education levels, the sample may not have included perspectives from the lowest socioeconomic groups who likely face additional challenges. Lastly, although certain findings about older adults' experiences may be unique to urban settings (e.g., parking challenges, extensive public transit options), overarching themes were largely consistent with existing literature and may still have relevance to rural settings (e.g., concerns about safety, importance of supportive infrastructure, and intrapersonal factors.) Still, the aim is to explore and gain insight into perception and experiences related to active transportation, and this information provides a basis for additional future research.

Independent coding and analysis of data also limits the validity of research findings, though collection of multiple types of data, member checking strategies, and documentation of analytic processes and decision-making help to support trustworthiness. Future research should consider inclusion of more than one coder to further enhance the strength and validity of study findings. While interviews were semi-structured and questions were largely open-ended, some lines of questioning were determined in retrospect to be potentially assumptive or leading. For example, one question asked: "How would being with a partner or friend influence how you feel about walking or biking?" to explore social influences. An alternative approach might instead ask: "Can you share an example of a time when someone may have influenced your decision about walking or biking?" and then follow up with additional probing questions to further open and explore social influences. Future studies using a similar interview protocol should consider strategies to maximize opportunities for greater depth and nuance within participant responses.

Conclusion

The present study used an ecological framework to explore and understand the factors that influence older adults' active transportation decisions in Washington, DC. It builds on existing evidence of the ecological influences on active transportation behavior, and the identification of overarching themes further demonstrates the relationship between factors across different ecological levels (Glanz et al., 2015; Sallis et al., 2006).

Findings contribute to existing research about factors important to older adults' decisions and experiences, including safety, proximity to destinations, access to public transit, weather conditions, personal values, a lack of courtesy and respect within the broader community, and neighborhood appearance and aesthetics. They also reveal new insights about factors that impact their experiences, such as the threat posed by dogs, the role of social protection, the importance of neighborhood identity, and their desires for public engagement, inclusion, and advocacy in local decision-making. The interaction of certain factors is also illuminated, such as how police presence, individual safety precautions, and social presence can enhance perceived safety and how the presence of trees and greenery can mitigate weather-related barriers, enhance aesthetics and appearance, or even create safety concerns.

Differences in experiences and opinions between participants and across neighborhoods highlight both the heterogeneity of the older adult demographic and the hyperlocal nature of certain issues and concerns. This emphasizes the importance of continued research to explore older adults' experiences across different settings in order to inform local policymaking in support of active transportation most effectively.

The walking interview method provided rich and context-specific information that may not have been possible to achieve through traditional interviews. Given that relatively few

studies have used this method to study older adults' use of active transportation in North American settings, it provides a model for similar research in other communities.

Findings also provide a basis for future quantitative research to investigate further the strength of associations between these factors and older adults' active transportation behavior. Examination of the interaction effects of different factors may further illuminate the most effective strategies for supporting safe and convenient active transportation within this population.

Chapter 6: Conclusion

Overview

This dissertation aimed to explore how older adults in Washington, DC, perceive and experience active transportation. A conceptual framework based on an ecological model of behavior guided two studies which aimed to provide a holistic perspective of factors that are important for promoting older adults' active transportation behavior. Together, the studies encompass each level of the ecological model and reinforce the theory that multiple layers of factors interact and influence active transportation behavior for older adults. This evidence can help guide future policy, planning, and research to further support and enable active transportation for older adults, ultimately leading to improved physical activity and health outcomes.

Study 1 aimed to describe the policy environment around active transportation and physical activity within Washington, DC, understand how it addresses the needs of aging and older adults, and inform policymakers of opportunities to support age-friendly active transportation. A systematic review of expert opinion and policy compiled current, best available evidence and policy recommendations for age-friendly active transportation. These findings encompassed recommendations at macroscale (e.g., strategic planning, land use, and zoning), mesoscale (e.g., pedestrian, bicycle, and public transit networks), and microscale of interventions (e.g., intersection design, aesthetics, and signage). The subsequent content analysis of citywide strategic planning and policy documents identified policies and strategies currently in place to build an environment that supports active modes of transportation, particularly for older adults.

This study found that DC's urban planning and transportation sectors contain numerous existing policies and strategies that address policy recommendations related to supporting older

adults' active transportation needs. The *Age-Friendly DC Strategic Plan* also names several strategies in relation to developing safe pedestrian and bicycling infrastructure, accessible public transit, and supportive social environments, all of which align with policy recommendations (*5 A's of Senior-Friendly Transit*, n.d.; Age-Friendly DC 2023 Strategic Plan, 2018; Community Preventive Services Task Force, 2016; McMillan et al., 2018). While results from this study indicate a generally supportive policy environment for age-friendly active transportation, opportunities remain to identify and further integrate active transportation as a key health-promoting strategy within future aging, age-friendly, and health sector planning and policies.

While Study 1 contextualized the study setting's current policy environment in relation to age-friendly active transportation, Study 2 applied qualitative methods to understand other intrapersonal, social-cultural, and additional environmental factors that influence older adults' decisions and experiences with active transportation. Walking interviews were conducted to explore these influencing factors through their own perceptions and experiences. Thematic analysis revealed ten overarching themes and 30 subthemes encompassing factors that corresponded to all levels of the ecological model. Salient themes related to safety, social environment, pedestrian and bicycling infrastructure, public transit, nearby destinations, neighborhood development and characteristics, appearance and attractiveness, natural environment, community policy and responsibility, and individual characteristics.

Within these larger themes, results indicated that independent factors relating to perceptions of safety, proximity to destinations, access to public transit, weather, local parking and traffic regulations, and certain individual characteristics were likely to influence decisions about engaging in active transportation. These findings support previous research and key assumptions about the role of certain factors in deterring active transportation behavior (e.g., lack

of perceived safety and lack of proximity to destinations) (Brüchert et al., 2020; Cerin et al., 2017). Other factors that were identified did not appear to influence decisions about active transportation per se, though they were reported to impact older adults' experiences while engaging in active transportation (e.g., neighborhood appearance and attractiveness, courtesy and respect for others, and concerns about dogs). Results also support previous research suggesting that certain factors may interact with each other, either exacerbating or mitigating barriers to active transport (Glanz et al., 2015; Sallis et al., 2006). For example, participants indicated that while perceived safety from crime might deter them from walking, increased police presence, the presence of other people, or independent safety precautions may help to mitigate that barrier.

The synthesis of Study 1 and Study 2 provide insights into potential gaps and opportunities for supporting age-friendly active transportation in Washington, DC. While Study 1 found numerous policies and strategies in place that align with key recommendations for developing a supportive built environment for active transportation, Study 2 illuminated numerous related concerns that still remain from residents' perspectives. This may reflect how certain policies may not be fully implemented or may not fully address older adults' concerns and desires. For one example, Study 1 found that multiple policy and planning documents indicate commitments to address sidewalk gaps and obstructions and provide routine sidewalk maintenance. However, in Study 2, participants frequently commented on the presence of cracks, gaps, and other tripping hazards along sidewalks in their neighborhoods. This highlights the need to continue building and strengthening efforts to improve pedestrian infrastructure within the community. In another example, urban planning and age-friendly planning documents included policies and actions to improve the accessibility of bus and transit stops, including a specific policy for the design of bus stops with shelters and seating (Age-Friendly DC 2023 Strategic

Plan, 2018, p. 8; District of Columbia Office of Planning, 2021, p. 9:47). While conducting and documenting observations for Study 2, bus stops with shelters and benches were rarely seen. Some study participants specifically commented on their desires for these features as well. Lastly, a key finding from the synthesis of studies is in relation to older adult engagement in community planning and implementation processes. While multiple policy documents referenced inclusive citizen engagement in planning and implementation processes, only one reference was found that explicitly mentioned the inclusion of older adults (District of Columbia Office of Planning, 2021, p. 9:39). Findings from Study 2 highlighted how this policy and inclusion gap may be felt by older adults, given that their desires for inclusion in neighborhood and community decision-making was mentioned on several occasions.

In contrast, the combination of both studies also illuminates some possible—though perhaps, incidental—successes of policy efforts that support age-friendly active transportation. First, Study 1 demonstrated that multiple policy documents reflected priorities to promote pedestrian safety from traffic and Study 2 found that multiple participants indicated that traffic safety was not a major concern or deterrent for them. Additionally, multiple policy and strategic planning documents emphasized strategies to promote social connectedness. Older adult residents often indicated their participation and access to various social programs, activities, and events which provide them with opportunities both for social connection and to engage in active transportation. While this dissertation cannot directly attribute these positive perceptions and experiences to DC's policy environment, it may provide some insight and direction for prioritizing future policy efforts.

Limitations

There are several limitations to consider in the analysis and interpretation of this dissertation. For Study 1, the analysis of the policy environment in DC only included a select sample of citywide strategic planning and policy documents, which primarily reflect organizational goals and priorities rather than local legislative policies. While intended to focus on documents most relevant to active transportation and the built environment, additional policies, strategies, or interventions from other sectors of the DC government may have been excluded. This limits the degree to which the policy environment is described. Second, the specificity of the Washington, DC context and its strategic planning efforts also limit generalizability to other settings. The policy frameworks and strategic planning documents selected for analysis were limited to the most recent, publicly available versions, which may not reflect policies and strategies implemented in the past or currently in development. Additionally, the extent to which strategic plans and active transportation-related components have been implemented to date is difficult to determine. Third, the use of a priori theory in content analysis may also contribute to researcher bias and subjectivity and may impact how best practice policy recommendations are selected, understood, and analyzed. However, the systematic search process helped to minimize potential bias and subjectivity. Lastly, independent data coding also limits the trustworthiness of research findings, though documentation of analytic processes and decision-making through analytic memos and external checks with advisors helped to support trustworthiness and validity.

For Study 2, the sample size was limited to 15 older adults living within a relatively small geographic area (Ward 5) of Washington, DC. Therefore, findings may not reflect the same perceptions and experiences of older adults in other areas of the community. More broadly, the sample size, age criteria, and geographic location limit the transferability of findings to other age

groups and individuals who live in other settings, including non-urban settings. Second, purposeful, non-random sampling contributed to sampling and self-selection biases and limited the representativeness of the sample—both within the study setting and the broader community. Recruitment methods and inclusion criteria may have excluded the perspectives of individuals who are less mobile, less socially connected, or who do not engage in active transportation for any other reasons, such as lack of interest, disability, or safety concerns. Findings and conclusions, therefore, are limited in understanding the barriers and perceptions of older adults who do not currently engage in active transportation. Third, the season and timing of data collection may have affected participants' responses and may not reflect the full range of barriers or facilitators they might experience during different seasons of the year. Interview questions did, however, provide space for participants to consider other seasons and types of weather. Fourth, participants' discussions about active transportation were sometimes conflated with walking or biking for the purposes of exercise or recreation. To address this, communication before and during interviews attempted to be precise and emphasize destination-oriented experiences. Lastly, independent coding and analysis limit the trustworthiness of research findings. Documentation of analytic processes and decision-making through memos and external checks with advisors and dissertation committee members help to support validity. The analysis of visual data also presented potential limitations, namely possible misinterpretation of meaning within photos and videos (Glaw et al., 2017; Trombeta & Cox, 2022). Photo elicitation strategies and discussions during interviews about the photos taken helped to minimize this concern.

Delimitations

This research focused on understanding the influencing factors that contribute to older adults' perceptions and experiences with active transportation behavior as one particular form of

physical activity. Therefore, a delimitation of the dissertation is that it did not investigate experiences or perceptions related to other forms of physical activity, such as planned exercise or recreational physical activity. Additionally, the research focused specifically on older adults, defined as those aged 65 years and older. While physical activity behavior is important across the lifespan, the literature review in Chapter 2 underscores its particular importance for the older adult population. It also indicates a general lack of published research and guidance for promoting active transportation within this population. Therefore, even though active transportation can benefit all populations and age groups, these studies only focused on older adults as the key population of interest. Lastly, the urban setting of this research does not fully represent the experiences and perceptions that older adults may experience in rural or other non-urban settings, though general findings may still have some relevance to these settings.

Strengths

Despite limitations, this research also had several strengths. As a whole, the research was guided by an ecological model of behavior that is specific to the research topic and is a well-established theory of behavioral science. Study 1 followed a systematic approach and protocol to identify best available evidence and policy recommendations for community-level active transportation policies, contributing to the study's credibility and replicability. Additionally, a manifest content analysis approach and deductive coding and analysis methods helped to limit subjective and potentially biased interpretations of content, contributing to the reliability of the research.

As a qualitative study, Study 2 provided a subjective exploration of factors that older adults perceived and experienced in relation to active transportation. Strengths of this study included its use of different types of data (textual and visual) and methods (interviewing and

observational), which supported triangulation and corroboration of the data (Creswell, 2013). Audio recordings of interviews, along with subsequent member checking and data validation strategies, ensured complete transcription and accuracy of data, further contributing to the reliability of the research. Lastly, the walking interview method is a unique method that adds value and richness of data that may not have been achieved through traditional interviewing or focus group methods. Additionally, the timeliness of this research is underscored by its alignment with ongoing efforts in Washington, DC, to promote active and healthy aging.

Implications for Public Health Policy and Practice

Older adults represent a growing demographic, but low rates of physical activity present a significant public health challenge for many communities. This dissertation highlights active transportation as an important opportunity to improve health outcomes within this demographic through increased physical activity behavior. However, older adults' active transportation needs are unique from those of other age groups. Public health professionals should continue to seek to engage directly with older adults to understand their needs and desires so they can be better addressed through policy and practice.

Results from these studies emphasize the wide range of factors that influence older adults' decisions and experiences with active transportation, particularly those related to safety, neighborhood infrastructure, public transit, and social support. This reinforces the need for multisectoral collaboration within the community, not only across urban planning, transportation, health, and age-friendly sectors, but also with law enforcement to help address safety concerns.

In addition, findings highlight the importance and desire for older adults to be included in public engagement and decision-making processes that affect their neighborhood and community environments. Community leaders and policymakers should prioritize their involvement to

ensure their perspectives are considered and reflected within local policy and practice. Given the role of the policy environment in governing how neighborhoods and communities are developed to support active transportation, public health professionals, local policymakers, and practitioners should leverage opportunities to more fully integrate age-friendly considerations within active transportation initiatives.

Implications for Future Research

Results of Study 1 compiled the best available evidence and policy recommendations for supporting age-friendly active transportation. Future research should continue to examine the relationships between policy recommendations and active transportation outcomes. For example, a meta-analysis could help identify the most effective or "best buy" strategies for communities. While these results are specific to Washington, DC, the methods used in this study could serve as a model for examining policy environments in other communities.

Given the relatively few qualitative studies that have explored older adults' experiences with active transportation, additional qualitative research—including through walking interview methods—can continue to illuminate how and why certain factors influence behavior. Future quantitative research should also investigate pathways, effect sizes, and interaction effects of these factors to build evidence for strategies that most effectively promote active transportation behavior.

Study 2 revealed some differences in findings across neighborhoods, which underscores the hyperlocal nature of certain influences. This emphasizes the importance of context-specific research in settings that wish to effectively support older adults' use of active transportation. Future research should also prioritize engagement with older adults to best capture their perspectives and experiences. While this study focused on individuals who already engage in

active transportation and were physically able to participate in the walking interview method, future studies should include individuals who do not currently engage in active transportation. This will ensure a more inclusive and comprehensive understanding of older adults' needs, which can better inform interventions that support the needs of all older adults.

Recent survey data published by Age-Friendly DC has emphasized the prevalence and importance of walking for transportation for DC residents, which is further reflected within built environment and transportation domains of its current strategic planning priorities (2024 Age-Friendly DC Livability Survey Results Report, 2024; Age-Friendly DC 2028 Strategic Plan, 2024). Opportunities for future research could leverage the availability of existing data and research from Age-Friendly DC to further validate and expand on findings from this study and examine their transferability and relevance across other segments of the older adult population in DC.

Conclusion

Physical activity rates tend to decline with age, contributing to reduced mobility, the development of NCDs and cognitive disorders, and low physiologic reserves (Anderson & Durstine, 2019; DiPietro, 2015; Keadle et al., 2016; Suryadinata et al., 2020; Thompson & Chen, 2023). As the older adult demographic continues to grow, there is a public health imperative to identify strategies that effectively support and promote physical activity behavior within this group.

This dissertation provides insights into promoting active transportation as a key strategy for improving physical activity and health outcomes in older adults. Its purpose was to apply an ecological perspective to understand the factors influencing older adults' experiences with active transportation. Study 1 examined the policy environment in Washington, DC, in relation to age-

friendly active transportation, making two key contributions. First, a systematic literature review produced a comprehensive list of current evidence and policy recommendations to support active transportation for older adults. These recommendations provide policymakers and practitioners with potential strategies for integrating age-friendly active transportation policies within their communities. Second, an analysis of DC's policy landscape identified opportunities to integrate additional considerations for older adults' needs into future planning and policy. Study 2 builds on existing evidence of other factors that influence older adults' active transportation decisions and experiences. These findings not only inform local efforts to support age-friendly active transportation but also contribute to an emerging field of research on policy and environmental interventions that promote physical activity in older adult populations.

Together, these studies explore the range of factors influencing older adults' experiences with active transportation within the broader context of the policy environment. This approach emphasizes the critical role of the policy environment in shaping neighborhood and community environments that support active transportation for older adults. This research also emphasizes the importance of respect, inclusion, and engagement with older adults themselves to more fully understand their collective concerns, needs, desires and to not "forget about [them]" in the midst of broader society. These findings can help communities, including Washington, DC, support the public health and wellbeing of aging populations by achieving the myriad health benefits associated with increased physical activity—including reduced chronic disease risk, improved mental and cognitive outcomes, and improved mobility and physical function (U.S. Department of Health and Human Services, 2023). Ultimately, this dissertation contributes not only to healthy aging and quality of life for older adults but also to the health and sustainability of local communities.

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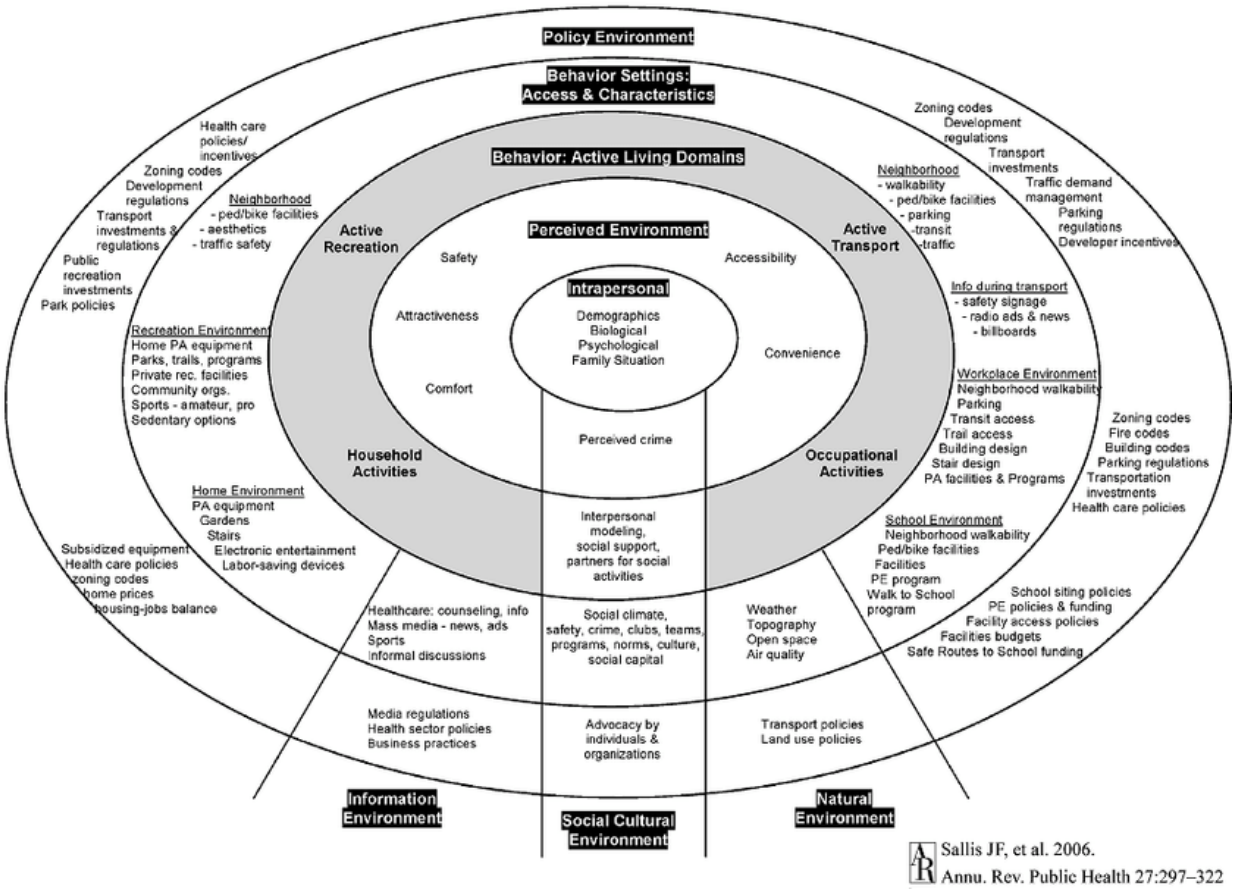
Appendix A

Ecological Model of Four Domains of Active Living



Appendix B

JBI Critical Appraisal Checklist for Text and Opinion Papers

JBI Critical Appraisal Checklist for Text and Opinion Papers

Reviewer_ Date_ _

Author _ Year_ _ _ _ _ _ _ _ _ _Record Number _ _ _ _

	Yes	No	Unclear	Not applicable
1. Is the source of the opinion clearly identified?	☐	☐	☐	☐
2. Does the source of opinion have standing in the field of expertise?	☐	☐	☐	☐
3. Are the interests of the relevant population the central focus of the opinion?	☐	☐	☐	☐
4. Is the stated position the result of an analytical process, and is there logic in the opinion expressed?	☐	☐	☐	☐
5. Is there reference to the extant literature?	☐	☐	☐	☐
6. Is any incongruence with the literature/sources logically defended?	☐	☐	☐	☐

Overall appraisal: Include ☐ Exclude ☐ Seek further info ☐

Comments (Including reason for exclusion)

_____

_____

_____

Appendix C

Active Transportation for Older Adults: Creating Healthier, Age-Friendly Communities

Physical activity is one of the most important behaviors for sustaining health and wellbeing, especially for older adults (people 65+ years).(U.S. Department of Health and Human Services, 2023) In addition to preventing and managing many chronic diseases, regular physical activity supports older adults' social, mental, and cognitive health.(Cerin et al., 2017; U.S. Department of Health and Human Services, 2018) Yet less than 15% of older adults in the US meet physical activity guidelines and rates tend to decrease as they continue to age.(Centers for Disease Control and Prevention, n.d.; U.S. Department of Health and Human Services, 2023) This contributes to significant health and economic burdens for individuals and communities—older adults account for 35% of total health expenditures in the US, largely due to chronic illness.(Ortaliza et al., 2021) Older adults are also a quickly growing segment of the population and are expected to comprise 22% of the general population by 2040.(2023 Profile of Older Americans, 2024) Given these trends, is it critical for communities to engage in efforts that can support greater levels of physical activity within this population.

This policy brief outlines how active transportation efforts can integrate age-friendly considerations to better support healthy, active aging in communities.

Active Transportation and Age-Friendly Efforts

Active transportation is an important strategy that communities can leverage to promote older adults' physical activity levels. Active transportation is any human-powered form of travel, such as walking, bicycling, or rolling, and is often a part of journeys that involve public transit.(Centers for Disease Control and Prevention, 2022) It contributes to overall physical activity levels and older adults often consider it an acceptable and feasible way to engage in physical activity.(Cerin et al., 2017; Mertens et al., 2019)

Many communities have also engaged in age-friendly initiatives by adapting policies, structures, and services that are accessible and inclusive of older adults' needs.(World Health Organization, 2007) These initiatives aim to support healthy aging to sustain older adults' mobility, independence, and social connections within their preferred neighborhoods and communities.(World Health Organization, 2007, 2023) Active transportation provides a valuable opportunity to complement age-friendly efforts by increasing opportunities for physical activity and enhancing health and quality of life for aging populations.

Policy Recommendations

To be effective, age-friendly active transportation policies and interventions within communities should occur at each scale of intervention described below:(U.S. Department of Health and Human Services, 2023; Young et al., 2020)

- **Macroscale:** high-level planning and zoning policies and processes that determine how neighborhoods and communities are built, e.g., mixed land use zoning that ensures proximity to everyday destinations

- **Mesoscale:** infrastructure, networks, facilities, and programs that create opportunities for and/or promote active transport, e.g., pedestrian and bicycling networks that connect neighborhoods to key destinations; education, outreach, and social support
- **Microscale:** design and functional details that impact safety, accessibility, and comfort when using active modes of transport,(Young et al., 2020) e.g., well-maintained sidewalks, protected bike lanes, and pedestrian-friendly intersections

Opportunities to integrate age-friendly considerations exist within each of these levels. A review of evidence has identified key recommendations that communities can adopt to better support older adults' unique needs.(Klicnik & Dogra, 2019)

	POLICY AREA	KEY RECOMMENDATIONS
MACROSCALE	**Policy Integration and Strategic Planning**	Ensure policy and planning documents address the needs of older adults using multiple modes of transport.
	Land Use and Zoning	Adopt land use and zoning policies that support physical activity for all ages. For example, promote mixed land use zoning and locate older adult facilities near transit and desirable destinations.
	Community Engagement	Promote multisectoral collaboration between local government, community stakeholders, and older adults. Involve older adults in decision-making.
	Monitoring and Evaluation	Conduct evaluation, outreach and assessment activities to identify context-specific issues, locations, and impact, with emphasis on older adults' needs.
MESOSCALE	**Active Transportation Systems**	Integrate and maintain safe, convenient, and activity-friendly routes with improved pedestrian, bicycling, and public transit infrastructure.
	Pedestrian Networks and Neighborhood Walkability	Improve overall neighborhood walkability and safety with sidewalk infrastructure that connects to nearby destinations and public transportation.
	Bicycle Networks	Create bicycling routes that provide access between residential areas and common destinations.
	Public Transit	Create or expand public transit networks to ensure availability, access, and convenience of public transit option.
	Traffic Safety	Ensure that traffic safety regulations and measures prioritize the protection of older adult road users. For example, implement lower speed limits and slow zones and enforce traffic laws.
	Education and Awareness	Develop public education and outreach programs to promote active transportation and improve safety skills.
	Social Environment	Foster a supportive social environment to increase the opportunities and appeal of active transportation
	Natural Environment	Address air pollution to make places more suitable and comfortable for walking.
MICROSCALE	**Intersection and Crosswalk Safety**	Prioritize well-designed, pedestrian-friendly crossings that promote safety and comfort, particularly in densely populated areas. For example, reduce crossing distances, install curb ramps, extend crossing signal times, provide adequate lighting, etc.
	Sidewalk Infrastructure and Maintenance	Provide safe and adequate sidewalk infrastructure that is well-maintained and minimizes obstructions and tripping hazards.
	Bicycling Infrastructure	Develop safe and accessible bicycling infrastructure and facilities that support diverse riding needs.

	Lighting	Provide proper lighting in public spaces to support safety and reduce fear of crime.
	Aesthetics and Function	Incorporate aesthetic and functional features within community and neighborhood environments, such as greenery and trees; resting points with benches, handrails, shelters, and public toilets.
	Public Transit Accessibility	Ensure transit facilities, vehicles, and stops are accessible, clean, safe, and user-friendly.
	Signage and Wayfinding	Create standardized and easily understood signage systems for all road users.

Conclusion

Active transportation is a valuable strategy to support safe and convenient opportunities for older adults to be more physically active, which minimize negative health and economic outcomes for individuals and communities alike. By integrating age-friendly considerations within policies and practices across different scales of intervention, communities can more effectively promote physical activity in older adults while also sustaining their ability to remain healthy, independent, and socially connected within their communities.

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Appendix D

Study Recruitment Flyer

DO YOU EVER WALK OR BIKE PLACES?

PARTICIPANTS WANTED!

GW researchers are conducting a study about older adults' experiences with walking and/or bicycling to get around in DC

INTERESTED?

CLICK HERE to complete a pre-interview survey

OR

contact Grey Maxson at gmaxson@gwu.edu or (208) 353-7265

Participation will include:

- A pre-interview survey and enrollment call
- One in-person "walking interview" (~30-45 minutes)
- *Optional* follow up conversation(s)

Participants will receive a $25 Visa gift card and a digital pedometer as a "thank you."

ELIGIBILITY CRITERIA

- Be 65+ years old
- Live in Ward 5
- Able to walk independently outdoors for up to 30 minutes
- Able to converse in English

THE GEORGE WASHINGTON UNIVERSITY
WASHINGTON, DC

Questions? Contact:
Grey Maxson
gmaxson@gwu.edu
(208) 353-7265

Appendix E

Prescreening Survey and Questionnaire

Eligibility Screener

To be conducted either online or over the telephone to assess eligibility for the study.

1. **Are you currently at least 65 years or older?**
   Yes
   No
   (If "*No*," participant considered ineligible and survey will not continue.)

2. **Do you currently live within Ward 5 of Washington, DC?**
   Yes
   No
   (If "*No*," participant considered ineligible and survey will not continue.)

   If "*Yes*": **How long have you lived in Ward 5?**
   Less than 6 months
   6 months to 1 year
   1 to 5 years
   More than 5 years
   (If *"Less than 6 months,"* participant considered ineligible and survey will not continue.)

3. **How often do you walk or bike when you need to go somewhere?** For example, when going to the grocery store, going to visit friends, or doing other typical errands or activities. You may also consider times when walking or biking to reach public transit stations.
   Never
   Almost never
   Occasionally/Sometimes
   Almost every time
   Every time
   (If *"Never"* or *"Almost never,"* participant considered ineligible and survey will not continue.)

4. **Are you comfortable conversing in English?**
   Yes
   No
   (If "*No*," participant considered ineligible and survey will not continue.)

This research will involve a "walking interview," which will consist of an interview with the researcher while walking together along a given route within your neighborhood. The walking interview is expected to last approximately 30 minutes.

5. **Are you able and willing to walk outdoors around your neighborhood without assistance for up to 30 minutes?**
   Yes
   No
   (If "*No*," participant considered ineligible and survey will not continue.)

6. **Is there any other information or consideration you would like to share that may impact your ability to participate in this type of study?**
   (Open response)

Additional Study Questionnaire

Upon confirmation of eligibility, informed consent, and continued interest in the study, the following questions will be asked of participants.

1. **How often do you use public transportation when you need to go somewhere?**
   Never
   Almost never
   Occasionally/Sometimes
   Almost every time
   Every time

2. **When you use public transportation, what type of transportation are you most likely to use?**
   Rail (Metrorail or DC Streetcar)
   Bus (Metrobus or other bus service)
   Door-to-door ride services (MetroAccess, Uber, Lyft, etc.)

Demographics

1. **What is your current age?**

2. **How would you describe yourself?** (select all that apply)
   American Indian or Alaskan Native
   Asian American
   Black or African American
   Native Hawaiian/Pacific Islander
   White or Caucasian
   Prefer not to say
   Prefer to self-identify (open text entry)

3. **Do you identify as Hispanic, Latino, or Spanish?**
   Yes
   No
   Prefer not to say

4. **What is your gender?**
   Female
   Male
   Other (open text entry)
   Prefer not to say

5. **What is the highest level of schooling you have completed?**
   Less than high school
   High school graduate or GED
   Some college or vocational training
   Associate's degree
   Bachelor's degree
   Graduate or professional degree
   Other (open text entry)

6. **What is your annual household income (before paying taxes), meaning the total amount that individuals in your home made in the last year?**
   Less than $25,000
   $25,000 – $49,999
   $50,000 – $74,999
   $75,000 – $99,999
   $100,000 – $149,999
   $150,000 or more
   Prefer not to say

Appendix F

Walking Interview Guide

Interview Protocol: Older Adults' Experiences with Active Transportation in Ward 5 of Washington, DC

Date:	
Time:	
Location (Neighborhood):	
Interviewer:	
Interviewee:	
Research Assistant(s):	

Introduction:

The purpose of our study is to learn about older adults' perceptions and experiences with walking and biking places in Washington, DC, and the ways that their neighborhoods and other factors influence their decisions to do so.

Today we will be walking to "Destination X" and back, following the route that was previously discussed. The purpose of walking during this interview is to observe and learn about the things in the neighborhood environment that you might typically experience, and how they might influence your decisions use active transportation. Although we are walking today, please feel free to share any experiences or thoughts that you might have about bicycling as well.

I have a few questions to guide our conversation, but you are the expert here and the purpose of our conversation is to create space for you to tell us freely about your experiences, thoughts, and opinions so that we can better understand what influences your decisions about walking or biking for transportation.

We have a camera with us, and [research assistant] will help with holding the camera and taking pictures of things that you tell us about. But I would like for you to be the "director" and tell us what you think is important to document. Please feel free to pause at any time if you would like to point out anything, or for any other reason.

As a reminder, we would like to audio record this interview. However, any information we talk about during this interview will be strictly anonymous and we will not take any photos or videos that include you in them.

Do you agree with this?

Do you have any questions before we begin?

Domains of Inquiry	**Interview Questions**
Opening Question(s)	1. How long have you lived in this area, and what do you enjoy about living here?
Behavior Settings (Built Environment)	2. How would you describe this neighborhood and community where you live? 3. Within the last two weeks, what were some of the places you were most likely to visit? *Probing Question:* a. When you went to [X destinations], how did you get there? *Follow-up:* Can you tell me about what influenced your decision(s) to [walk, bike, drive, public transit]? *[If responses indicate walking, biking, public transit]:* 4. What is it about the neighborhood that influences your decision to [walk, bike, public transit]? *Probing Questions:* a. Can you tell me more about [X] aspect? b. What does [X] mean for you and your decision/ability to do [X]? *[If responses indicate driving]:* 5. What is it about the neighborhood that influences your decision to drive to your destinations? 6. As you consider growing older, what (if any) changes would you like to see in the neighborhood or community that would make it more appealing to walk, bike, or use public transport to get to destinations?
Perceived Environment	7. How do you feel when you are walking or biking in your neighborhood [to X destination]? *Probing question:* a. Can you tell me more about what makes you feel that way? b. You mentioned feeling [X], what does that mean for you?
Social-Cultural Environment	8. In what ways, if any, do social activities or connections influence your decisions to walk, bike, or use public transit? 9. How would being with a partner or friend influence how you feel about walking or biking?

Natural Environment	10. How do the seasons or the weather influence your decisions about walking or biking to [X destination(s)], if at all?
Intrapersonal Factors	11. If you're willing to share, are there any personal reasons or factors that might influence your decision to use active transportation one way or another?
Policy Environment	12. In recent years, DC's Age-Friendly Program has emphasized improvements to walking and bicycling networks, and increased accessibility standards at public transit stops. How do these city policies and programs—or others that you are aware of—influence your experiences with walking, biking, or using public transport? 13. What suggestions would you have for the city to improve the environment and better support walking and biking?
Closing Questions	Thank you for your willingness to share your thoughts in this interview. Are there any final thoughts that you would like to share that we haven't covered?

Appendix G

Walking Interview Observation Protocol

Date:	
Time:	
Duration of Meeting:	
Location:	
Observer(s):	
Interviewee:	
Length of Activity:	

Research Questions
1. What are the intrapersonal, social-cultural, and environmental factors that older adults who live in Ward 5 of Washington, DC perceive and experience in relation to active transportation? 2. How do these factors and perceptions interact to influence older adults' active transportation behavior?

Notes	
Descriptive Notes	**Reflective Notes**
Prompts: Describe what you see, hear, touch, feel, e.g., sidewalks, traffic movement and noise, shade, etc. Highlight chronology of what happens (stops, points of interest)	**Prompts:** Write notes to self, e.g., challenges or highlights with observation, interview, or notetaking Document impressions about high-level themes that may be emerging

Appendix H

Search Syntax for Systematic Expert Opinion and Policy Review

Search Number	Query	Filters
1	"active transport*" OR "active transit" OR "active travel" OR "built environment"	
2	policy OR policies OR guidelines OR "Policy"[Mesh] OR "Guidelines as Topic"[Mesh]	
3	"older adult*" OR "age-friendly" OR "Aged"[Mesh]	
4	(("active transport*" OR "active transit" OR "active travel" OR "built environment") AND (policy OR policies OR guidelines OR "Policy"[Mesh] OR "Guidelines as Topic"[Mesh])) AND ("older adult*" OR "age-friendly" OR "Aged"[Mesh])	
5	(("active transport*" OR "active transit" OR "active travel" OR "built environment") AND (policy OR policies OR guidelines OR "Policy"[Mesh] OR "Guidelines as Topic"[Mesh])) AND ("older adult*" OR "age-friendly" OR "Aged"[Mesh])	from 2015–2024
6	(("active transport*" OR "active transit" OR "active travel" OR "built environment") AND (policy OR policies OR guidelines OR "Policy"[Mesh] OR "Guidelines as Topic"[Mesh])) AND ("older adult*" OR "age-friendly" OR "Aged"[Mesh])	English, from 2015–2024

Note. Search syntax was developed for PubMed database and later adapted for Web of Science and Google Scholar.

Appendix I

AGE-FRIENDLY ACTIVE TRANSPORTATION POLICY RECOMMENDATIONS				
	Walking	**Cycling**	**Public Transit**	**Sources**
MACROSCALE (MA)				
Policy Integration and Strategic Planning				
MA 1: Ensure that policies and planning documents address the needs of all travelers, including older adults, using multiple modes of transport	✓	✓	✓	(Lynott et al., n.d.)
MA 1.1: Adopt Complete Streets and/or other similar policy frameworks (e.g., Vision Zero, Safe Streets, and Roads for All) to ensure roads serve multiple functions	✓	✓	✓	(Age-Friendly DC 2023 Strategic Plan, 2018; *The Community Preventive Task Forces' Built Environment Recommendation to Increase Physical Activity Real World Examples*, 2017; McMillan et al., 2018)(*5 A's of Senior-Friendly Transit*, n.d.; Age-Friendly DC 2023 Strategic Plan, 2018; Community Preventive Services Task Force, 2016; McMillan et al., 2018)(Lynott et al., n.d.; Mowatt, 2018; *The Inclusion Imperative: Towards Disability-Inclusive and Accessible Urban Development.*, n.d.; U.S. Department of Health and Human Services, 2023)
MA 1.2: Implement multi-level policies and interventions to include the built environment, social environment, and political environment	✓	✓	✓	(Dogra et al., 2022; Hartt et al., 2023; Hwang & Ziebarth, 2015; Loo et al., 2017; McNeil-Gauthier et al., 2024)
MA 1.3: Older adults in All Policies: Consider and apply an age-friendly and accessibility lens to current and future municipal policy and planning	✓	✓	✓	(Doulabi S et al., 2021; Engaging Older Adults in Transportation Planning, n.d.; Klicnik & Dogra, 2019; S. Li, 2020)
MA 1.4: Explicitly incorporate active transportation considerations within age-friendly, master transportation, and other strategic policy and planning documents	✓	✓	✓	(Klicnik & Dogra, 2019; U.S. Department of Health and Human Services, 2023)
MA 1.5: Prioritize equitable policies and practices that consider diverse needs and desires of older adults	✓	✓	✓	(Hartt et al., 2023; Klicnik & Dogra, 2019; Lin & Cui, 2021)
MA 1.6: Earmark funding for sidewalk construction and maintenance in municipal budgeting	✓			(*8 Municipal Policies to Help Older Adults Age in Community*, n.d.)
Land Use, Zoning, and Infrastructure				
MA 2: Adopt land use and zoning policies that support physical activity for all ages	✓	✓	✓	(CDC, 2024)
MA 2.1: Promote mixed land use zoning that includes proximity and access to everyday destinations, services, and parks and green spaces	✓	✓	✓	(Chhay, 2015; Chudyk AM et al., 2015; Eisenberg et al., 2017; Gagnon, n.d.; Herbolsheimer et al., 2020; Laddu et al., 2021; McNeil-Gauthier et al., 2024; Nguyen &

				Mertens, 2021; Ozbilen et al., 2022; Rosso et al., 2021, 2021; Shaer & Haghshenas, 2021; *The Community Preventive Task Forces' Built Environment Recommendation to Increase Physical Activity Real World Examples*, 2017; *The Inclusion Imperative: Towards Disability-Inclusive and Accessible Urban Development.*, n.d.)
MA 2.2: Increase residential and housing density	✓	✓	✓	(Biglieri S & Hartt M, 2024; Eisenberg et al., 2017; Gagnon, n.d.; Herbolsheimer et al., 2020; Laddu et al., 2021; Stearns et al., 2023; *The Community Preventive Task Forces' Built Environment Recommendation to Increase Physical Activity Real World Examples*, 2017)
MA 2.3: Improve street connectivity, such as through grid-like design	✓			(Kim et al., 2024; Laddu et al., 2021; Stearns et al., 2023)
MA 2.4: Ensure new developments include multiple access routes for pedestrians and cyclists to ensure proximity and access to services	✓	✓		(Brüchert et al., 2020)
MA 2.5: Develop and locate older adult-serving facilities and housing in places with proximity to transit and other desirable destinations	✓	✓	✓	(*8 Municipal Policies to Help Older Adults Age in Community*, n.d.; Lin & Cui, 2021; Rosso et al., 2021)
Collaborative Governance and Community Engagement				
MA 3: Promote multisectoral collaboration between local governments, community stakeholders, and older adults	✓			(Herrmann-Lunecke MG et al., 2023; Laddu et al., 2021)
MA 3.1: Address walkability and safety through intersectoral collaboration across multiple government agencies, e.g., urban planning, transportation, parks, health providers, housing, etc.	✓	✓		(Brüchert et al., 2020; Chudyk AM et al., 2015; S. Li, 2020; Lin & Cui, 2021)
MA 3.2: Empower older adults with decision-making authority and representation on advisory boards and committees	✓	✓	✓	(Chau & Jamei, 2021; Engaging Older Adults in Transportation Planning, n.d.; McMillan et al., 2018)
MA 3.3: Promote inclusive citizen engagement by involving older adults and persons with disability in planning and implementation processes, such as pedestrian infrastructure improvements	✓	✓	✓	(*8 Municipal Policies to Help Older Adults Age in Community*, n.d.; Engaging Older Adults in Transportation Planning, n.d.; *The Inclusion Imperative: Towards Disability-Inclusive and Accessible Urban Development.*, n.d.; Chau & Jamei, 2021; Eisenberg et al., 2017; Hwang & Ziebarth, 2015)
Monitoring and Evaluation				
MA 4: Conduct evaluation, outreach and assessment activities to identify context-specific issues, locations, and impact, with emphasis on older adults' needs for active transportation	✓	✓	✓	(Cerin et al., 2017; McMillan et al., 2018)
MA 4.1: Conduct walkability audits and other built environment assessments in collaboration with older adults to identify hyperlocal issues, such as broken or incomplete sidewalks	✓	✓	✓	(*8 Municipal Policies to Help Older Adults Age in Community*, n.d.; Eisenberg et al., 2017)
MA 4.2: Regularly evaluate planning documents to ensure they adequately account for the needs of older adults	✓	✓	✓	(*8 Municipal Policies to Help Older Adults Age in Community*, n.d.)

MESOSCALE (ME)				
Active Transportation Systems				
ME 1: Integrate and maintain safe, convenient, and activity-friendly routes with improved pedestrian, bicycling, and public transit infrastructure	✓	✓	✓	(Bonaccorsi et al., 2020; Mowatt, 2018; Najafi P & Mohammadi M, 2024; *The Community Preventive Task Forces' Built Environment Recommendation to Increase Physical Activity Real World Examples*, 2017)
ME 1.1: Prioritize separate paths for different modes of transportation, i.e., routes for pedestrians and cyclists that are separate from each other and from vehicles	✓	✓	✓	(*Active Transportation for People with Challenges and Limitations*, 2019; *Dementia Friendly Design Considerations for Shared Streets and Spaces*, n.d.; *The Inclusion Imperative: Towards Disability-Inclusive and Accessible Urban Development.*, n.d.; Brüchert et al., 2020; Cui et al., 2017; Gagnon, n.d.; Timmons et al., 2024; World Health Organization, 2017)
Pedestrian Network and Neighborhood Walkability				
ME 2: Improve overall neighborhood walkability and safety	✓			(Bonaccorsi et al., 2020; Herbolsheimer et al., 2020; Laddu et al., 2021; Levasseur et al., 2015; Stearns et al., 2023)
ME 2.1: Provide adequate pedestrian infrastructure with improved sidewalk connectivity and increased route options	✓			(Brüchert et al., 2020; Laddu et al., 2021; Mowatt, 2018; *The Community Preventive Task Forces' Built Environment Recommendation to Increase Physical Activity Real World Examples*, 2017; U.S. Department of Health and Human Services, 2023; Walia et al., 2024)
ME 2.2: Make a variety of everyday destinations available and accessible, e.g., grocery stores, shops, parks, restaurants, recreational facilities	✓	✓	✓	(*Active Transportation for People with Challenges and Limitations*, 2019; Bonaccorsi et al., 2020; Cairncross, 2016; Choe et al., 2022; Chudyk AM et al., 2015; Cui et al., 2017; Levasseur et al., 2015; Mowatt, 2018; U.S. Department of Health and Human Services, 2023; Van Cauwenberg et al., 2018)
ME 2.3: Locate essential services like schools, worksite, businesses, parks, and other destinations within walking distance of one another	✓			(CDC, 2024; Cerin et al., 2017; Mowatt, 2018)
ME 2.4: Ensure pedestrian infrastructure connects and supports walking to and from public transportation	✓			(Cui et al., 2017)
Bicycle Network				
ME 3: Create routes with improved bicycle infrastructure and facilities that provide access between residential areas and common destinations				(Brüchert et al., 2022; Najafi P & Mohammadi M, 2024; *The Community Preventive Task Forces' Built Environment Recommendation to Increase Physical Activity Real World Examples*, 2017; Timmons et al., 2024; World Health Organization, 2017)
ME 3.1: Provide well-connected bike tracks, cycling trails, and shortcuts for cyclists within street networks	✓			(Brüchert et al., 2022; Chau & Jamei, 2021; World Health Organization, 2017)

Public Transit				
ME 4: Create or expand public transit networks to ensure availability, access, and convenience of public transit options			✓	(Biglieri S & Hartt M, 2024; Mowatt, 2018; Van Cauwenberg et al., 2018)
ME 4.1: Ensure that public transit options are available when needed and operate at high frequency			✓	(*5 A's of Senior-Friendly Transit*, n.d.; Ozbilen et al., 2022)
ME 4.2: Ensure sufficient transit stops are located near residential locations and connect to common destinations			✓	(Choe et al., 2022; Cui et al., 2017; Jia et al., 2022)
ME 4.3: Minimize distances between transit stops			✓	(Cairncross, 2016)
ME 4.4: Offer subsidies, vouchers, or discounts to ensure affordability, including for low-income individuals			✓	(*5 A's of Senior-Friendly Transit*, n.d.; Cui et al., 2017)
Traffic Safety				
ME 5: Ensure that traffic safety regulations measures prioritize the protection of older adult road users	✓	✓		(Lin & Cui, 2021)
ME 5.1: Implement lower speed limits, slow zones, and traffic calming measures for vehicle traffic in areas with high older adult populations (e.g., older adult housing, senior centers, other frequently visited locations)	✓	✓		(*8 Municipal Policies to Help Older Adults Age in Community*, n.d.; *Active Transportation for People with Challenges and Limitations*, 2019; Cairncross, 2016; Lynott et al., n.d., p. 8; Mowatt, 2018; Najafi P & Mohammadi M, 2024; Timmons et al., 2024)
ME 5.2: Consider the effects of street congestion when planning locations of retail and services, as well as the routes and pathways to access them	✓			(Jia et al., 2022)
ME 5.3: Ensure pedestrian safety from traffic, particularly at street crossings and near bus stops	✓			(Kim D, 2019; Laddu et al., 2021)
ME 5.4: Enforce traffic laws to enhance both real and perceived safety for older adults	✓	✓		(McMillan et al., 2018)
Education and Awareness				
ME 6: Develop public education and outreach programs to promote active transportation and improve safety skills	✓	✓	✓	(*Breaking Barriers to Bike Share*, n.d.; Doulabi S et al., 2021; Kachadoorian, 2024; McMillan et al., 2018; Najafi P & Mohammadi M, 2024; Nguyen & Mertens, 2021)
ME 6.1: Provide education about benefits of active transportation	✓	✓		(McMillan et al., 2018; Najafi P & Mohammadi M, 2024)
ME 6.2: Improve awareness of neighborhood enhancements and amenities	✓	✓	✓	(*8 Infrastructure Improvements to Help Older Adults Age in Community*, n.d.; Cerin et al., 2017)
ME 6.3: Promote training programs to boost older adults' self-efficacy to engage in active transportation, including walking skills, crossing safety, and other pedestrian safety strategies				(Doulabi S et al., 2021; McMillan et al., 2018; Nguyen & Mertens, 2021)
ME 6.4: Conduct education and outreach focused on safe bicycling for older adults		✓		(*Bicycle Transportation For Older Adults and People with Disabilities*, n.d.)4/1/2025 11:42:00 AM
Social Environment				

ME 7: Foster a supportive social environment to increase the opportunities and appeal of active transportation	✓	✓	✓	(Laddu et al., 2021; Levasseur et al., 2015; McMillan et al., 2018)
ME 7.1: Provide services and activities that offer social support, connectedness, and/or arrange companionship	✓	✓	✓	(Levasseur et al., 2015; McMillan et al., 2018; Schehl & Leukel, 2020)
ME 7.2: Promote respect and courtesy toward older adults within the broader community	✓	✓	✓	(Kachadoorian, 2024)
Natural Environment				
ME 8: Address air pollution to make places more suitable and comfortable for walking	✓			(Cairncross, 2016)
MICROSCALE (MI)				
Intersection and Crosswalk Safety				
MI 1: Prioritize well-designed, pedestrian-friendly crossings that promote safety and comfort, particularly in densely populated areas	✓	✓		(Cui et al., 2017; European Conference of Ministers of Transport, 2006; Herbolsheimer et al., 2020; Herrmann-Lunecke MG et al., 2023; Jia et al., 2022; Shaer & Haghshenas, 2021; Walia et al., 2024)
MI 1.1: Design intersections with raised curbs	✓	✓		(Gagnon, n.d.)
MI 1.2: Reduce crossing distances via curb extensions, bulb-outs, and median/pedestrian refuge islands	✓	✓		(Kim D, 2019; Lynott et al., n.d.; McMillan et al., 2018)
MI 1.3: Install pedestrian curb ramps that lead directly into crosswalks on both sides of the crossing	✓			(Herrmann-Lunecke MG et al., 2023; Kachadoorian, 2024; Lynott et al., n.d.)
MI 1.4: Include tactile treatments on pedestrian curb ramps	✓			(McMillan et al., 2018)
MI 1.5: Provide adequate lighting in intersections	✓			(*8 Infrastructure Improvements to Help Older Adults Age in Community*, n.d.)
MI 1.6: Use high-visibility paint for crosswalks that aligns with older adults' perception and sensory levels	✓			(Kim D, 2019; Lynott et al., n.d.)
MI 1.7: Remove parking close to crosswalks to increase visibility	✓			(McMillan et al., 2018)
MI 1.8: Provide countdown signal buttons that can be accessible from a wheelchair	✓			(McMillan et al., 2018)
MI 1.9: Use countdown signals that include both audio and visual cues	✓			(*Dementia Friendly Design Considerations for Shared Streets and Spaces*, n.d.; Lynott et al., n.d.)
MI 1.10: Extend crossing signal times for pedestrians according to older adults' walking speed and/or limitations, especially in areas with high older adult density	✓			(*8 Infrastructure Improvements to Help Older Adults Age in Community*, n.d.; *Active Transportation for People with Challenges and Limitations*, 2019; *Dementia Friendly Design Considerations for Shared Streets and Spaces*, n.d.; Cairncross, 2016; Chhay, 2015; Cui et al., 2017; Doulabi S et al., 2021; McMillan et al., 2018; Ozbilen et al., 2022; Walia et al., 2024)

MI 1.11: Integrate people-detectors with crossing signals to automatically match walking speed of pedestrians	✓			(Cairncross, 2016)
MI 1.12: Provide Leading Pedestrian Intervals for crossing signals	✓			(McMillan et al., 2018)
MI 1.13: Utilize crossing guards in neighborhoods with large concentrations of older adults	✓			(Chippendale T & Boltz M, 2015)
MI 1.14: Install dedicated light signals for bicyclists at intersections		✓		(Timmons et al., 2024)
Sidewalk Infrastructure and Maintenance				
MI 2: Provide safe and adequate sidewalk infrastructure				(Mehegan, 2022)
MI 2.1: Ensure sidewalk infrastructure is both present and continuous to minimize difficulty navigating changes in surface level	✓	✓		(Cairncross, 2016; Gagnon, n.d.; McMillan et al., 2018)
MI 2.2: Use quality pavement materials that are smooth, strong, and non-slip (e.g., concrete or asphalt instead of bricks or cobblestones)	✓	✓		(Brookfield K & Tilley S, 2016; *Dementia Friendly Design Considerations for Shared Streets and Spaces*, n.d.; European Conference of Ministers of Transport, 2006; Laddu et al., 2021; D. Li et al., 2023; Loo et al., 2017; Lynott et al., n.d.; Rosso et al., 2021; World Health Organization, 2017)
MI 2.3: Ensure sidewalk width accommodates wheelchair-users, allows for sociable walking, and provides space for awnings, benches, etc.	✓			(Herrmann-Lunecke MG et al., 2023; Kachadoorian, 2024; Lynott et al., n.d.; World Health Organization, 2017)
MI 2.4: Provide tactile guidance and warning paths	✓			(European Conference of Ministers of Transport, 2006)
MI 2.5: Incorporate accessible pathways with ramps and minimal steep slopes	✓			(Cairncross, 2016; Najafi P & Mohammadi M, 2024; Rosso et al., 2021)
MI 2.6: Maintain sidewalks to be free of obstructions, barriers or tripping hazards, including heaves, uplifting, and unnecessary clutter	✓	✓		(Chhay, 2015; *Dementia Friendly Design Considerations for Shared Streets and Spaces*, n.d.; European Conference of Ministers of Transport, 2006; Herrmann-Lunecke MG et al., 2023; Lynott et al., n.d.; McMillan et al., 2018; Timmons et al., 2024; World Health Organization, 2017)
MI 2.7: Clear priority walking paths of snow, ice, other weather-related hazards as needed	✓			(*Active Transportation for People with Challenges and Limitations*, 2019; Chippendale T & Boltz M, 2015; Mehegan, 2022)
Bicycling Infrastructure				
MI 3: Develop safe and accessible bicycling infrastructure and facilities that support diverse riding needs				
MI 3.1: Include protected bike paths with physical barriers from traffic		✓		(Gagnon, n.d.; Timmons et al., 2024)
MI 3.2: Use painted lanes to enhance perceived safety		✓		(Timmons et al., 2024)
MI 3.3: Develop one-way cycling lanes		✓		(Timmons et al., 2024)

MI 3.4: Design cycling lanes wide enough to accommodate riding at different speeds		✓		(Timmons et al., 2024; World Health Organization, 2017)
MI 3.5: Implement self-service bike sharing systems with stations in safe and accessible areas		✓		(*Bicycle Transportation For Older Adults and People with Disabilities*, n.d.; World Health Organization, 2017)
MI 3.6: Provide adaptive, tricycle, and electric bike (e-bike) options through bike/trike libraries or by integrating them into existing bike share systems		✓		(*Bicycle Transportation For Older Adults and People with Disabilities*, n.d.; *Breaking Barriers to Bike Share*, n.d.; Shaer & Haghshenas, 2021)
Lighting				
MI 4: Provide proper lighting in public spaces to promote safety and address fear of crime				(Cairncross, 2016; Mehegan, 2022)
MI 4.1: Install adequate lighting along sidewalks, crosswalks, transit stops, and shopping areas	✓	✓		(*8 Infrastructure Improvements to Help Older Adults Age in Community*, n.d.; *Dementia Friendly Design Considerations for Shared Streets and Spaces*, n.d.; Cairncross, 2016; European Conference of Ministers of Transport, 2006; Laddu et al., 2021; Lynott et al., n.d.; Mehegan, 2022; Najafi P & Mohammadi M, 2024; Schehl & Leukel, 2020; World Health Organization, 2017)
MI 4.2: Ensure lighting is oriented towards sidewalks and paths	✓	✓		(*Active Transportation for People with Challenges and Limitations*, 2019; Lynott et al., n.d.; McMillan et al., 2018)
Aesthetics and Function				
MI 5: Incorporate aesthetic and functional features within community and neighborhood environments	✓			(Brüchert et al., 2022; U.S. Department of Health and Human Services, 2023)
MI 5.1: Enhance neighborhood aesthetics through attractive buildings, parks, trees and greenery, and water	✓	✓	✓	(Brüchert et al., 2022; Cairncross, 2016; Herrmann-Lunecke MG et al., 2023; Laddu et al., 2021; D. Li et al., 2023; Mowatt, 2018; Van Cauwenberg et al., 2018)
MI 5.2: Provide adequate street trees for shade and to buffer between roadways and sidewalks	✓	✓		(*8 Infrastructure Improvements to Help Older Adults Age in Community*, n.d.; Lynott et al., n.d.; McMillan et al., 2018; World Health Organization, 2017)
MI 5.3: Plant trees along slow zones and routes frequented by older adults	✓			(Kim D, 2019)
MI 5.4: Incorporate greenery and landscape elements to soften hardscapes and minimize noise pollution	✓			(*Dementia Friendly Design Considerations for Shared Streets and Spaces*, n.d.; McMillan et al., 2018)
MI 5.5: Ensure pedestrian routes have resting points (benches, shelters, public toilets) and places of interest (parks, game tables, etc.)	✓	✓		(*Active Transportation for People with Challenges and Limitations*, 2019; Cairncross, 2016; Cerin et al., 2017; Lynott et al., n.d.; World Health Organization, 2017)
MI 5.6: Install benches, handrails, fences, and poles strategically along routes for functional support, especially where slopes are unmodifiable	✓	✓		(Cairncross, 2016; Chippendale T & Boltz M, 2015; *Dementia Friendly Design Considerations for Shared Streets and Spaces*, n.d.; Gagnon, n.d.; Herrmann-

				Lunecke MG et al., 2023; McMillan et al., 2018; Rosso et al., 2021)
MI 5.7: Design benches with armrests and backrests for comfort and functional support	✓			(*8 Infrastructure Improvements to Help Older Adults Age in Community*, n.d.; *Dementia Friendly Design Considerations for Shared Streets and Spaces*, n.d.)
MI 5.8: Provide public restrooms and drinking fountains along pedestrian routes at regular intervals	✓			(Chhay, 2015; Herrmann-Lunecke MG et al., 2023; Schehl & Leukel, 2020)
MI 5.9: Ensure cleanliness of streets, sidewalks, and public transit facilities (stations, stops, vehicles)	✓	✓	✓	(*5 A's of Senior-Friendly Transit*, n.d.; Stearns et al., 2023)
MI 5.10: Minimize presence of abandoned properties, graffiti, and litter	✓	✓	✓	(Cairncross, 2016; Rosso et al., 2021)
Signage and Wayfinding				
MI 6: Create standardized and easily understood wayfinding signage systems for all road users	✓	✓	✓	(*8 Infrastructure Improvements to Help Older Adults Age in Community*, n.d.; *Dementia Friendly Design Considerations for Shared Streets and Spaces*, n.d.; Kachadoorian, 2024; Schehl & Leukel, 2020)
MI 6.1: Ensure signage is visible and clear for all road users (pedestrians, cyclists, and vehicles)	✓	✓		(McMillan et al., 2018; Najafi P & Mohammadi M, 2024)
MI 6.2: Ensure signage and information at bus and transit stops is available, accessible, and readable			✓	(*5 A's of Senior-Friendly Transit*, n.d.; Cairncross, 2016; Cui et al., 2017)
Public Transit Accessibility				
MI 7: Ensure transit facilities, vehicles, and stops are accessible, clean, safe, and user-friendly				(*5 A's of Senior-Friendly Transit*, n.d.)
MI 7.1: Equip vehicles with low-floor boarding, comfortable seating, and adequate space for special needs (e.g., wheelchairs, grocery carts, strollers)				(*5 A's of Senior-Friendly Transit*, n.d.)
MI 7.2: Allow sufficient time for older adults to board, stand, sit down, and disembark vehicles safely			✓	(Cui et al., 2017)
MI 7.3: Ensure transit stops are fully accessible and include benches and shelters to enhance comfort and usability			✓	(*8 Infrastructure Improvements to Help Older Adults Age in Community*, n.d.; Cairncross, 2016)

Appendix J

Codebook for Age-Friendly Active Transportation Policy Content Analysis

Macroscale

Code	Subcode	Definition	Notes
Policy integration and strategic planning		Policies, objectives, or strategies outlines within documents that express consideration of needs of all travelers and all modes of transport	Code any mention of policies or frameworks that are inclusive of older adults and multiple modes of transportation.
Policy integration and strategic planning	**Complete Streets and similar frameworks**	Adoption of Complete Streets or similar policy frameworks, such as Vision Zero, Safe Streets, Roads for All which ensure roads serve multiple functions	Subcode explicitly mentions any of these specific frameworks.
Policy integration and strategic planning	**Multi-level interventions**	Policies or strategies that aim to address multiple layers of interventions, e.g., built environment, social environment, policy environment	Subcode mentions strategies or approaches that address multiple levels of intervention.
Policy integration and strategic planning	**Age-friendly lens**	Policies or strategies that mention intent of or application of age-friendly or accessibility perspectives to strategic planning efforts	Subcode any reference to applying an age-friendly lens to policy or planning.
Policy integration and strategic planning	**Active transportation lens**	Integration of strategies or policies that address active transportation as a key objective	Subcode explicit mention of active transportation or clear reference to types of active transportation (e.g., walking for transport) within documents.
Policy integration and strategic planning	**Equitable practices**	Considerations given to equitable distribution of resources to address varying desires and needs of different older adult subgroups	Subcode mentions of policies that explicitly mention equity and considerations of diverse subgroups of older adults.
Policy integration and strategic planning	**Funding**	Earmarking or commitment to funds for sidewalk construction, facilities, and maintenance	Subcode mention of budget allocations for pedestrian or pedestrian-adjacent infrastructure.
Land use and zoning		Land use and zoning policies that support physical activity for all ages, inclusive of older adults	Code policies or strategies that mention zoning or land use guidelines that prioritize access to common destinations, services, and green spaces
Land use and zoning	**Mixed land use**	Zoning policies that include multiple uses within a given area, for example, including residential, retail, parks, services within a given block, neighborhood, sector, etc.	Subcode explicit references to increasing mixed land use policies, objectives, etc.
Land use and zoning	**Housing density**	Policies or strategies that emphasize increased residential density within a given block, neighborhood, sector, etc.	Subcode references to increasing housing density policies or guidelines.
Land use and zoning	**Street connectivity**	Measure of how streets connect origins to destinations, often through grid-like design (shorter blocks, more intersections)	Subcode references efforts to increase street connectivity or implement grid-like street designs.
Land use and zoning	**Access routes**	Developments include multiple access routes throughout for pedestrians and cyclists to ensure proximity and convenient access to services	Subcode references to integration of multiple access routes for non-vehicle modes (walking and cycling)
Land use and zoning	**Older adult facilities**	Develop older adult-serving facilities and housing near transit and other common destinations	Subcode reference to strategies or guidelines for locating older adult-serving facilities near transit or destinations
Collaboration		Collaboration across multiple sectors of governments and with community stakeholders, and older adult community members	Code mentions of strategies or frameworks for collaboration across sectors and stakeholder groups
Collaboration	**Walkability**	Walkability and pedestrian safety within the community is addressed through intersectoral collaboration	Subcode mentions collaborative strategies or efforts related to walkability and pedestrian safety
Collaboration	**Older adult authority**	Older adults are empowered with decision-making authority on advisory boards, committees, etc.	Subcode mentions inclusion of older adults in decision-making roles.
Collaboration	**Citizen engagement**	Planning, implementation, and other decision-making processes seek and	Subcode any policies or strategies that mention inclusion of older adult or disabled

		promote involvement of older adult community members and community members with disabilities	populations within planning or implementation processes related to active transportation efforts (e.g., pedestrian infrastructure improvements)
Monitoring and evaluation		Evaluation, outreach, and assessment activities focus on identifying context-specific issues, locations, and impact for older adults	Code monitoring or evaluation efforts that are aimed at older adult populations to consider needs related to active transportation
Monitoring and evaluation	**Walkability audits**	Conduct walkability audits or other similar built environment assessments in collaboration with older adults to identify hyperlocal issues	Subcode mentions walkability audits or similar activities or efforts done in collaboration with older adults to identify hyperlocal issues and concerns
Monitoring and evaluation	**Policy audits**	Regular evaluation of planning and policy documents to ensure they adequately account for the needs of older adults	Subcode references system or process for regular evaluations or audits of strategic planning or policy documents related to inclusion of older adults' needs for active transportation within them

Mesoscale

Code	Subcode	Definition	Notes
Active transportation systems		Policies or strategies that support integration and maintenance of transportation systems with pedestrian, bicycling, and transit infrastructure	Code for policies or strategies that address multiple modes of transportation, namely walking, cycling, and public transit
Active transportation systems	**Mode separation**	Policies or strategies that emphasize separation of paths for different transportation modes	Subcode policies, strategies, or guidelines that mention dedicated or separated routes for different modes of transportation, e.g., bike lanes separated from traffic and from sidewalks
Neighborhood walkability		Policies are focused on improving neighborhood walkability and the general pedestrian environment	Code for policies, strategies, or guidelines that explicitly aim to improve overall walkability and pedestrian safety
Neighborhood walkability	**Sidewalk connectivity**	Pedestrian infrastructure provides networks of sidewalks that connect people efficiently to destinations and provide different route options (e.g., sidewalks exist on more than one side of a street)	Subcode for policies or guidelines that focus on improving sidewalk networks, connectivity, and ensuring multiple route options for pedestrians
Neighborhood walkability	**Variety of destinations**	Policies and guidelines ensure that a variety of destinations (grocery stores, parks, restaurants, recreational facilities) are both available and accessible to community residents	Subcode for references or guidelines that ensure a variety of destinations are available to community members
Neighborhood walkability	**Proximity to destinations**	Location of common and essential destinations and services (schools, worksites, businesses, parks, etc.) within walking distance of each other	Subcode for mention of clustering of destinations and services within walking distance of one another and within proximity to where community members live
Neighborhood walkability	**Public transit connections**	Policies and guidelines that emphasize connections between pedestrian networks and public transit, as well as pedestrian infrastructure surrounding public transit	Subcode for references to pedestrian-friendly connections to and infrastructure near public transportation
Bicycle infrastructure		Policies and guidelines focus on improving bicycle infrastructure and facilities that connect residential areas with common destinations for cyclists	Code for priorities focused on expanding or enhancing bicycle routes and infrastructure.
Bicycle infrastructure	**Cycling connectivity**	Ensure that bike lanes, paths, and routes are well-connected and provide direct routes and/or shortcuts for cyclists within street networks	Subcode for mention of policies and guidelines for improving and integrating bicycling infrastructure (bike lanes, paths, routes)
Public Transit		Policies and guidelines for the creation or expansion of public transit networks to ensure its availability, access, and convenience	Code for policies mentioning improvements to public transit facilities or expansion of public transit networks
Public Transit	**Transit frequency**	Public transit options are available when they are needed and with high frequency	Subcode for policies or guidelines that address scheduling, availability, and frequency of public transit

Public Transit	**Transit stops**	Transit stops are located near residential locations and routes connect to common destinations	Policies or guidelines that discuss strategic placement of transit stops and routes
Public Transit	**Distance between stops**	Policies and guidance that minimize the distance between transit stops to ensure ease of access	Subcode for policies or guidelines that mention minimizing the distance between transit stops in order to reduce walking distance or safety concerns
Public Transit	**Transit affordability**	Subsidies, vouchers, or discounts for public transit are provided to ensure affordability, especially for lower-income older adults	Subcode for financial assistance policies or programs for transit fares for older adults
Traffic safety		Policies and strategies focused on ensuring that traffic regulations and measures prioritize the protection of vulnerable road users, including older adults	Code for policies and strategies that discuss traffic safety improvements or interventions to protect vulnerable road users, especially pedestrians and cyclists
Traffic safety	**Traffic calming**	Implementation of reduced speed limits, slow zones, and traffic calming measures in areas frequented by older adults	Subcode for mentions of traffic calming measures explicitly targeting areas with high older adult populations (e.g., senior centers, older adult housing, other frequently visited locations)
Traffic safety	**Traffic congestion**	Policies and strategies that consider the effects of street congestion on access to retail and services via pedestrian and cycling routes	Subcode for any mention of strategies to address or limit traffic congestion surrounding retail and services which might impact ease of access to those destinations via walking or cycling paths
Traffic safety	**Pedestrian safety**	Strategies to ensure pedestrian safety from traffic, particularly at street crossings and near bus and transit stops	Subcode for policies that explicitly emphasize pedestrian safety at street crossings and around transit stops.
Traffic safety	**Traffic enforcement**	Enforcement of traffic laws in order to enhance real and perceived safety for older adults	Subcode for mention of strategies or intention to promote enforcement of traffic laws, namely those which aim to protect pedestrians and cyclists.
Education and awareness		Development and implementation of public education and outreach programs to promote active transportation and improve safety skills for engaging in active transportation	Code for policies, strategies, and objectives focused on public awareness, education, and outreach related to older adults' use of active transportation
Education and awareness	**Active transportation benefits**	Programs that educate older adults on the benefits of active transportation	Subcode for mention of public or community education efforts about the benefits of walking, biking, using public transit for transportation.
Education and awareness	**Neighborhood awareness**	Efforts to improve awareness of neighborhood infrastructure enhancements and amenities that are available to support active transportation (e.g., publicly accessible toilets, benches, bike stations, etc.)	Subcode for any mention of efforts that aim to inform older adults about neighborhood improvements or amenities and resources that are available to support walking, biking, and use of public transit.
Education and awareness	**Pedestrian self-efficacy training**	Training and education programs that aim to boost older adults' skills and confidence to engage in walking for active transportation (e.g., walking skills, crossing safety)	Subcode for references to training and education programs that aim to support pedestrian-related skills and confidence. Note whether programs are designed specifically for older adults or more broadly for the community at large.
Education and awareness	**Cycling self-efficacy training**	Education and outreach efforts that focus on safe bicycling skills for older adults	Subcode for references to training and education programs that aim to support cycling-related skills and confidence. Note whether programs are designed specifically for older adults or more broadly for the community at large.
Social environment		Policies and strategies that aim to foster a supportive social environment that increases opportunities and appeal of active transportation for older adults	Code for strategies to encourage social support and connectedness for older adults that may create opportunities for to engage in active transportation.
Social environment	**Social connectedness**	Provision of services and activities that offer social support, connectedness, and/or arrange companionship for older adults	Subcode for references to social programs or activities that increase social connectedness for older adults and reduce isolation.
Social environment	**Community respect**	Efforts within the broader community to promote respect and courtesy toward older adults	Subcode for references to efforts that aim to foster respect and courtesy toward older adults in public spaces.

Natural environment	**Air quality**	Efforts that aim to address air pollution to ensure neighborhood and community is more suitable and comfortable for walking	Code for policies and strategies that aim to improve air quality within walking and cycling environments.

Microscale

Code	Subcode	Definition	Notes
Intersection and crosswalk safety		Policies, guidelines, and efforts that prioritize well-designed, pedestrian-friendly street crossings that support safety and comfort	Code for policies that address safety and comfort for pedestrians in relation to the design of intersections. Make note of any special reference to accommodations for older adults or vulnerable pedestrians.
Intersection and crosswalk safety	**Raised curbs**	Guidelines for the design of intersections that include raised curbs	Subcode for policies or guidelines that specify the use of raised curbs at intersections.
Intersection and crosswalk safety	**Crossing distance**	Policies and guidelines that aim to reduce crossing distances via curb extensions, bulb-outs, and median/pedestrian refuge islands	Subcode for policies or guidance for minimizing the crossing distance at intersections, such as through the use of curb extensions, bulb-outs, pedestrian refuge islands, etc.
Intersection and crosswalk safety	**Curb ramps**	Guidelines for the installation of pedestrian curb ramps that lead directly into crosswalks on both sides of the crossing	Subcode for policies or guidelines that specify standards for installation of curb ramps that lead directly into crosswalks at street crossings.
Intersection and crosswalk safety	**Tactile curb ramps**	Inclusion of tactile treatments on pedestrian curb ramps	Subcode for policies or guidelines that specify inclusion of tactile surfaces on curb ramps.
Intersection and crosswalk safety	**Intersection lighting**	Guidelines for the provision of adequate lighting in and around intersections	Subcode for policies or guidelines referencing standards for lighting and/or lighting improvements at intersections. (This is not referring to vehicle traffic lights.)
Intersection and crosswalk safety	**High-visibility crosswalks**	Guidelines that specify the use of high-visibility paint for crosswalks that aligns with older adults' perception and sensory levels	Subcode for policies or guidelines recommending the use of high-visibility or high-contrast paint for crosswalks.
Intersection and crosswalk safety	**Crosswalk visibility**	Guidelines for the removal of parking spaces close to crosswalks to increase visibility	Subcode for guidelines that aim to remove parking spots adjacent to crosswalks—or actions with similar intent—as a measure for increasing pedestrian visibility to vehicles.
Intersection and crosswalk safety	**Accessible signal buttons**	Provision of countdown signal buttons that can be accessible from a wheelchair	Subcode for policies or guidelines that implicitly or explicitly mention placement of crossing signal buttons to be accessible for wheelchair users.
Intersection and crosswalk safety	**Audio and visual signals**	Installation of countdown signals that include both audio and visual cues	Subcode for policies or guidelines that describe the inclusion of multi-sensory crossing signals (audio and visual) at intersections.
Intersection and crosswalk safety	**Crossing times**	Guidelines that extend crossing signal times according to older adults' walking speed and/or limitations, especially in areas with high older adult density	Subcode for policies or guidelines that ensure the timing of crossing signals is sufficient to accommodate slower walking speeds.
Intersection and crosswalk safety	**People-detectors**	Integration of people-detectors with crossing signals to automatically match walking speed of pedestrians	Subcode for any mention of actions to adopt "people-detectors" or similar technology that automatically adjust crossing signal times according to actual walking speed of pedestrians.
Intersection and crosswalk safety	**LPIs**	Provide Leading Pedestrian Intervals with crossing signals	Subcode for any policies or guidelines that describe the integration of "Leading Pedestrian Intervals" at intersections.
Intersection and crosswalk safety	**Crossing guards**	Utilize crossing guards in neighborhoods with high concentrations of older adults	Subcode for any references to the use of crossing guards in areas with high concentrations of older adults (e.g., senior centers)

Intersection and crosswalk safety	**Bicycle signals**	Install dedicated light signals for bicyclists at intersections	Subcode for policies or guidelines that describe the installation of separate light signals at intersections for bicyclists.
Sidewalk infrastructure		Policies, guidelines, and strategies for providing safe and adequate sidewalk infrastructure	Code for policies aimed at ensuring sidewalks are present, safe, comfortable, and adequate for pedestrian activity. Make note of any explicit reference to accommodations for older adults or other vulnerable pedestrians.
Sidewalk infrastructure	**Continuous sidewalks**	Ensure sidewalk infrastructure is both present and continuous to minimize difficulty navigating changes in surface level	Subcode for policies or guidelines for ensuring that sidewalks are consistently available throughout neighborhoods and the community, that they are continuous, without abrupt gaps or changes in surface level.
Sidewalk infrastructure	**Pavement quality**	Guidelines that inform the use of high-quality pavement materials that are smooth, strong, and non-slip (e.g., concrete or asphalt instead of bricks or cobblestones)	Subcode for policies or guidelines for the type and quality of pavement used for sidewalk infrastructure. Note whether it describe options that are smooth, non-slip, and other characteristics.
Sidewalk infrastructure	**Sidewalk width**	Ensure sidewalk width accommodates wheelchair-users, allows for sociable walking, and provides space for awnings, benches, etc.	Subcode for policies or guidelines that discuss sidewalk width. Note whether guidelines allow space for wheelchairs, benches, awnings, and passage for multiple users.
Sidewalk infrastructure	**Tactile sidewalks**	Guidelines to include tactile guidance and warning paths along pedestrian routes	Subcode for policies or guidelines related to inclusion of tactile treatments along sidewalk infrastructure or similar measures intended to support individuals with impaired vision.
Sidewalk infrastructure	**Sidewalk accessibility**	Guidelines for the incorporation accessible pathways with ramps and to minimize steep slopes along pedestrian routes	Subcode for policies or guidelines related to the inclusion of accessible pathways, ramps, and other measures to ensuring accessibility around steep slopes or stairs.
Sidewalk infrastructure	**Sidewalk maintenance**	Guidelines for maintaining sidewalks to remove obstructions, barriers or tripping hazards, including heaves, uplifting, and other unnecessary clutter	Subcode for policies, guidelines, or processes for the maintenance or removal of obstructions on sidewalks (e.g., heaves or uplifting due to tree roots). Make note of processes mentioned for conducting maintenance.
Sidewalk infrastructure	**Weather maintenance**	Policies and guidelines for clearing priority walking paths of snow, ice, other weather-related hazards when it is needed	Subcode for policies, guidelines, or processes for weather-related maintenance along sidewalks and pedestrian infrastructure, such as snow and ice removal.
Bicycling infrastructure		Microscale policies that focus on developing safe and accessible bicycling infrastructure and facilities that support diverse riding needs	Code for policies and guidelines that aim to ensure the availability of bicycling infrastructure that is safe, accessible, and meets the needs of diverse riders including older adults. Make note of any explicit reference to accommodations or considerations for older adults.
Bicycling infrastructure	**Protected bike lanes**	Policies or guidelines that specify include protected bike paths with physical barriers from traffic	Subcode for policies or guidelines for the installation of protected bike lanes.
Bicycling infrastructure	**Painted lanes**	Policies or guidelines that specify the use of painted lanes to enhance perceived safety	Subcode for policies or guidelines for the use of painted bicycle lanes.
Bicycling infrastructure	**One-way lanes**	Policies or guidelines for developing one-way cycling lanes	Subcode for policies, guidelines, or priorities for supporting the creation of one-way cycling lanes.
Bicycling infrastructure	**Wide lanes**	Policies or guidelines for design cycling lanes wide enough to accommodate riding at different speeds	Subcode for policies or guidelines that discuss creation of bicycle lanes wide enough to allow for passing and to accommodate different riders' cycling speeds.

Bicycling infrastructure	**Bike-sharing**	Implement self-service bike sharing systems with stations in safe and accessible areas	Subcode for programs or policies that describe the development or expansion of bike sharing systems. Also subcode for any discussion of priorities for placing stations in safe and accessible areas.
Bicycling infrastructure	**Bike options**	Provide adaptive, tricycle, and electric bike (e-bike) options through bike/trike libraries or by integrating them into existing bike share systems	Subcode for programs or policies that describe the integration of e-bikes, adaptive bikes, tricycles within the bike sharing systems. Also subcode for reference to programs that provide alternative bike options that may be separate from the DC bike sharing system.
Lighting		Policies and guidelines that aim to promote safety and address fear of crime with proper lighting in public spaces	Code for policies or guidelines focused on standards for lighting in public spaces, such as along sidewalks and at transit stops.
Lighting	**Pedestrian lighting**	Installation of adequate lighting along sidewalks, crosswalks, transit stops, and shopping areas	Subcode for policies or guidelines that specify placement of lighting along pedestrian routes and destinations.
Lighting	**Lighting orientation**	Ensure lighting is oriented towards sidewalks and paths	Subcode for polices or guidelines that further specify the orientation and direction of lighting to illuminate sidewalks and paths.
Aesthetics and function		Policies and guidelines that aim to incorporate aesthetic and functional features within community and neighborhood environments	Code for policies or guidelines that promote both aesthetic (visual) and functional improvements within neighborhood environments to support active modes of transportation.
Aesthetics and function	**Neighborhood aesthetics**	Policies and guidelines that aim to enhance neighborhood aesthetics through attractive buildings, parks, trees and greenery, and water	Subcode for policies or guidelines that address the visual appeal of neighborhoods through natural elements or building design standards. Make note of specific aspects mentioned
Aesthetics and function	**Street trees**	Policies for guidelines for ensuring adequate street trees are provided for shade and to buffer between roadways and sidewalks	Subcode for policies or guidelines for the planting and care of street trees, with either the intent of creating a buffer from traffic and/or to provide shade for pedestrian. Make note of the context and objectives noted for the street trees.
Aesthetics and function	**Tree placement**	Policies or guidelines for planting trees along slow zones and routes frequented by older adults	Subcode for any mention of placement of trees specifically along slow zones or other areas frequented by older adults.
Aesthetics and function	**Greenery**	Policies and guidelines for incorporating greenery and landscape elements to soften hardscapes and minimize noise pollution	Subcode for policies supporting the use of greenery or other landscape elements within the built environment, particularly along pedestrian and bicycling routes.
Aesthetics and function	**Resting places**	Policies and guidelines for ensuring pedestrian routes have resting points (benches, shelters, public toilets) and places of interest (parks, game tables, etc.)	Subcode for any mention of inclusion of benches, public shelters, restrooms, other places of interest along pedestrian routes. Make note of the specific elements described.
Aesthetics and function	**Functional support**	Guidelines for installing benches, handrails, fences, and poles strategically along routes for functional support, especially where slopes are unmodifiable	Subcode for policies or guidelines that support strategic placement of benches, handrails, fences, etc. Make note of what elements are mentioned and objectives, if given.
Aesthetics and function	**Bench design**	Guidelines for designing benches with armrests and backrests for comfort and functional support	Subcode for guidance for bench design, specifically for design that includes armrests and backrests.
Aesthetics and function	**Public restrooms and fountains**	Provision of public restrooms and drinking fountains along pedestrian routes at regular intervals	Subcode for policies or guidelines about the provision and availability of public amenities including public restrooms and drinking fountains.
Aesthetics and function	**Cleanliness**	Policies and guidelines to ensure cleanliness of streets, sidewalks, and public transit facilities (stations, stops, vehicles)	Subcode for policies that support general upkeep and cleanliness of pedestrian spaces, which may include placement of trash bins, trash collection, park maintenance, etc.

Aesthetics and function	**Neighborhood blight**	Policies that focus on minimizing presence of abandoned properties, graffiti, and litter	Subcode for policies or guidelines that aim to minimize neighborhood blight and to support perceived safety and comfort.
Signage and wayfinding		Policies and guidelines for creating standardized and easily understood and wayfinding signage systems	Code for policies and guidelines aimed at supporting navigation and safety with clear signage and wayfinding strategies for different modes of transportation.
Signage and wayfinding	**Visible signage**	Ensure signage is visible and clear for all road users (pedestrians, cyclists, and vehicles)	Subcode for policies or guidelines for ensuring that signage is visible and clear for all road users. Make note of any specifications described to ensure accommodations for older adults.
Signage and wayfinding	**Understandable signage**	Ensure signage and information at bus and transit stops is available, accessible, and readable	Subcode for policies or guidelines emphasizing clear and available information at transit locations to support navigation of public transit. Make note of any special accommodations for older adults.
Public transit accessibility		Ensure transit facilities, vehicles, and stops are accessible, clean, safe, and user-friendly	Code for policies or guidelines that mention accessibility, safety, and cleanliness of public transit facilities and vehicles.
Public transit accessibility	**Transit vehicle accommodations**	Equip vehicles with low-floor boarding, comfortable seating, and adequate space for special needs (e.g., wheelchairs, grocery carts, strollers)	Subcode for policies or guidelines that ensure vehicles are equipped with low-floor boarding, seating, and space to accommodate special needs.
Public transit accessibility	**Transit boarding time**	Allow sufficient time for older adults to board, stand, sit down, and disembark vehicles safely	Subcode for policies, guidelines, or training for drivers to provide sufficient time for passengers to comfortably and safely board, disembark, etc. Make note of mention of any specialized training or other guidelines for drivers to accommodate older adults.
Public transit accessibility	**Transit accessibility**	Ensure transit stops are fully accessible and include benches and shelters to enhance comfort and usability	Subcode for policies or guidelines for ensuring transit stops are fully accessible. Note any guidelines for providing benches and/or shelters.

Appendix K

Codebook for Textual and Visual Data Analysis of Walking Interviews

Provisional Codes

Code	Subcode	Definition	Examples
Intrapersonal factors	N/A	References or discussion about individual-level characteristics that may influence perceptions, experiences, and adoption of active transportation behavior. May include demographic (age, gender, income, education), psychosocial (knowledge, beliefs, self-efficacy), or biological factors (disease or mobility limitations).	Oh, I should have told you, I have a hip replacement. I got it about two or three years ago… So that's why I don't walk as much as I used to. 27:15 ¶ 1543 – 1568 in Transcript_03.docx
Perceived environment	N/A	Discussion and references about subjective perceptions of the surrounding physical and social environment. May include perceptions of safety, convenience, accessibility, aesthetics, etc.	Quiet, pretty much. It's a quiet neighborhood. You know, it just feels like community. This part of DC, to me, never feels like DC. It has a little suburban feel to it. 5:1 ¶ 20 – 23 in Transcript_01.docx
Social-cultural environment	N/A	References to social or cultural factors that may influence active transportation, such as social norms, programs that create opportunities for social connections, cultural values, barriers to social participation. May be cross-coded with other levels of influence, e.g., perceptions of crime may also be considered within the context of the perceived environment. Barriers to social participation, such as lack of infrastructure to facilitate social interaction, may be considered in this plus the built environment.	Mh-hmm. And every once in a while, Seabury, the organization that runs our Center, they will host parties or get togethers or what have you in this little square right here, the round area right here. 16:7 ¶ 144 – 145 in Transcript_02.docx
Natural environment	N/A	Mention of factors that relate to the natural environment, e.g., weather, topography, air quality. Often interacts with other levels of influence and may be cross-coded with them, such as built environment or policy environment. E.g., strategies to mitigate effects of weather conditions may be influenced by the policy environment.	Oh well, if it's snowing and icy, you can forget me walking around. [laughter] 5:24 ¶ 487 – 515 in Transcript_01.docx
Behavior Settings: Access and Characteristics)	N/A	References, including comments and observations about factors related to characteristics of and access to physical infrastructure and environment; places and characteristics where active transportation occurs. E.g., factors relating to	The sidewalk was in generally good condition, with only minor cracks occasionally visible. Mature trees lined the street, providing shade…and I imagined would provide pretty significant shade coverage

		neighborhood design, pedestrian and bicycling infrastructure (sidewalks and bike lanes), public transit networks, or programs that enable access.	throughout most of the day. The sidewalk was separated from the street by a strip of grass with regularly-spaced tree boxes. 79:7 ¶ 37 in Walking Interview Observation Protocol_12.docx
Policy environment	N/A	Discussion or references to policy-driven factors or desires for policy involvement to either support or impede active transportation, especially in relation to how the built environment is developed and managed. E.g., through land use policies (zoning laws) or transportation policies (public transit or road safety regulations).	Yeah, we certainly do. We have thoughts! You know, I'm not a biker and I'm not opposed to bike lanes. But I think that they need to be very thoughtful and practical in where they're placing bike lanes. 5:32 ¶ 583 – 590 in Transcript_01.docx

Structural Codes

Code	Subcode	Definition	Examples
Singular influences	N/A	Discussions within text that primarily relate to specific or singular influencing factors on active transportation decisions or experiences. Relating to Research Question #1: What are the intrapersonal, social-cultural, and environmental factors that older adults who live in Ward 5 of Washington, DC perceive and experience in relation to active transportation?	Absolutely. Things are close by. We have a few, not very many, but a few little grocery stores—neighborhood grocery stores, I call them, like I could walk straight up or straight down 12th Street and I can get two grocery stores. Like I mentioned, the fact that I could walk to a hardware store. I definitely can walk to the metro. 5:22 ¶ 415 – 425 in Transcript_01.docx
Interacting influences	N/A	Discussions within text that highlight potential interactions between different factors on active transportation. Relating to Research Question #2: How do these factors and perceptions interact to influence older adults' active transportation behavior?	Yeah, you feel better when there's someone with you. But some of these young people you know, they—they still beat you up, assault, carjack you. But yeah, that would make you feel—make me feel a little more comfortable sometimes. And you probably see people sometimes they don't be out here alone, isolated just themselves. They try to walk with a partner. But that's not always practical sometimes. Yeah, yeah. 5:16 ¶ 319 – 323 in Transcript_01.docx

Descriptive Codes

Code	Subcode	Definition	Examples

Active transportation behavior		References that discuss participants' use of active modes of transportation (walking, biking, using public transit).	I can see, um.. [unintelligible due to construction noise]...tend to, um, just try to build activity into my daily life. So if I have a destination, I'll try to walk there or bike there. 98:12 ¶ 317 in Transcript_21.docx
Appearance and attractiveness		References to visual or sensory characteristics of a neighborhood that influence appearance, attractiveness, and appeal.	
	aesthetics	Reference about positive or negative perceptions about visual or non-visual characteristics, such as vistas, architectural design and detail, or general feelings about of the neighborhood.	I'll show you, or maybe we can see it better on the other side, um... The—this, this ugly architecture I was telling you about? 74:10 ¶ 323 – 359 in Transcript_11.docx Yep. Yep. And then you can see the Shrine, so that's always a beautiful view. 5:50 ¶ 293 in Transcript_01.docx
	greenery and trees	References specifically to elements of nature, e.g., trees, grass, gardens, landscaping as contributions to visual appeal and comfort. Includes references about potential associated challenges like low-hanging branches or overgrowth.	Um, well, I love the green. I just love the green. 46:19 ¶ 308 in Transcript_05.docx In a couple of instances, low hanging foliage from trees or from bushes from people's yards made it so that we had to duck and/or walk past in single file. 6:25 ¶ 35 in Walking Interview Observation Protocol_01.docx
	trash and litter	References and observations to the presence (or lack of presence) of trash, little, and blight including actions or discussion about addressing it.	Just to tell you that trash is a big issue here. I wish that were something that would be addressed more. 101:17 ¶ 311 – 323 in Transcript_22.docx
Bicycling infrastructure		Discussion, observations, or other references to bicycling facilities and infrastructure, including thoughts and opinions towards their development or impact.	
	bike lanes	References and observations related to the presence or lack of bicycle lanes within the neighborhood or community environment.	I noticed protected bike lanes on both sides of the street, with some curbs and bollards between the bike and traffic lanes. This is one of the few places I've noticed dedicated bike lanes in the neighborhood.

			102:11 ¶ 39 in Walking Interview Observation Protocol_22.docx
	bike racks	References to bike racks as a component of bicycling infrastructure.	Sometimes it's hard to find a place to lock up a bicycle. So having more of those bike racks would be good. You know, otherwise, I look for a stop sign like that. 98:49 ¶ 772 – 778 in Transcript_21.docx
	bikeshare	References and observations related to bike sharing systems and facilities.	This was a nice addition, the ride share. 101:3 ¶ 77 in Transcript_22.docx
	controversy about bike lanes	References to thoughts and opinions about the development of bike lanes within the community, including negative perceptions and impact.	So... but in my city—and I love the city because I'm a Washingtonian—I do have a problem with one thing and that is bike lanes. 16:19 ¶ 373 – 422 in Transcript_02.docx
Biological and physical factors		References to biological or physical abilities or limitations that may influence active behavior—either against or in favor of physical activity, such as past surgeries, injuries, pain, etc.	I walk very slow, but some Achilles issues and then I feel like I have to keep up with their pace... 101:41 ¶ 872 – 878 in Transcript_22.docx
Car ownership		References to car ownership and its potential influence on decisions about engaging in active transportation behavior.	She also spoke about no longer having a private vehicle, which seemed mostly by choice, but I would also interpret to be a major contributing factor to her decisions about active transportation. 95:44 ¶ 73 in Walking Interview Observation Protocol_19.docx
Community engagement and advocacy		References to actions, efforts, or other types of initiatives by individuals or organizations to influence local policy and decision-making.	
	public engagement in decision-making	References to efforts or desires for the city to involve residents in planning, decision-making, or other discussions about neighborhood developments, transportation, etc. Think: top-down, i.e., community efforts to involve residents.	You know, you want the bike lanes, you know why you want the bike lanes, but come to us and ask us how do we feel about the bike lanes. We're the ones with that's traveling those areas on a daily basis. Not you. You know, so... 16:37 ¶ 458 – 464 in Transcript_02.docx
	social and climate advocacy	References to individual or collective beliefs, efforts, and initiatives to support social or climate concerns. Think: grassroots efforts, i.e., residents and organizations aiming to influence city policy/processes.	Uh, and...I feel like it helps a lot to feel less helpless, more engaged, more empowered, if there are ways that you can connect and try to effect policies. 98:11 ¶ 293 – 311 in Transcript_21.docx

Crime		References to known, documented, or observable instances and experiences with criminal threats or activity within the community (as opposed to perceptions or feelings about it, see: *perceptions about crime).*	No, I mean, somehow, I ended up on the Nextdoor alert system, and I must get two or three emails a day about car thefts and breaking into cars and stuff. 89:51 ¶ 584 – 590 in Transcript_15 (Validated).docx
Dogs		References to observable instances and experiences related to the presence of dogs within the community (as opposed to perceptions or feelings about it, see: *perceptions about dogs).*	So my knees are gone, so I tend to walk on dirt. But then I gotta deal—ditch dog poop, cause people don't pick up the dog poop! 55:9 ¶ 282 – 288 in Transcript_06.docx As we prepared to leave, I also noticed someone walking their dog—a large husky… The dog was on a leash, but I also noticed that it had a muzzle around its mouth. 79:14 ¶ 57 – 58 in Walking Interview Observation Protocol_12.docx
Funding and investment		References about city investments or need for investment to support transportation options for older adults.	But before that, Seabury had a bus that picked, that the seniors who either had canes or who had some type of deformity, and they stopped that. So those seniors have not been to a senior center since the pandemic. 91:17 ¶ 548 – 590 in Transcript_18.docx
Individual safety precautions		Comments and observations about participants' individual-level responses to perceived or real risks while engaging in active transportation behavior.	
	precautions from dogs	Comments and observations about individual-level precautionary measures that participants take to minimize perceived or real risk of harm from dogs.	…the participant explained that she carried the stick to protect herself from dogs. She shared a story about nearly being attacked by an aggressive dog, which clarified the purpose of the stick. 79:28 ¶ 27 in Walking Interview Observation Protocol_12.docx
	precautions from injury	Comments and observations about individual-level precautionary measures to reduce the risk of injury while walking, biking, or using public transportation.	So, see how I ride my—with my helmet and my flaming vest and I have lights and all that. 98:46 ¶ 676 in Transcript_21.docx
	precautions from threat of crime	Comments and observations about individual-level precautionary measures to avoid real or perceived risk of crime while engaging walking, biking, or using public transportation.	And I don't walk with headphones or anything like that. Yeah, I try to be aware…

			And, um, so I always travel light. Nothing in my hands. I try to be free. I can run, if I have to. You know what I'm saying. 46:40 ¶ 792 – 831 in Transcript_05.docx
Neighborhood destinations and amenities		Comments, observations, and other references to typical destinations, amenities, and resources within proximity to participants' homes and/or accessible by public transportation.	
	community amenities and resources	Comments, observations, and other references to community-oriented or public services and resources (primarily designed for community benefit and shared use). Examples include libraries, community gardens, recreation centers, schools, fitness tracks, etc.	There were, however, several community and public amenities within a small radius, including the Senior Center itself, the elementary school, a communication recreation center, and the public park. Although we did not walk by it, I am also aware of a branch library on one of the blocks beyond our route. 17:16 ¶ 56 in Walking Interview Observation Protocol_02.docx
	nearby retail and service destinations	Comments, observations, and other references to retail, commercial destinations or services (primarily serving individual or household needs). Examples include grocery stores, restaurants, pharmacies, etc.	Well, right now, for me, it was just—I mean in my neighborhood I am so convenient to different things that I need to do in the neighborhood. The Walmart is like a block and a half for me. 16:29 ¶ 237 in Transcript_02.docx
	parks and greenspaces	Comments, observations, and other references to natural or semi-natural spaces intended for recreation, relaxation, etc. Note some overlap with *community amenities and resources*, but with emphasis on nature and open space rather than built amenities.	We continued along South Dakota Avenue until reaching Galloway Street. At that intersection, I noticed a park on the far side of Galloway Street. 56:23 ¶ 41 in Walking Interview Observation Protocol_06.docx
Neighborhood development		References to past, current, or upcoming development of physical infrastructure and neighborhood design, including design of new housing, buildings, transit facilities, etc.	
	development of built environment	References to past, current, or anticipated physical changes to the neighborhood environment, such as buildings, housing, retail, etc.	And so they're building a new development. They're building some more buildings there. We didn't think they'd find space [unintelligible due to traffic noise]...they always find more space. [laughter] 46:37 ¶ 773 – 780 in Transcript_05.docx

	preservation of neighborhood character	Comments and observations about the preservation—or lack thereof—of a neighborhood's historical or cultural character during new development.	And it's not protected, but, um, the city is—actually to its credit—trying to help us, um, at least incorporate some historic elements into the new design. I mean, it's not much with those medallions, and even the roofline, you know, is, is more interesting than... 74:15 ¶ 422 – 434 in Transcript_11.docx
	gentrification	Comments and references made by participants about gentrification, particularly in relation to social impacts and effects (e.g., displacement, demographic shifts, etc.). Closely related to *Neighborhood Development* code, but note that this is focused on the social impact rather than the physical changes in the neighborhood.	The neighborhood has gentrified a lot I'd say over the last 10-15 years. So there's only a few African American families, single family homeowners that are still here. 46:56 ¶ 92 in Transcript_05.docx
Neighborhood identity		References, comments, and observations of historical or cultural elements and characteristics with the neighborhood that contribute to sense of pride, attachment, or connection among residents.	
	cultural features incorporated into neighborhood	Microscale features within the neighborhood that represent neighborhood or community culture, such as art or names of destinations.	As we approached the park on the West side of the street, the participant told us about the memorial that we could see at the entrance of the park, which she said was to honor Chuck Brown—well known in DC as go-go musician. 17:6 ¶ 40 in Walking Interview Observation Protocol_02.docx
	historical connection to neighborhood	References about neighborhood elements or characteristics that tie in historical connections; including references to how this may contribute to building pride and attachment to the neighborhood.	So anyway, but this is also a wonderful school. It's called Ernestine—and someone else's—Shaed. Two sisters, African American educators. Back in the day when there weren't that many African American educators and so the school is named after them. 46:4 ¶ 118 – 124 in Transcript_05.docx
Pedestrian infrastructure		Comments, observations, and other references to the presence, characteristics, and concerns about pedestrian infrastructure, including sidewalks, crosswalks and intersections, and other microscale elements along pedestrian routes.	
	benches	References within discussions and observations about the presence, absence, or role of benches within the pedestrian environment.	I've noticed that benches are placed at certain points. It would be great if there were more benches.

			67:12 ¶ 35 in Supplemental Email Response_08.docx
	broken sidewalks	References and observations about breaks, cracks, heaves, and gaps along sidewalks.	Yeah, but the concrete in some places is all cracked up. Over there, where we're walking, it's all cracked up. And you can see, you know, that's— that's—that's a problem. 55:12 ¶ 339 – 342 in Transcript_06.docx
	handrails	References to potential value and role of handrail placement along pedestrian routes.	The participant pointed these handrails out to us, noting how they should be repaired and how she thought they should be strategically placed in more locations to serve older adults. 95:21 ¶ 65 in Walking Interview Observation Protocol_19.docx
	intersections and crosswalks	References, comments, and observations about features and design of crosswalks and intersections, including markings, signals, signal times, and curb ramps.	The intersection had a crossing signal, though from our vantage point it was a bit obscured by a telephone/power pole in front of it. I had to walk a few steps to the side to be able to see whether the "walk" or "stop" signal was on. 17:2 ¶ 36 in Walking Interview Observation Protocol_02.docx
	obstructions and hazards	References, comments, and observations about barriers, obstructions, and other tripping hazards within and near pedestrian routes. Note that code reflects non-permanent or other issues not related to sidewalk cracks (*broken sidewalks*). E.g., overgrown weeds, abandoned bikes, hanging wires, etc.	Um, for us, you know our area and it is used a lot. I see, um, what is problematic, less so now, but the scooters...people just drop them in the middle of a sidewalk. 101:4 ¶ 83 – 98 in Transcript_22.docx
	present and continuous sidewalks	Comments and observations about the general presence and continuity of sidewalks within neighborhoods.	Overall, our route consisted of continuous sidewalks which I observed to be on both sides of the street and separated from traffic by a narrow strip of grass, dirt, or landscaping, etc. 47:19 ¶ 61 in Walking Interview Observation Protocol_05.docx
	sidewalk maintenance	Comments and observations about the need for, or attention given, to repairing sidewalk cracks, heaves, etc., as well as landscape maintenance along sidewalks to clear weeds and overgrowth.	DC needs to do a better job of maintaining neighborhoods, you know, sidewalks, you know... 5:54 ¶ 371 in Transcript_01.docx
Pedestrian/bicycling network		References about the broader network of pedestrian and bicycling routes, such as the connections made available to other parts of the community.	And, well, we have this Met Branch Trail… Yeah, which is a tremendous asset for the neighborhood,

			you know, and neighborhoods all up and down it. Fort Totten. 74:19 ¶ 578 – 584 in Transcript_11.docx
Perceived safety		Comments and references made by participants about how they feel about their safety within the neighborhood and community while engaging in active transportation, including factors that contribute to either favorable or unfavorable perceptions.	
	perceptions about crime	References to perceptions and feelings about crime and the factors that contribute to them.	People. People, because there's so much crime that's going on and I think I've sort of... I guess brought this on myself being afraid to go outside because of the crime rate that's going on. 16:28 ¶ 223 – 230 in Transcript_02.docx
	perceptions about dogs	References to perceptions, feelings, and concerns about dogs and perceive threat they pose to participants.	One—one thing I can tell you, I'm afraid of dogs. I don't care how little they are, I got bit by a dog. 55:2 ¶ 156 – 157 in Transcript_06.docx
	perceptions about police presence	References about feelings of safety as a result of the presence or absence of police within community, including in relation to safety from crime and traffic enforcement.	So we need more...policeman and whatever. It would help me feel safer. 78:16 ¶ 395 – 407 in Transcript_12.docx
	perceptions about vehicle traffic	References about perceived safety from traffic while walking and biking within the neighborhood, i.e., feelings about safety as a result of drivers' behavior and/or street design	Most drivers do not stop at crossing signs at street intersections. Trying to cross the street at the crossings is dangerous. 67:10 ¶ 31 in Supplemental Email Response_08.docx
Police presence		References and observations about the actual presence of police within neighborhoods.	Along the way, I noticed a policeman on a motorcycle, paused along the side of the street. The participant seemed to know the policeman and stopped to greet him and introduced us to him. 75:11 ¶ 47 in Walking Interview Observation Protocol_11.docx
Psychological factors		Comments, observations, and other references about individual beliefs, attitudes, values, etc. in relation to decisions about active transportation behavior.	
	personal health and wellbeing	Comments and references about participants' values towards their own health and wellbeing as factors influencing active transportation behavior.	And then I just said, you know, I'd rather walk. Like I know walking is so heart healthy... 94:14 ¶ 373 in Transcript_19.docx

	skills and self-efficacy	Comments, observations, or other references to participants' abilities and confidence for walking or biking, including references about skills for fall prevention.	My exercise teacher says I shouldn't have to worry about stumbling because if you pick your feet up you don't have to worry about it. That's why he teaches us to roll, you know, well, ya'll know exercising, roll your feet. 55:39 ¶ 504 – 510 in Transcript_06.docx
Public transit		Comments, observations, and other references about the availability of, access to, and participants' experiences with public transit, including concerns and desired improvements.	
	access to transit stops and stations	References to the proximity and convenience of nearby bus stops and transit stations, as well references about ability to reach destinations through the transit network.	I definitely can walk to the metro…When I come out of my house, all I have to do is go across the street and walk a block. I'm at a bus stop. 5:57 ¶ 419 – 425 in Transcript_01.docx
	affordable transportation	References to the availability and/or need for affordable transportation options, such as discount programs and affordable alternatives to buses.	And I like the fact that I'm old enough that I have the old lady Metro card. 68:16 ¶ 341 – 365 in Transcript_08.docx
	comfortable and accessible facilities	References and observations about available or desired features of transit facilities (vehicles, stops, stations) that support comfort and accessibility	But luckily the bus has this thing that can lower, or this thing that, you know, flat thing that wheelchairs can roll on. 55:29 ¶ 636 – 645 in Transcript_06.docx
	frequency of service	References and observations about the frequency of transit service.	So it was around 12. And I had to wait more than an hour for a bus again, the same bus line. 27:4 ¶ 380 in Transcript_03.docx
Social environment		References to various aspects of the social environment, including opportunities for social connection, the presence of other people, general courtesy and respect, and discussion about the potential influence of social support for engaging in active transportation.	
	courtesy and respect within community	References related to general courtesy and respect—or lack thereof—for older adults and other people within the broader community.	Uh, I—well, it's never been stated, but crime is so prevalent. And then young people, they don't respect the elders like they used to. 91:13 ¶ 449 – 482 in Transcript_18.docx
	education and awareness	References to the role of promoting education and awareness for supporting active transportation and physical activity.	Is there anything else you think could help in that? In hotter weath—hotter weather, things that... Participant 29:38 Educating people. 81:35 ¶ 1028 – 1037 in Transcript_13.docx

	programs, events, and activities	References to social gatherings or activities, as well as references about structured programs, activities, or classes that provide opportunities for social connection.	And this right here—this right here is where the jazz thing is. Right there. And they pull chairs out there. People bring their own chairs, you know. And there often just hundreds of people sitting out there every Friday night. 55:10 ¶ 324 – 336 in Transcript_06.docx
	perceived social protection	References or comments about observable instances of other people walking or biking within the neighborhood environment. Including references about the perceptions related to seeing other people, i.e., protection or reassurance	We probably saw and passed some 8-10 other people walking along the sidewalk during our walk, mostly older individuals who the participant greeted each time, but also one father pushing a stroller. 6:20 ¶ 49 in Walking Interview Observation Protocol_01.docx
	programs and activities	References about structured programs, activities, or classes that provide opportunities for social connection.	There's also a very active garden club… It does a house tour, a house and garden tour every year, and we also have monthly meetings in people's homes to talk about different gardening themes. 98:21 ¶ 628 – 634 in Transcript_21.docx
	social support	References and perspectives about the role or benefits of having a friend/partner while engaging in active transport.	Well, I know a lot of adults older than I am, if they had a partner...to go with them. 91:12 ¶ 431 – 446 in Transcript_18.docx
Topography (hills)		References to and observations about the topography (i.e., hills and slopes) within the neighborhood, including positive, neutral, and negative perspectives on their role in activity decisions.	Actually, I like the fact that it has like a hill like this. You know, like, if you feel like challenging yourself. [laughter] 94:20 ¶ 562 in Transcript_19.docx And I usually pick level—that's why I picked this route too. 101:1 ¶ 35 – 41 in Transcript_22.docx
Traffic		References, comments, and observations about vehicle traffic, as well as factors that contribute to participants' ability to navigate traffic as a pedestrian/bicyclist.	
	crossing guards	References and observations about the presence of crossing guards to assist older adults and community members at street crossings.	Crossing guards were stationed on all sides of the intersection, helping to direct the flow of traffic and to support pedestrians crossing the street. 36:28 ¶ 53 in Walking Interview Observation Protocol_04.docx

	negligent or aggressive drivers	References and comments about drivers' behavior and negligence, especially in terms of risk to pedestrian or bicyclist safety.	Some drivers are too intent on getting to where they are going and won't stop and yield the right-of-way to pedestrians even when we have the lighted walk signs. 67:10 ¶ 31 in Supplemental Email Response_08.docx
	transportation safety measures	References, comments, and observations of street design, traffic calming, or other measures to support pedestrian/bicyclist safety within the neighborhood.	And, uh, but I know there's a lot of, um...in recent years there's been a lot of interest in traffic calming. Slowing down the speeds, a lot more speed humps going in, bump outs, bulb outs, um... 74:20 ¶ 589 – 605 in Transcript_11.docx
	vehicle traffic	Comments and observations about the presence and characteristics of vehicle traffic along pedestrian routes.	This is a busy thoroughfare. Very busy. 55:11 ¶ 317 – 318 in Transcript_06.docx
Traffic and parking regulations		References to policies and regulations that influence decisions about driving within the community.	
	driving inconveniences	Comments about general inconveniences associated with driving as a result of city regulations, traffic conditions, or other challenges.	She seemed to emphasize the challenges associated with driving and parking (fines, fees, availability of parking, not able to pre-book parking spots on phone, etc.) as major reasons for choosing to use public and active transport. 92:12 ¶ 59 in Walking Interview Observation Protocol_18.docx
	parking regulations	Comments and references specifically about parking regulations within the city, especially in relation to decisions about driving.	And then they—the parking fees! You gotta feed that meter! 91:7 ¶ 308 – 323 in Transcript_18.docx
Weather conditions		References to how weather conditions and seasons influence decisions about activity, including comments about approaches to mitigating the challenges of inclement weather.	Oh well, if it's snowing and icy, you can forget me walking around. [laughter] 5:60 ¶ 491 in Transcript_01.docx You know, if it's wet or something like that, I'm not walking in the rain...particularly. But I'll catch the bus! 35:23 ¶ 1023 – 1030 in Transcript_04.docx

Process Codes

Code	Subcode	Definition	Examples

biking with ease	N/A	Observations where participants seem to bike comfortably, confidently, and without difficulty	…but soon saw a woman riding her biking up the sidewalk towards the landing area at the top of the escalators, where there were some bike racks. 99:25 ¶ 27 in Walking Interview Observation Protocol_21.docx
discussing development effects and concerns	N/A	Observations of verbal expression about past, current, or planned development, especially while it is visibly pointed out in real time.	The participant pointed out plum trees along the sidewalk in this area, and shared concerns about the grassy area being re-developed in the future. 75:23 ¶ 43 in Walking Interview Observation Protocol_11.docx
discussing fall prevention strategies	N/A	Observations about participant remarks or demonstration of fall prevention strategies or skills they have learned and/or implemented.	Just before reaching this point, the participant had also started telling us about a training class he had participated in about preventing falls and injury. 28:17 ¶ 39 in Walking Interview Observation Protocol_03.docx
discussing neighborhood features	N/A	Verbal expressions about specific characteristics and features of the neighborhood, especially while it is visibly pointed out in real time.	The participant took care to point out several buildings and views that she thought were beautiful and I felt similarly. 47:31 ¶ 61 in Walking Interview Observation Protocol_05.docx
ducking branches and overgrowth	N/A	Observable actions to physically avoid low-hanging branches or overgrowth along pathways.	There was also an instance mid-block where some tree branches were hanging quite low over the sidewalk and the participant had to duck to avoid walking into them… 17:10 ¶ 46 in Walking Interview Observation Protocol_02.docx
engaging with community members	N/A	Observations made about how participants interact and engage with other community members.	Just passing the front of the building, there was a bus stop with a couple of older gentlemen who the participant greeted, introduced us, and playfully bantered with briefly. 95:18 ¶ 61 in Walking Interview Observation Protocol_19.docx
navigating obstructions and hazards	N/A	Observations of reactions and/or movements in response obstructions or tripping hazards along sidewalks.	In one instance, I noticed a piece of plastic trash in the middle of the sidewalk, which the participant ended up just walking on top off. 28:13 ¶ 31 in Walking Interview Observation Protocol_03.docx
navigating traffic and intersections	N/A	Observations and/or comments while participants navigated intersections and crossings.	Even at four way stops, I stop, because cars don't...you know... 81:4 ¶ 206 in Transcript_13.docx

pausing to rest	N/A	Observations of instances in which participants paused to rest during walking interviews.	The participant maintained a decent pace but paused a couple of times along the stretch back up to Fort Lincoln Street to catch her breath. 79:27 ¶ 51 in Walking Interview Observation Protocol_12.docx
picking up trash	N/A	Observations made about participants picking up trash as a demonstration of how they interact with the environment.	I noticed that she paused a few other times during the walk to pick up more pieces of trash. 82:45 ¶ 47 in Walking Interview Observation Protocol_13.docx
pointing out safety concerns	N/A	Instances where participants highlight elements of the environment that they perceive as unsafe, such as broken sidewalks or dense greenery.	When probed, she said that the dense greenery—which I expected to be a positive aspect of the environment—made her feel unsafe. 95:15 ¶ 55 in Walking Interview Observation Protocol_19.docx
reacting to dogs	N/A	Instances where participants are observed to visibly or verbally respond to dogs.	I could see her pause and assess the situation for a second, while I also paused to make sure I was ready to intervene if the dog did jump the fence and to assess an easy way around. 92:14 ¶ 37 – 39 in Walking Interview Observation Protocol_18.docx
seeking protection from weather	N/A	Observable actions and comments about seeking protection from weather, such as seeking shade from the sun, or shelter from the rain.	We crossed the street…and continued walking along a segment that had more trees and shade. 36:31 ¶ 63 in Walking Interview Observation Protocol_04.docx
tripping on sidewalk	N/A	Instances where participants are observed to trip or stumble while walking along sidewalks, streets, etc.	I did take note, however, of at least two instances where she stumbled slightly where the sidewalk seemed slightly uneven. 82:21 ¶ 67 in Walking Interview Observation Protocol_13.docx
using walls for support	N/A	Instances where participants are observed to use walls or other structures for physical support while walking.	Part of the reason I noticed the retaining walls was because the participant used his hand to lean against them, seemingly for some support while walking along. 28:16 ¶ 37 in Walking Interview Observation Protocol_03.docx
walking slowly	N/A	Observations related to slow or deliberate walking speed, which may reflect comfort or ability to safety navigate the neighborhood environment.	As we walked, I noticed that the participant was slow on his feet and took short, shuffling steps. 28:14 ¶ 33 in Walking Interview Observation Protocol_03.docx

walking with ease	N/A	Observations where participants seem to walk comfortably, confidently, and without difficulty.	I started slow, so as to follow the participant's pace, and I was somewhat surprised at the quick pace that the participant took right off the bat. 6:5 ¶ 33 in Walking Interview Observation Protocol_01.docx