

***“Just Ask Us”*: Perceptions of Sedentary Behavior and Healthy Aging  
Among Community-Dwelling Older Adults**

by

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Functional ability and continued engagement in life activities are essential to healthy aging. Targeting reductions in sedentary behavior may be a viable pathway to promoting healthy aging during late adulthood. To develop the senior center programs offered by occupational therapy fieldwork students, the present mixed-methods needs assessment explored the perceptions community-dwelling older adults have regarding sedentary behavior and its influence on healthy aging. Older adult participants (n = 46) at two senior centers in New York City took part in 6 focus group discussions and completed surveys about their overall health and daily activity patterns. Focus groups were audio-recorded and transcribed verbatim. Thematic analysis of focus group transcripts used inductive and deductive approaches. Four main themes emerged: (1) *“But, you do need to sit once in a while”*: what older adults really think about sedentary behavior; (2) *Barriers and facilitators to less sitting: an ecological view*; (3) *Social determinants of health in aging populations*; and (4) *“Just ask us”*: senior center program recommendations for healthy aging. Findings revealed participants were aware of the physical costs of engaging in prolonged sedentary behavior. However, they also reported these sedentary activities offered many psychological, cognitive, and social benefits that supported their health and wellbeing. The factors that influenced their engagement in sedentary behavior are multidimensional and can be mapped across socioecological domains. Insights provided by these older adults will inform the development of

health promotion messaging strategies and senior center programs aimed to reduce older adult sedentary behavior. Additionally, findings from this inquiry will aid the development of a fieldwork orientation manual that can be used to guide the fieldwork experience of future occupational therapy students assigned to these senior centers.

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## Preface

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## **1.0 Chapter One: Introduction**

### **1.1 Problem Area**

Occupational therapy has previously demonstrated the ability to improve the health of community-dwelling older adults living with chronic conditions through the use of self-management programs that foster engagement in meaningful activities (Berger et al., 2018; Stav et al., 2012, Liu et al., 2018). Most notably, the *Well Elderly* studies (Clark, Azen, Zemke et al., 1997; Clark, Jackson, Carlson et al., 2012) have had a significant impact in delineating a role for occupational therapy in community-based health promotion among older adults. With increasing opportunities for occupational therapy to promote older adult health in community settings, occupational therapy graduates need to be equipped with the necessary knowledge and skills to meet the demand. New graduates must be able to facilitate health behavior change, demonstrate the ability to help set individualized goals, teach effective coping strategies, and foster goal attainment (Morris & Jenkins, 2018; Berger et al., 2018). These skills, in particular, are critical for the promotion of health among older adults living self-sufficiently in the community.

Occupational therapy is known for helping older adults maintain independence in ADLs (activities of daily living) and IADLs (instrumental activities of daily living). Daily physical activity plays a significant role in the prevention of ADL disability (Tak et al., 2013) and preservation of the physical health needed to age successfully (Baker et al., 2009; Liffiton et al., 2012; Anton et al., 2015). However, approximately 1 in 4 U.S. older adults between 65 – 74 years of age, and about 1 in 3 older adults aged 75 and older are physically inactive. Of note, a higher prevalence is observed among women, African-Americans, and Hispanic populations (Watson et

al., 2016; Keadle et al., 2016). Additionally, adults over the age of 60 spend between 7.7 – 11 hours of their waking day engaged in sedentary behaviors (Diaz et al., 2016; Harvey et al., 2013; Matthews et al., 2008). Almost half of this sedentary time is accumulated in prolonged, uninterrupted bouts of 30 minutes or more (Diaz et al., 2016). Indeed, older adults are the least physically active and most sedentary age group in the United States, which places these older adults at higher risk for ADL disability.

Sedentary behavior is defined as any waking activity performed in a sitting, reclining, or lying posture that is characterized by an energy expenditure of  $\leq 1.5$  metabolic equivalents (METs) (Tremblay et al., 2017). Sedentary behavior is increasingly recognized as an independent risk factor for healthy aging (Dogra & Stathokostas, 2012). Personal and environmental barriers (Bethancourt et al., 2014; Brawley et al., 2003; Gothe & Kendall, 2016; Miller & Brown, 2017) hinder many older adults from achieving the recommended levels of physical activity (Physical Activity Guidelines Advisory Committee, 2018). Occupational therapy can facilitate increased engagement in higher-intensity daily activities in community settings through lifestyle interventions (Levasseur et al., 2019) and chronic disease self-management programs (Hunter & Kearney, 2018).

However, few providers offer occupational therapy services for health promotion and prevention within the community because of: 1) limited (or no) reimbursement (Hildenbrand & Lamb, 2013) and 2) limited evidence supporting occupational therapy health promotion programs (Stav et al., 2012). Consequently, less than 0.5% of licensed practitioners work in health and wellness and community practice settings (National Board Certification of Occupational Therapy, 2017). In turn, few fieldwork opportunities exist with community partners for occupational therapy students to apply knowledge of health promotion and population health during fieldwork

experiences. Community partnerships are essential to the growth of occupational therapy scholarship and practice in community settings (Suarez-Balcazar et al., 2005). These university-community affiliations could offer a mutually beneficial relationship through resource sharing as a way to build upon existing programs that target greater health within the community.

## **1.2 Problem of Practice**

Long Island University Department of Occupational Therapy (LIU OT) maintains an ongoing academic affiliation with two senior centers for fieldwork education of occupational therapy students. Occupational therapy programs in these two senior centers are run by occupational therapy students who are supervised by on-site personnel and an off-site occupational therapist. Academic programs utilize this arrangement for fieldwork education, in part, due to the belief this type of experience will provide students opportunities to develop essential practice skills such as resourcefulness, creativity, cultural humility, and greater problem solving and organizational skills (Dancza, 2013; Hunter & Volkert, 2016; Mattila, 2017). However, with the lack of a well-developed occupational therapy program and limited on-site supervision from an occupational therapist, fieldwork students in community settings have reported feeling isolated and overwhelmed, confused about their role, expressed difficulty adapting to a slower pace, and questioned the relevance of the experience to the overarching tenets of occupational therapy (Dancza et al., 2013; Hunter & Volkert, 2016).

A cohort of LIU OT fieldwork students shared similar sentiments in their fieldwork evaluation forms regarding their community-based fieldwork rotation at a senior center. These students appreciated the experience but often felt underutilized and ineffective because of the lack

of engagement in their group interventions by the senior center members. Without an established occupational therapy program to offer services throughout the year and an on-site occupational therapy practitioner to generate a demand for services, the task for fieldwork students to develop healthy aging programs in a community setting will continue to feel disjointed and lacking. Consequently, student learning needs may potentially go unmet.

For this collaboration with the senior center to be useful and beneficial to all stakeholders, the approach needs to be re-evaluated. Before the implementation of any healthy aging programs, the needs of older adults should be carefully explored and incorporated to maximize the acceptability of the programs. In the context of older adult daily physical activity patterns and health, a needs assessment should be conducted to explore the particular views older adults have on sedentary behavior and its relationship to healthy aging. These older adults can provide useful insight into factors that influence engagement in daily occupations and sedentary activities.

A more coordinated and client-centered approach is needed between LIU OT and community-based sites to better support health in the older adult population. This problem of practice will explore the health and activity needs of older adults living with chronic conditions in the community. Insights provided by these older adults can contribute to an improved fieldwork partnership and the development of tailored health promotion programs at senior centers.

## **2.0 Chapter Two: Review of Supporting Scholarship and Professional Knowledge**

### **2.1 Theoretical Framework**

Sedentary behavior – defined as any waking activity performed in a sitting, reclining, or lying posture characterized by an energy expenditure of  $\leq 1.5$  metabolic equivalents (METS) (Tremblay et al., 2017) – negatively affects the physical, psychological, and social determinants that foster optimal health among aging populations, independent of physical activity (Dogra & Stathokostas, 2012). Theories of ecological systems (Bronfenbrenner, 1979; 2004; Sallis, Owen, & Fisher, 2008; Owen et al., 2011; Law et al., 1996) and a framework for healthy aging (Hansen-Kyle, 2005; Friedman et al., 2019; World Health Organization, 2015) provide the conceptual background to understand the perceived relationship older adults hold regarding sedentary behavior and healthy aging.

#### **2.1.1 Ecological Systems**

According to Bronfenbrenner (1979; 2004), human behavior is a function of a complex interaction between person and environment. Bronfenbrenner draws attention to the proximal (micro-) and distal (macro-) subsystems that influence human development. In developing healthy aging programs, ecological models can help understand the personal and environmental determinants of sedentary behavior.

Sallis, Owen, and Fisher (2008) assert that four core principles comprise any effective health interventions. That is: 1) health is influenced by multiple levels; 2) influences interact across

levels; 3) multi-level interventions should be most effective in changing behavior; 4) interventions are most potent when they address specific health behaviors. As such, when the individual is placed within an ecosystem that depicts the interaction between proximal intrapersonal factors (e.g., bio-psycho-social) and more distal interpersonal (e.g., social, cultural), community, environmental (e.g., physical, built environment), and public policy-level determinants, health interventions can be contextualized in a manner that guides a multi-layered approach to catalyze change (Sallis, Owen, & Fisher, 2008). In other words, individuals are more likely to make healthful choices when the setting supports that behavior.

Specific to adult sedentary behavior, Owen et al. (2011) present an ecological model of sedentary behavior that outlines the personal, social, and environmental determinants of older adult sedentary behavior. The *behavior setting* is a critical construct in this model, bringing attention to the context in which sedentary behavior occurs. Adult sedentary time is grouped into four *behavior settings*, or domains: occupation, household, leisure, and transportation. Each domain has multiple levels of influence, including: intrapersonal, perceived environment (e.g., interpersonal, social norms); neighborhood and physical environment; and policy-level factors. Sedentary behavior is shaped by the attributes of each domain and level. For example, an office worker is more likely to sit for extended periods when their workstation consists of a standard desk, chair, and computer. Similarly, a college student may follow the normative behavior of sitting for the duration of a lecture because of social expectations. Understanding these patterns of behavior is essential to the development of policy interventions, public health strategies, healthy aging programs, and recommended actions for individuals to reduce time spent in sedentary activities.

Within occupational therapy, the relationship between the individual and their environment is also recognized in the Person-Environment-Occupation (PEO) Model of Occupational

Performance (Law et al., 1996). PEO offers a useful ecological framework for the promotion of health and participation among groups, populations, and communities. The PEO model has been used in occupational therapy to explain how occupational performance is influenced by the dynamic transaction between an individual, their occupations and roles, and the environment in which they live, work, and play (Law et al., 1996). The term *occupation* refers to the day-to-day activities in which people engage (American Occupational Therapy Association, 2014) and occupy their time. Occupations are considered meaningful and provide purpose and role fulfillment to an individual. It is not uncommon for occupational therapy practitioners to use the terms *occupation* and *activity* interchangeably; however, occupations are conceptually thought of as sets of activities that are completed during daily life pursuits (American Occupational Therapy Association, 2014). Occupational therapy practitioners incorporate the therapeutic use and health-enhancing effects of occupations to promote health and community participation. According to the PEO model, targeting the individual, the environment, or the occupation can facilitate behavior change, enhancing health, occupational performance, and participation in life activities. Like other ecological health models, programs that take a multi-factorial approach to find an optimal match between a person's initiative and a supportive environment are more likely to be successful and sustainable (Scaffa et al., 2010).

### **2.1.2 Healthy Aging Framework**

The term *healthy aging* represents a paradigm shift away from conventional expectations of late adulthood where pathology, disability, and disengagement was thought of as products of normal aging. While there is no group consensus surrounding a definition or how to measure *healthy aging*, various descriptions have been used to capture this positive view of aging that

emphasizes resilience, autonomy, physical and mental ability, and continued social engagement (Hansen-Kyle, 2005). Synonymous terms include *successful aging*, *productive aging*, *active aging*, *effective aging*, and *optimal aging* (Katz & Calasanti, 2015; Lowry, Vallejo, & Studenski, 2012; Strawbridge, Wallhagen, & Cohen, 2002), with each offering its own nuanced definition.

The World Health Organization (WHO) endorses a lifespan approach to *healthy aging* when conceptualizing the dynamics of health in late adulthood. WHO attempts to define *healthy aging* by succinctly stating it is a “process of developing and maintaining the functional ability that enables wellbeing in older age” (World Health Organization, 2015, p. 28). Here, functional ability includes the health-related characteristics that enable individuals to fulfill life roles and engage in meaningful activities. In line with ecological models previously discussed, functional ability is understood as the interaction of an individual’s intrinsic capacity and relevant environmental determinants. WHO (2015) identified six domains of functional ability that is key to autonomy, role identity, and satisfaction in older age. These include (1) ability to be mobile; (2) ability to build and maintain relationships; (3) ability to meet basic needs; (4) ability to continue to learn, grow, and make decisions; and (5) ability to contribute.

Similarly, the American Geriatrics Society (AGS) (2019) also endorses *healthy aging* over other terms for its utility in describing a multidimensional (i.e., physical, functional, social, and psychological) and lifespan approach to aging (Friedman et al., 2019). However, there are differences in how the term is operationalized in comparison to WHO. AGS does not define *healthy aging* outright, but instead presents five domains of health are considered to support healthy aging, namely: (1) health promotion, chronic disease management, and injury prevention; (2) cognitive health; (3) physical health; (4) mental health; and (5) social engagement (Friedman

et al., 2019). Additionally, AGS takes on a more medical and gerontologic orientation, whereas WHO builds a comparatively, more expansive construct that attends to global and societal forces.

In addition to researchers' definitions, it is crucial to understand the beliefs older adults have about the attributes of *healthy aging*. A cross-sectional study by Phelan and colleagues (2004) surveyed older adults about the determinants that support aging (designated as *successful aging* in this study) and found slight differences in perceptions from what was published. Similar to the theories posited in the literature, participants emphasized physical health, independent functioning, and active engagement with life as essential attributes to successful aging (Phalen et al., 2004). However, these older adults also stressed psychological health, where resiliency, an optimistic outlook on aging, and spiritual wellbeing are a part of successful aging as well. Likewise, a recent qualitative study by Tkatch et al. (2017) also revealed that older adults view aging more holistically than the predominant successful aging theories. Perceived health status (regardless of the presence of disease), psychosocial wellbeing and robust coping mechanisms, and the ability to meet the demands of day-to-day living were identified by participants as essential determinants for aging successfully. Therefore, programs that incorporate older adults' views of healthy aging, integrating psychological and social components, could be successful.

## **2.2 Physical Activity as a Determinant of Healthy Aging**

Regular physical activity plays a crucial role in healthy aging. A 2018 systematic review and meta-analysis by Daskalopoulou and colleagues (2018) of 174,114 participants in 23 peer-reviewed longitudinal studies found that physical activity was positively associated with *healthy aging*. Health status measured by healthy aging (or synonymous term) was the primary outcome

of this study. While a causal relationship could not be concluded, more physically active older adults seemed to have better odds of maintaining functional ability later life than those who were less physically active or inactive (Daskalopoulou et al., 2018).

In Baker et al. (2009) and Meisner et al. (2010), data was analyzed from the Canadian Community Health Survey (CCHS) revealed active and moderately active older adults were 1.5 – 2 times more likely to age successfully than survey respondents who were not physically active, even when controlling for demographic variables. These studies showed that physical activity is positively correlated with *overall* successful aging (as defined by meeting all three components of Rowe and Kahn’s model (Rowe & Kahn, 1997; 1998)) (Baker et al., 2009), and *each component* of the successful aging model (Meisner et al., 2010). Other studies have also found greater engagement in physical activity positively influences successful aging (Choi et al., 2017; McPhee et al., 2016).

Menec (2003) examined the relationship between everyday activities (e.g., reading, handiwork, volunteering, social engagement) and successful aging (used here as an all-encompassing label that includes other definitions of the positive aging process used in the literature). Findings show more engagement in everyday activities was related to greater wellbeing, reduced functional decline, and reduced mortality over a 6-year time span (Menec, 2003). While the literature has shown that being physically active in late adulthood increases the odds of healthy aging, the independent relationship sedentary behavior has with *healthy aging* is less known. More information is needed to better understand the complexities of sedentary behavior and its associations with *healthy aging*.

### 2.3 Negative Health Consequences of Sedentary Behavior

Owen and colleagues (2010a; 2010b) hypothesized long-term health consequences of excessive sitting are distinct from those associated with too little exercise. Prolonged sedentary behavior ( $\geq 10$  hours/day) has been associated with increased risk of all-cause mortality (Schmid et al., 2015; Rezende et al., 2014; Rillamas-Sun et al., 2018) and cardiovascular disease, cancer, and type 2 diabetes, independent of physical activity (Biswas et al., 2015). Additionally, disability in activities of daily living (ADL) (Dunlop et al., 2015), declines in physical function (Gennuso et al., 2016; Santos et al., 2012), and subjective reports of poorer health (Russell & Chase, 2019) among older adults were also found to have deleterious health effects independent of time accumulated in moderate-to-vigorous physical activity (MVPA). Although a recent review of the literature by Stamatakis (2019) highlighted methodological limitations in existing studies make it difficult to isolate the independent effect of prolonged sitting from overall physical inactivity, this body of research raises the prospects of health promotion messaging targeting a reduction of sedentary behavior as a way to manage risk factors for chronic disease and disability in older age.

The relationship between sedentary behavior and cognitive function is less clear. In an analysis of national longitudinal survey data of Medicare beneficiaries, Russell and Chase (2019) observed that more time spent in passive, sedentary activities was associated with poorer cognitive performance, as measured by a 10-item delayed word recall. However, the analysis also revealed that survey respondents who spent more time using a computer or tablet or in social activities was associated with better word recall (Russell & Chase, 2019). These findings suggest that sedentary activities that are mentally or socially engaging may be more beneficial to cognitive than passive, sedentary activities. Therefore, it is important to consider types of sedentary activities separately and evaluate their distinct effect across physical, cognitive, and psychosocial domains.

With regards to the link between sedentary behavior and healthy aging, Dogra and Stathokostas (2012) found older adults who were less sedentary were more likely to report they were aging successfully in physical, psychological, and social domains independent of physical activity levels. While more research is needed to confirm these findings, the results suggest that limiting prolonged sedentary time may promote healthy aging. Considering that time spent in sedentary activities tends to displace time that could potentially be spent in light-intensity physical activities or higher (Owen et al., 2010a), efforts to promote healthy aging through a reduction in sedentary behavior may contribute to an increase in overall physical activity engagement. Sedentary and inactive older adults facing barriers to physical activity engagement may find programs that target sedentary behavior less strenuous and more acceptable than programs aimed at increasing MVPA.

## **2.4 Older Adult Perception of Sedentary Behavior**

### **2.4.1 Knowledge of Health Effects and Terminology**

The full scope of the detrimental health effects sedentary behavior has on health may not be as widely known among the older adult population. Interviews with a sample of recently retired Belgian older adults reveal limited awareness about the negative health consequences of prolonged sitting or the importance of breaking up sedentary time (Van Dyck et al., 2017). Similarly, Shuval et al. (2013) found that participants were unaware of the negative relationship sedentary behavior has with health outcomes. Likewise, other researchers have found considerable variability in how the term *sedentary behavior* is perceived, leaving it prone to misinterpretations (McEwan et al.,

2017; Stamatakis, 2019) or a source of adverse feelings (McEwan et al., 2017) as older adults may not perceive themselves with being sedentary. In these instances, sedentary behavior and the activities that encompass it has been defined for older adults or described simply as prolonged or excessive sitting.

#### **2.4.2 Perceived Benefits and Detriments of Sedentary Behavior**

Community-dwelling older adults seem to acknowledge both the costs and benefits to the sedentary activities in which they engage. These views can be categorized into physical, psychosocial, and cognitive domains.

*Perceptions of Physical Health.* Older adults report prolonged engagement in sedentary activities contributed to their experience of short-term consequences such as pain, joint stiffness, and difficulty rising from a seated position (Mcewan et al., 2017, Lesak et al., 2016; Chastin et al., 2014). Other older adults have reported awareness of the potential long-term health effects of excessive sitting, such as the increased risk of developing cardiovascular disease and diabetes, depression, as well as poorer mental health and cognition because of prolonged sedentary time (Alley et al., 2018).

Alternatively, older adults have discussed how engagement in sedentary activities has had a positive effect on their health. Extended periods of sitting were viewed as an adaptive behavior that conserved energy or managed pain in the presence of chronic health conditions (Tam-Seto et al., 2016). Based on semi-structured interviews of 11 community-dwelling older women residing in the United Kingdom, sedentary behavior may be perceived not as unhealthy behavior but as a positive coping strategy that enabled the participants to continue functioning and remain independent (Chastin et al., 2014). Participants from this study pushed back on the idea that

sedentary time is detrimental, stating these activities were an instrumental part of their daily routine.

*Perceptions of Psychosocial Health.* Older adults have observed a bi-directional relationship between mood and excessive sitting in qualitative investigations of sedentary behavior. Lack of motivation to be upright and active caused by depressive states or low self-efficacy has been reported to lead to excessive sitting (Chastin et al., 2014). Conversely, prolonged periods of sitting and disengagement was identified as a contributor to depressed mood (Alley et al., 2018; Greenwood-Hickman et al., 2016; Palmer et al., 2018). In a sample of Australian older adults, over half (57%) of those surveyed agreed that breaking up sedentary time reduces the risk of depression and overall poor mental health (Alley et al., 2018). An analysis of exit interviews of overweight and obese sedentary older adults enrolled in a pilot sedentary behavior intervention (Take Active Breaks from Sitting [TABS]) revealed an increase in reported health benefits from less sitting (Greenwood-Hickman et al., 2016). These participants reported improved energy, alertness, and mood that may have contributed to increased engagement in household activities and an increase in participation in lifestyle activities (Greenwood-Hickman et al., 2016).

Older adult views on how sedentary behavior influences health is more nuanced than the ‘good’ or ‘bad’ binary. In a qualitative study of a socioeconomically diverse sample of older adults, participants with varying levels of sedentary time discussed the importance of value with regards to different sedentary activities. Activities that were viewed as inherently meaningful or a part of their daily routine were considered high-value (Palmer et al., 2018). These activities were viewed as purposeful and associated with social, cognitive, and restorative benefits (Palmer et al., 2018). Sedentary activities such as card games, crossword puzzles, arts and crafts, computer use, and talking with friends and family offered positive social benefits (McEwan et al., 2017; Palmer et

al., 2018). These types of sedentary activities are viewed in contrast to more passive, low-value endeavors such as TV channel surfing or browsing the internet without a specific purpose (Palmer et al., 2018).

***Perceptions of Cognitive Health.*** Older adults also perceived a cognitive benefit to their sedentary activities. For example, activities such as knitting, sewing, and various puzzles and games are viewed as mentally stimulating activities that require continued use of cognitive functions (McEwan et al., 2017). Twenty-six community-dwelling older adults interviewed by McEwan and colleagues (2017) felt many social and cognitive benefits could be derived from the sedentary activities they engage in, and that it provided meaning in their lives. Furthermore, the participants felt that any reduction in engaging in these activities would negatively impact their perceived health and quality of life.

One study reported that older adults also perceived that prolonged sedentary behavior negatively impacted cognitive function. In focus groups with senior center members, participants reported the need for continued mental stimulation limited their engagement in excessive sitting (Tam-Seto et al., 2016). Instead, these older adults engaged in leisurely pursuits and physical activity to maintain cognitive function.

## **2.5 Determinants of Sedentary Behavior**

Chastin and colleagues (2015) conducted a systematic review of 22 studies (19 cross-sectional, two longitudinal, one qualitative) that analyzed objectively recorded (i.e., accelerometers) and self-reported sedentary behavior data. The authors found the available global literature on determinants that influence sedentary time in older adults was limited, skewed

towards high-income countries (half were European), focused on individual-level determinants over more environmental influences, and offered little contextual information that influences sedentary behavior. Consequently, possible interventions to reduce older adult sedentary behavior in different behavior settings are challenging to ground in the evidence. Causal factors have not been elucidated. Furthermore, existing studies overwhelmingly focus on age, education, income, and other determinants of sedentary behavior that are not modifiable.

A more recent systematic review by Compernelle et al. (2019) provides in-depth contextual information about older adult perceptions of sedentary behavior. Here, the authors thematically synthesized 15 qualitative studies that explored older adult perceptions of sedentary behavior, barriers and facilitators of sedentary behavior, and possible sedentary behavior reduction strategies. Older adult capability with regards to their health and physical functioning was found to be a determinant for sedentary behavior (Compernelle et al., 2019), which is important considering older adults often experience declines in physical health. Additionally, enjoyment and convenience were found to be important reinforcers of sedentary behavior within the social and physical context (Compernelle et al., 2019). Lastly, habits and routines were perceived by older adults to be a significant contributor to sedentary behavior (Compernelle et al., 2019), underscoring how many older adults engaged in sedentary activities without being fully aware of it.

### **2.5.1 Determinants that Encourage and Discourage Sedentary Behavior**

*Personal Determinants.* Personal determinants associated with increased sedentary behavior include perceived physical limitations, personal beliefs on aging, and perceived lack of control over the effects of aging (McGowan et al., 2019; Tam-Seto et al., 2016; Van Dyck et al.,

2017). Other studies have reported fatigue, mobility limitations, arthritis-related pain, and joint stiffness as well as the loss of agility, and a history of falls and hospitalizations as determinants that contribute to increased sedentary time (Chastin et al., 2014; McGowan et al., 2019; McEwan et al., 2017; Palmer et al., 2018; Greenwood-Hickman et al., 2016). Fear of falling and a lack of confidence in functional ability can significantly increase the risk of mobility disability (Auais et al., 2016) and sedentary behavior in a manner that is quite insidious as older adults may avoid activity in order to prevent falls (Stubbs et al., 2014).

Financial costs of physical activity programs, lack of motivation to be active, perceived time constraints for physical activity, limited social networks, lack of awareness of community programs, personal enjoyment of sedentary behaviors have also been identified as personal determinants that contribute to increased sedentary behavior (Tam-Seto et al., 2016; Van Dyck et al., 2017). Enjoyment of sedentary activities presents a significant challenge to decreasing sedentary time, particularly if the activity is embedded within an individual's daily routine or contributes to their self-identity. For example, Greenwood-Hickman and colleagues (2016) found that participants felt chosen sedentary activities inherently meaningful and were resistant to changing these habits. Similarly, McGowan et al., (2019) found their sample of older adults, perhaps due to their perceived mortality, were less motivated by the prospect of future health benefits in comparison to more short-term benefits, such as enjoyment or pain avoidance.

Interestingly, other older adults in the study by McGowan et al. (2019) discussed how pain and stiffness seem to act as a motivating factor to limit sedentary time. These older adults sought to relieve the discomfort by breaking up prolonged sitting bouts. Similar strategies have been discussed in the literature by older adults as a way to remain active despite functional limitations. Older adults have used pacing, energy conservation, and enjoyment of non-sedentary activities as

coping strategies in light of physical limitations and reduced confidence (McGowan et al., 2019). These modifications may be a useful adaptation to overcome personal barriers in reducing sedentary behavior.

In a focus group conducted by Leask and colleagues (2016), a strengths-based approach was taken to identify personal assets that can be used to discourage routine sedentary behavior. Older adult participants identified psychosocial determinants such as family support, feelings of guilt from engaging in low-value sedentary activities, and household chores and responsibilities as determinants that can be leveraged to limit prolonged sitting (Leask et al., 2016) and decrease overall sedentary behavior.

Lastly, it seems increased consciousness of time accumulated in sedentary activities and reflecting on knowledge of the negative health consequences also may discourage sedentary behavior among older adults. Greenwood-Hickman and colleagues (2016) found that participants were previously unaware of how much sitting they accumulated in a day. These participants found an increased awareness of their sedentary habits motivated them to limit their sedentary time. A range of personal determinants of older adult sedentary behavior has been reported by the qualitative studies mentioned. Owen et al. (2010) contributes to this research by stating that these determinants are shaped by the distinct attributes of the context and behavior setting. Personal determinants of an older adult sedentary time accumulated in the leisure or household domain may present differently in the occupation domain, given the increase in leisure time after retirement.

***Social Determinants.*** The social context has also been explored to better understand how older adults perceive the influence of interpersonal relationships and social norms on sedentary behavior. Personal accounts reported in various qualitative studies have advanced the idea of familial support, social interactions, and companionship as a way to decrease sedentary time

(Leask et al., 2016, McGowan et al., 2019; Chastin et al., 2014; McEwan et al., 2017). However, in an analysis of interviews and objective sedentary behavior data from three cohorts of older adults in the United Kingdom, the social environment was not found to be directly associated with sedentary behavior (Shaw et al., 2017). The authors of this study suggested that interventions targeting enhanced opportunities for informal interpersonal interactions *only* might not be sufficient. It may be, in fact, the combination of social interaction *and* residing in a walkable neighborhood, where it is conducive to more leisurely walking and incidental social contact, which is more likely associated with less sedentary behavior (Shaw et al., 2017).

Shaw and colleagues (2017) also observed that continued social engagement and group membership in places of worship, fitness centers, or other community centers seemed to be related to older adults spending less time in sedentary behaviors. Assuming a purposeful role within the community in activities such as caregiving (Shaw et al., 2017), volunteering (Tam-Seto et al., 2016), or intergenerational exchanges (McGowan et al., 2019) were reported as determinants that encouraged older adults to be less sedentary. A sense of belonging and feelings of value may be particularly important when older adults find themselves with increased time following retirement or when they no longer have caregiving obligations. Without the responsibilities of work or family, life transitions present both challenges and opportunities in managing the newfound time.

Equally, older adults have reported the lack of social support and grief from loss and bereavement contributes to disengagement from previous activities, and more time spent indoors being sedentary (McGowan et al., 2019). The lack of close connections, limited social networks, and a weak sense of community belonging encouraged more sedentary behaviors – which was found to be more prevalent in communities of higher social and economic disinvestment (McGowan et al., 2019; Shaw et al., 2017). Older adults living in disinvested areas reported having

comparatively less social capital and less access to local community activities and subsidized senior programming (McGowan et al., 2019). Additionally, concerns about neighborhood safety and perceived crime have been reported by older adults as reasons to remain indoors and lead a more socially-isolated and sedentary lifestyle (McGowan et al., 2019; Shaw et al., 2017). These environmental determinants limited engagement in leisurely and recreational activities, which, in turn, may have contributed to increased sedentary time.

Social norms regarding age-appropriate activities have also been reported to influence the extent older adults engage in indoor sedentary activities. A social climate that encourages sitting in many office, home, and community settings or a social network that is less supportive of discouraging prolonged sitting presents barriers that may ultimately contribute to increased sedentary behavior (Greenwood-Hickman et al., 2016). Some individuals have felt compelled to sit – or disengage – in certain situations as a result of social pressure from family, friends, and society. Others have reported feeling infantilized by friends and family who performed household responsibilities and incidental daily activities for participants to ease the burden (Chastin et al., 2014). Similarly, institutional staff may unintentionally encourage more sedentary behavior because of heightened concern over older adults falling. Despite the best intentions, an individual's social network can promote engagement in less healthy behaviors by providing more assistance with everyday tasks than what was needed.

In public settings, participants reported feeling constrained by social norms and ageist expectations to sit down and do less (Greenwood-Hickman et al., 2016; Palmer et al., 2018; Chastin et al., 2014). They perceived a societal expectation to sit all day. Participants viewed the negative stereotype of older adults being dependent, lazy, or not useful as an affront to their sense

of purpose (Chastin et al., 2014; McEwan et al., 2017). They expressed a strong desire to challenge this stigma towards aging.

Gender norms and expectations have also been reported as an influence on the type and amount of sedentary behavior older adults engaged in. Some participants discussed a perceived gender difference with how older adults managed the increase in leisure time after retiring. With women traditionally being responsible for domestic duties (sometimes in addition to working outside the home) and men typically leaving home for work, men found transitioning to retirement challenging. They were more likely than women to increase sedentary time (McGowan et al., 2019). Women, traditionally with more domestic experience, seemed to have developed a less sedentary and more social lifestyle than men. At the same time, a different sample of older adults found gender differences in the type of sedentary activities engaged in where women often talked about knitting, sewing, playing bingo, chatting with friends, and other sitting social activities (e.g., theatre, café) outside the home. Whereas, men reported more non-sitting social activities outside the home (e.g., golf, recreation) (Palmer et al., 2018).

***Environmental Determinants.*** The built environment influences the occupations in which people engage, and therefore, can promote mental and physical wellbeing (Thompson & Kent, 2014). The effect of neighborhood-level determinants and features of the built environment (e.g., walkability, physical infrastructure, perceived crime/safety, attractive scenery, resting places, transportation, presence of amenities, mixed land-use) on physical activity levels and older adult mobility has been investigated considerably (Rosso et al., 2011; Haselwandter et al., 2014; Chaudhury et al., 2016; Kärmeniemi et al., 2018; Smith et al. 2017). However, the influence of the physical environment and neighborhood characteristics, as a phenomenon distinct from physical activity, has been studied less. Only a small number of studies have investigated the associations

between the built environment and sedentary behavior (Owen et al., 2014). Of those, TV viewing (a common proxy used to estimate sedentary time accumulated in leisure domain) (Hsueh et al., 2016) and transport-related sedentary time (i.e., driving in a car) (Van Dyck et al., 2012) have been primarily examined. However, these studies do not capture other behavior settings in which sedentary activities occur.

Older adults have reported weather, accessibility, and affordability of transportation, and proximity of community programs as determinants that influence their sedentary behavior patterns (Palmer et al., 2018; McEwan et al., 2017; Tam-Seto et al., 2016; McGowan et al., 2019; Greenwood-Hickman et al., 2016). Physical features of the neighborhood such as the lack of benches and other resting places (Chastin et al., 2014) and uneven terrain (McGowan et al., 2019) have also presented barriers to engagement in outdoor activities, thus contributing to more sedentary time indoors. Walkable neighborhoods that emphasize pedestrian safety with the inclusion of supportive pedestrian infrastructure (i.e., traffic calming measures, nearby amenities, public transit) encourages increased mobility and physical activity for all adults, including older adults with mobility limitations (Chaudhury et al., 2016; Chippendale & Boltz, 2015). Neighborhood walkability has been associated with more physical activity in older adults in the transportation domain, less television watching, and less overall sedentary time (Shaw et al., 2017; Van Holle et al., 2016). With fewer amenities within walking distance, however, neighborhoods with low walkability may contribute to older adults remaining sedentary indoors.

In addition to the outdoor physical environment, the qualitative studies reviewed have also reported on features of the indoor physical environment such as smaller living quarters (McGowan et al., 2019) and the number of televisions in the home (Hsueh et al., 2016) that have to be described by older adults as contributors to more sedentary time. Here, the lack of physical space at home to

move around naturally (e.g., navigating steps) presented barriers to incorporating more movement into their daily routines in their own homes (McGowan et al., 2019). As an alternative to moving around inside or outdoors, older adults may turn to TV watching as a leisure activity because of the desire for relaxation, enjoyment, and also because of the perceived threats from within the outside environment such as excessive traffic, noise and perceived crime (Hsueh et al., 2016). These findings highlight the important consideration within home and neighborhood settings to account for when developing sedentary behavior reduction strategies for the older adult population.

## **2.6 Summary**

This literature review outlined important theoretical concepts and findings from the qualitative studies previously conducted on older adult sedentary behavior. This information contributes to a greater understanding of the perceptions and determinants that influence engagement in sedentary activities and its influence on healthy aging. While messaging on sedentary behavior terminology and its adverse health effects continues to be refined, when outlined with concrete examples, older adults have reported a range of intrinsic and extrinsic determinants that encourage and discourage their sedentary behavior. Sedentary activities that are embedded within daily routines, perceived of high value, or offer social, cognitive and restorative benefits were viewed as being supportive of health and wellbeing. Features within the social and physical environment also have been reported to be important determinants.

### **3.0 Chapter Three: Methods**

Inquiry questions of this study emanated from theories of ecological systems (Bronfenbrenner, 1979; Sallis, Owen, & Fisher, 2008; Owen et al., 2011; Law et al., 1996) and a framework for healthy aging (Hansen-Kyle, 2005; Friedman et al., 2019; World Health Organization, 2015). The three primary inquiry questions included:

#### **3.1 Inquiry Questions**

- IQ1 – What perceptions do community-dwelling older adults residing in an urban, socioeconomically, ethnically, and racially diverse setting have regarding sedentary behavior and its association with successful aging?
- IQ2 – What are the factors that encourage and discourage sedentary behavior among these older adults?
- IQ3 – What recommendations do these older adults have regarding programs to reduce sedentary behavior at the senior center?

### **3.2 Inquiry Design**

The inquiry design of the present study is a mixed-method needs assessment that aimed to explore the perceptions community-dwelling older adults maintain about sedentary behavior and its influence on healthy aging.

### **3.3 Setting**

The inquiry setting included two senior centers located in New York City. LIU OT maintains an ongoing academic affiliation with each center for the fieldwork education of occupational therapy students. Both centers are located in mixed residential and commercial areas that are rich with neighborhood amenities (e.g., parks, shopping, public transportation) within walking distance. Center A is centrally located within a large low-income public housing development in Queens, NY. Center B is located on a commercial strip in a middle and upper-class Brooklyn neighborhood. Each center is funded primarily by government grants as well as private and corporate donations. Both sites offer similar programs and activities such as low-cost meals, structured physical activity programs, health screenings, wellness education, social interaction, and volunteer opportunities so that older adults can remain in the community and out of institutional care.

### **3.4 Participants and Sample Selection**

The target population of this inquiry included community-dwelling older adults who lived in a multi-racial, multi-ethnic metropolitan setting and attended one of the two aforementioned senior centers. Participants were recruited over several sessions in January 2020. Recruitment strategies included flyers and in-person recruitment, which included a sign-up table staffed by the principal investigator, announcements during lunch, and informal interactions with potential participants, which were facilitated by center personnel. An introductory script (*see Appendix A*) was read to prospective participants to inform them of study protocols. Consistent with the inclusion criteria, participants were 60 years or older; showed a willingness to participate in a focus group interview; demonstrated an understanding of the aims and procedures of the study; and had sufficient ability to speak, write, and read English.

### **3.5 Instrumentation**

#### **3.5.1 Focus Group Interview**

A semi-structured discussion guide (*see Appendix B*) was used to explore older adult perceptions of sedentary behavior and healthy aging. The moderator, who was also the principal investigator of this study, used a semi-structured discussion guide based on findings from previous qualitative studies on sedentary behavior in older adults (Chastin et al., 2014; McGowan et al., 2019; Palmer et al., 2018; Shuval et al., 2013; Tam-Seto et al., 2016; Russell & Chase, 2019; Van Dyck et al., 2017; Greenwood-Hickman et al., 2016). The semi-structured discussion guide

integrated four main topics drawn from the literature: (1) perceived benefits and detriments of sedentary behavior; (2) socioecological determinants of sedentary behavior; (3) perceived influence of sedentary behavior on healthy aging; and (4) recommended senior center programs targeting sedentary behavior reduction. As recommended by Mertens (2015), open-ended questions were asked to create dialogue and encourage participants to offer their unique perspective in the development of senior center programs. Interview questions were developed to address the primary inquiry questions. For example:

***IQ1 Focus Group questions.*** Theories of ecological systems (Bronfenbrenner, 1979; Sallis, Owen, & Fisher, 2008; Owen et al., 2011; Law et al., 1996) informed the development of IQ1, which in turn, was used to guide the development of Focus Group Questions 1 – 3 (FG Q1 – FG Q3). Discussion prompts such as, “*Tell me about the activities you engage in during a typical day that involve sitting.*” (FG Q1) and “*How has your activity level has changed over the years?*” (FG Q2) and probing questions were developed to gain a life course perspective of the sedentary habits and routines from the sample of participants

***IQ2 Focus Group questions.*** The theoretical construct of IQ2 also emanated from ecological theories (Bronfenbrenner, 1979; Sallis, Owen, & Fisher, 2008; Owen et al., 2011; Law et al., 1996). FG Q4 – FG Q8 addressed IQ2 through the incorporation of information from previous qualitative studies that investigated perceived costs and benefits of sedentary behavior (Palmer et al., 2018; McGowan et al., 2019; Chastin et al., 2014; McEwan et al., 2017; Tam-Seto et al., 2016; Greenwood-Hickman, 2016). Discussion prompts such as, “*What do you find beneficial about the seated activities you typically engage in?*” (FG Q4) and “*In what ways has coming to the center contributed to you sitting more during the day?*” (FG Q8) and probing questions across biopsychosocial domains and behavior settings were used to gain a better

understanding of the perceived personal, social, and environmental determinants of sedentary behavior.

***IQ3 Focus Group questions.*** Lastly, ecological theories (Bronfenbrenner, 1979; Sallis, Owen, & Fisher, 2008; Owen et al., 2011; Law et al., 1996) also informed the development of IQ3 and focused on obtaining recommendations from participants regarding the types of programs and supports within the community that would help reduce either sedentary behavior or increase overall physical activity levels (McGowan et al., 2019; McEwan et al., 2017; Tam-Seto et al., 2016; Van Dyck et al., 2017). The main question, “*Would you like to see added programs here [at the center] that may help break up sitting for long periods and encourage more activity during the day? If so, what kind of added programs would you like to see?*” (FG Q10) was asked to elicit the input of participants on desired senior center programs to reduce sedentary behavior or to support healthy aging.

### **3.5.2 Survey**

***Older Adult Sedentary Behavior.*** To assess time spent in sedentary activities, participants completed a sedentary behavior questionnaire adapted from two validated instruments: *Measuring Older Adult Sedentary Time* (MOST; Gardiner et al., 2011) and *Sedentary Behavior Questionnaire* (SBQ; Rosenberg et al., 2010) (*see Appendix C*). The MOST instrument was previously validated with non-working older adults (Gardiner et al., 2011), and the SBQ was validated in overweight adults (Rosenberg et al., 2010). Main adaptations included: 1) adoption of a Likert-type scale to report time spent in various sedentary activities (SBQ; Rosenberg et al., 2010); 2) expansion of sedentary activity items from 7 (SBQ) and 9 (MOST) to 15 based on everyday sedentary activities reported by older adults in the literature (Chastin et al., 2014; McGowan et al., 2019; Palmer et al.,

2018; Shuval et al., 2013; Tam-Seto et al., 2016; Greenwood-Hickman; 2016; Russell & Chase, 2019; Van Dyck, 2017); 3) organization of activities by subheadings using leisure, transportation, work, and household behavior settings as identified by Owens and colleagues (2011); and 4) adjustment of recall period to the past seven days (MOST; Gardiner et al., 2011). Relevant examples of sedentary activities were included in survey items for clarification purposes so participants could more accurately report on their sedentary behaviors (van Uffelen et al., 2011). The survey was pilot-tested before the start of data collection with a convenience sample of 7 older adults to estimate timing and assess readability.

The final survey included an assessment of engagement in 15 everyday sedentary activities reported by older adults. Survey respondents were asked to consider a typical day in the past seven days, and the time they spent in the different sedentary activities. Response options included: none, 15 minutes or less, 30 minutes, 1 hour, 2 hours, 3 hours, 4 hours, 5 hours, or 6 hours or more. Responses were summarized to provide information regarding the amount of time spent in each behavior and each behavior setting.

***Sedentary Behavior Visual Analog Scale.*** A single-item visual analog scale with a 1-week recall was also used to assess the average amount of time participants spent sitting in a day (Chastin et al., 2018) (*see Appendix D*). This measure was incorporated to triangulate reports of sedentary behavior, combining surveillance of total daily sedentary time with more detailed information provided by the survey, which participants reported on time spent in specific sedentary activities and the settings in which their sedentary behavior occurred.

***Health Status, Patterns of Daily Activity, and Demographic Characteristics.*** The survey instrument also consisted of several subsections focused on senior center utilization, demographic characteristics, health-related quality of life (Behavioral Risk Factor Surveillance System

(BRFSS), Center for Disease Control and Prevention, 2019), and daily activity patterns (*see Appendix E*). Response options ranged from 1 (excellent) to 5 (poor). Participants also were asked to report basic demographic information, including age, gender, race/ethnicity, educational attainment, marital status, income level, employment status, zip code, and living status.

### **3.6 Data Collection Procedures**

Data was collected over six sessions held between January and March 2020. The focus group was conducted first, followed by the administration of pen-and-paper surveys. Focus group interviews lasted approximately 60 minutes and were moderated by the principal investigator in a semi-private area within each senior center shortly after lunchtime. At the beginning of each focus group, permission to audio-record the interview was obtained verbally from all participants. Participants were not compensated for their study participation. Light refreshments were provided during the focus groups. At the end of each focus group interview, the principal investigator took debriefing notes of participant observations and observer's comments for reference during data analysis. Saldana (2008) and Miles, Huberman, and Saldana (2014) encouraged the practice of preliminary jottings to ensure initial ideas worthy of future consideration are documented and retrievable during data analysis. All study procedures were

### 3.7 Data Analysis Procedures

Data was triangulated across the three different data sources (i.e., six focus group interviews, survey data, debriefing notes) to establish trustworthiness in the inquiry (Creswell, 2007). Descriptive statistics (means and standard deviations and frequencies) were calculated for participant survey data (demographic characteristics, health status, and self-reported activity patterns). Audiotaped semi-structured focus group interviews were transcribed verbatim in its entirety using an AI-powered transcription software *Otter.ai* (Los Altos, CA). The principal investigator listened to the audio-recordings and read the transcripts several times to verify its accuracy. The principal investigator corrected transcription errors. This iterative process provided familiarity with the data and minimized the omission of any important content or context during the data preparation process. *ATLAS.ti* (version 8.4.4, Scientific Software Development GmbH, Berlin, Germany) was used to store, organize, and manage the data retrieved from the interview transcripts.

Once transcripts were prepared for coding, the following method was used to reduce the raw data into codes and themes: a) *Pre-coding*: highlighting provocative text for future consideration b) *First and second cycle coding*: line-by-line reading, interpretation, and labeling of content, c) *Analytical framework application*: storing, organizing, and indexing data by codes; d) *Thematic analysis*: discovering themes, core categories, and categories through reoccurring topics, identification of similarities/differences, linguistic connectors, and theory-related content (Saldana, 2008; Miles, Huberman, & Saldana, 2014; Gale et al. 2013; Ryan & Bernard, 2003). Memos were taken to document steps taken during data preparation and analysis in order to monitor data analysis activities (McLellan et al., 2003).

The principal investigator independently coded each interview transcript. Codes and initial analyses were reviewed by another faculty member (dissertation advisor). Codes were developed based on a combined inductive and deductive qualitative analysis approach. Inductive codes were generated through an iterative process to ensure important perspectives were not missed. Deductive codes were based on common refrains reported in sedentary behavior literature. For example, deductive codes included perceived benefits and disadvantages of sedentary activities (McEwan et al., 2017), intrinsic and extrinsic factors that encourage and discourage sedentary behavior (Tam-Seto et al., 2016), perceived environmental (Tam-Seto et al., 2016; Hsueh et al., 2016) and social determinants (McEwan et al., 2017; Palmer et al., 2018) of sedentary behavior. The conceptual framework of this inquiry informed the analysis and interpretation of data into broad themes.

### **3.8 Trustworthiness**

This study sought to increase trustworthiness through credibility and transferability (Lincoln & Guba, 1985). Creditability was established through the use of validation strategies such as clarifying researcher bias, audit trail, and triangulation (Creswell, 2007). With regard to the researcher's positionality, the principal investigator is a faculty member as an academic fieldwork coordinator at a teaching university in a densely-populated metropolitan area and has a clinical background as an occupational therapist. In the role of academic fieldwork educator, the principal investigator has a working relationship with the senior centers in this inquiry for fieldwork education of occupational therapy students. The principal investigator did not have any prior relationship with the participants of the study. As an occupational therapist, the principal

investigator holds underlying assumptions that informed the current study. Namely, engagement in occupation (including daily physical activity) is health-promoting and positively influences each domain of healthy aging. Conversely, prolonged sedentary behavior can negatively physical health and functional capacity leading to reduced occupational performance and poorer aging outcomes. These biases were minimized by following a discussion guide that was approved by the dissertation committee that allowed participants to share their perceptions of sedentary behavior and aging.

Before gaining access to the participants and setting, the principal investigator met with the senior center program directors to discuss the proposed study and important topics in healthy aging. During the recruitment period before the start of the study, the principal investigator spent a few hours each visit engaging in informal interactions with the older adults and senior center staff to build trust and rapport. Additionally, the principal investigator grounded the interview guide and surveys in previously published studies, ensuring measures of this inquiry had an accepted theoretical base that reflective of established knowledge on sedentary behavior and aging. This period of prolonged engagement and observation in the field, combined with detailed descriptions from focus group interviews, adds to the credibility of study findings and allow the reader to make decisions regarding transferability (Creswell, 2007).

Lastly, all data collected, research and coding procedures, literature reviewed, coding documents, field notes, and study measures were maintained as part of an audit trail. The three sources of data (survey, focus group interview transcripts, and debriefing notes) were collected over time for the triangulation of sources to increase the credibility of the inquiry (Creswell, 2007). The principal investigator also consulted regularly with the faculty advisor as a method of external audits (Creswell, 2007) to ensure the principal investigator's inquiry process, findings,

interpretations of data, and conclusions are credible and reliable. The reader can judge the transferability of the findings based on examination of the data collection and analysis methods. Although findings are unique to the principal investigator's problem of practice, the reader may decide the extent to which these findings can be transferred to other groups of community-dwelling older adults.

## 4.0 Results

### 4.1 Demographic Characteristics

Forty-six older adults participated in a total of 6 focus groups at two senior centers. Sample characteristics for all participants and by the center are available in Table 1. The mean age was  $75.6 \pm 7.8$  years, with 89.1% of the participants being female. The majority of participants (60.0%) identified as Black, Caribbean, or African-American, and 48.9% reported having a college degree or higher. A majority of participants reported being retired (89.67%), lived alone (60.86%), and visited the center at least a few times a week (45.6%) or daily (37.0%).

Descriptively, there were differences between the two senior centers with regards to race/ethnicity, educational attainment, and the mode of transportation participants used to get to their center. The majority (95.2%) of participants from Center A identified as Black, Caribbean, or of African descent, while there was more heterogeneity amongst participants from Center B including White (45.8%), Hispanic or Latino (4.4%), and other (16.7%). Also, a majority (83.3%) of participants from Center B reported attainment of a college degree or higher, compared to 9.5% of participants from Center A. Lastly, most (95.5%) participants from Center A reported walking or biking to the center. Whereas, participants from Center B reported a combination of transportation options, mostly waling or biking (37.5%) or public transit (41.7%).

**Table 1. Participant demographic characteristics for total participants and by senior center (mean [SD] or n %)**

	<b>Total</b> (n = 46)	<b>Senior Center A</b> (n = 22)	<b>Senior Center B</b> (n = 24)
<b>Age, years</b>	75.6 [7.8]	74.8 [9.3]	76.3 [6.4]
<b>Gender, female</b>	41 (89.1%)	21 (95.5%)	20 (83.3%)
<b>Race/Ethnicity</b>			
Black, or of Caribbean or African descent	27 (60.0%)	20 (95.2%)	7 (29.2%)
White, or of European descent	11 (24.4 %)	-	11 (45.8%)
Hispanic or Latino	2 (4.4%)	-	2 (4.4%)
Other	5 (11.1%)	1 (4.8%)	4 (16.7%)
<b>Employment Status</b>			
Retired	39 (89.7%)	17 (77.3%)	22 (95.7%)
Disabled	4 (8.9%)	3 (13.6%)	1 (4.4%)
Employed	2 (4.4%)	2 (9.1%)	-
<b>Relationship Status</b>			
Single, never married	10 (22.7%)	6 (30.0%)	4 (16.7%)
Married/committed relationship	5 (11.4%)	1 (5.0%)	4 (16.7%)
Widowed	15 (34.1%)	9 (45.0%)	6 (25.0%)
Divorced	11 (25.0%)	3 (15.0%)	8 (33.3%)
Separated	3 (6.8%)	1 (5.0%)	2 (8.3%)
<b>Living Status</b>			
Lives alone	28 (60.9%)	15 (68.2%)	13 (54.2%)
Lives with spouse/partner	5 (10.9%)	1 (4.5%)	4 (16.7%)
Lives with other family members	8 (17.4%)	6 (27.3%)	2 (8.3%)
Other	5 (10.4%)	-	5 (20.8%)

<b>How often do you visit the center?</b>			
Daily	17 (37.0%)	12 (54.5%)	5 (20.8%)
A few times a week	21 (45.6%)	8 (36.4%)	13 (54.2%)
Once a week	6 (13.0%)	-	6 (25.0%)
A few times a month	2 (4.4%)	2 (9.1%)	-
<b>How do you usually get to the center?</b>			
Walk or bike	30 (65.2%)	21 (95.5%)	9 (37.5%)
Public transit	10 (21.5%)	-	10 (41.7%)
Para-transit	4 (8.7%)	1 (4.6%)	3 (12.5%)
Private Car	2 (4.4%)	-	2 (8.3%)

*Note: Values rounded to nearest tenth*

### 4.2 Health Status and Patterns of Daily Activity

General health status and activity patterns of the participants are shown in Table 2. Most participants reported their general physical and mental health as excellent/very good or good (45.7% or 43.5% and 58.1% or 28.3%, respectively). Additionally, many participants perceived themselves to be more physically active than their peers (68.9%), reporting they regularly walked or biked to do errands (82.61%). A majority of participants reported they engaged in at least 10 minutes of vigorous-intensity recreational activity, moderate-intensity recreational activity, and heavy household work (75.0%, 60.6%, and 56.6%, respectively) most days of the week. With regards to the average time spent in sedentary behavior, participants reported they spent on average,  $4.5 \pm 2.0$  hours sitting per day.

**Table 2. Self-reported health status and activity patterns for total participants and by senior center (mean [SD] or n %)**

	<b>Total</b> (n = 46)	<b>Senior Center A</b> (n = 22)	<b>Senior Center B</b> (n = 24)
<b>General physical health is?</b>			
Excellent/Very good	21 (45.7%)	9 (40.9%)	12 (50.0%)
Good	20 (43.5%)	9 (41.0%)	11 (45.8%)
Fair/Poor	5 (10.9%)	4 (18.2%)	1 (4.2%)
<b>General mental health is?</b>			
Excellent/Very Good	27 (58.1%)	13 (59.1%)	14 (58.3%)
Good	13 (28.3%)	6 (27.3%)	7 (29.2%)
Fair/Poor	6 (13.0%)	3 (13.6%)	3 (12.5%)
<b>Compared to my peers, I am...</b>			
More physically active	31 (68.9%)	15 (68.2%)	16 (69.6%)
About the same	10 (22.2%)	5 (22.7%)	5 (21.7%)
Less physically active	4 (8.9%)	2 (9.9%)	2 (8.7%)
<b>Self-reported intensity and frequency of physical activities</b>			
<b>Over the past 30 days, ...</b>			
<b>...did you walk or bike to do you errands?</b>			
Yes	38 (82.6%)	16 (72.7%)	22 (91.7%)
No or unable	8 (17.4%)	6 (27.3%)	2 (8.3%)

<b>...did you do any vigorous recreational activities for at least 10 minutes?</b>	(n = 45)	(n = 22)	(n = 23)
Yes	24 (53.3%)	11 (50.0%)	13 (56.5%)
No or unable	19 (42.2%)	10 (45.5%)	9 (39.1%)
I don't know	2 (4.4%)	1 (4.5%)	1 (4.3%)
<b>If yes, how often?</b>	(n = 24)	(n = 12)	(n = 12)
Once a week	4 (16.7%)	1 (8.3%)	3 (25.0%)
Most days a week	18 (75.0%)	10 (83.3%)	8 (66.7%)
Every day	1 (4.2%)	-	1 (8.3%)
I don't know	1 (4.2%)	1 (8.3%)	-
<b>...did you do any moderate-intensity recreational activities for at least 10 minutes?</b>	(n = 44)	(n = 22)	(n = 22)
Yes	33 (75.0%)	15 (68.2%)	18 (81.8%)
No or unable	9 (20.5%)	5 (22.7%)	4 (18.2%)
I don't know/unable	2 (4.5%)	2 (9.1%)	-
<b>If yes, how often?</b>	(n = 33)	(n = 16)	(n = 17)
Once a week	4 (12.1%)	2 (12.5%)	2 (11.8%)
Most days a week	20 (60.6%)	8 (50.0%)	12 (82.4%)
Every day	7 (21.2%)	4 (25.0%)	3 (17.6%)
I don't know	2 (6.1%)	2 (12.5%)	-

<b>...did you do any heavy work in the house or yard for at least 10 minutes?</b>	(n = 44)	(n = 21)	(n = 23)
Yes	23 (52.3%)	11 (52.4%)	12 (52.2%)
No	18 (40.9%)	9 (42.8%)	9 (29.1%)
I don't know	3 (6.8%)	1 (4.8%)	2 (8.7%)
<b>If yes, how often?</b>	(n = 23)	(n = 11)	(n = 12)
Once a week	5 (21.7%)	3 (27.3%)	2 (16.7%)
Most days a week	13 (56.5%)	7 (63.6%)	6 (50.0%)
Every day	2 (8.7%)	-	2 (16.2%)
I don't know	3 (13.0%)	1 (9.1%)	2 (16.2%)
<b>Mean [SD] self-reported total sitting time</b>			
<b>In the past week, I typically sat for _____ hours a day</b>	4.5 [2.0]	4.6 [2.4]	4.4 [1.4]

*Note: Values rounded to nearest tenth*

### 4.3 Older Adult Sedentary Behavior

Table 3 presents the results of participant-reported time spent in common sedentary activities within leisure, work, transportation, and household domains. Overall, participants reported spending most of their time in activities in the leisure domain and the least amount of time in the work domain, as the majority of participants were retired. In the total group, the top leisure-time activities were watching TV (2.6 hours/day), going online (2.1 hours/day), and sitting/talking with friends (2.1 hours/day). Descriptively, there were slight differences in top

leisurely activities between senior centers. While participants from both centers averaged about the same amount of time going online (2.2 vs. 2.0 hours/day), Center B reported less time spent TV watching (2.1 vs. 3.1 hours/day), less time sitting and talking with friends (1.8 vs. 2.5 hours/day), and more time reading (2.0 vs. 0.7 hours/day) than Center A.

Participants reported spending the least amount of time engaged in work-related activities. The most frequently reported sedentary activity within the work domain was computer use (0.5 hours/day). As for the transportation domain, participants, on average, reported spending 1.7 hours/day driving or using public transit. Of note, participants from Center B reported more time spent commuting when compared to Center A (2.1 vs. 1.3 hours/day). Lastly, participants reported spending time engaged in sedentary activities in the household domain, such as having meals at home (1.8 hours/day) and completing administrative tasks (e. g., bill paying, making appointments) (1.4 hours/day). These activities were similar in participants by the center.

**Table 3. Self-reported average daily sedentary time (hours) by sedentary behavior domain for the total group (n = 46) and by senior center (mean [SD])**

<b>Activity</b>	<b>Total</b> (n = 46)	<b>Senior Center A</b> (n = 22)	<b>Senior Center B</b> (n = 24)
<b>Leisure Domain</b>			
Watching TV	2.6 [1.8]	3.1 [1.7]	2.1 [1.0]
Listening to radio/music	1.4 [1.4]	1.7 [1.7]	1.1 [1.2]
Reading a book, newspaper, or magazine	1.5 [1.4]	0.7 [0.6]	2.0 [1.5]
Going online/Web browsing	2.1 [1.8]	2.0 [1.6]	2.2 [1.9]
Sitting and talking with friends	2.1 [1.8]	2.5 [2.3]	1.8 [1.3]
Doing hobbies, arts and crafts	1.6 [1.9]	1.6 [1.7]	1.6 [2.0]
Sitting in the park or garden	0.4 [0.7]	0.4 [0.7]	0.4 [0.8]

Sitting while eating out at a restaurant	1.4 [1.4]	1.4 [1.4]	1.4 [1.4]
Playing board games or puzzles	1.1 [1.7]	1.3 [1.8]	0.9 [1.7]
<b>Work Domain</b>			
Driving for work/volunteering	0.1 [0.6]	0.3 [1.0]	0 [0]
Using the computer for work/volunteering	0.5 [1.2]	0.3 [0.7]	0.7 [1.5]
Doing administrative tasks for work/volunteering	0.2 [0.7]	0.3 [0.7]	0.2 [0.7]
<b>Transportation Domain</b>			
Driving or using public transit	1.7 [1.7]	1.3 [1.4]	2.1 [1.9]
<b>Household Domain</b>			
Doing administrative task for home	1.4 [1.2]	1.4 [1.1]	1.5 [1.4]
Eating/Drinking a meal at home	1.8 [1.7]	1.5 [1.5]	2.1 [1.9]

*Note: Values rounded to nearest tenth*

#### 4.4 Focus Groups Results

Based on line-by-line coding, four themes, ten core categories, and 30 categories arose from the focus group content analysis (Table 4). The four main themes included: (1) *“But, you do need to sit once in a while”*: what older adults really think about sedentary behavior; (2) *Barriers and facilitators to less sitting: an ecological view*; (3) *Social determinants of health in aging populations*; and (4) *“Just ask us”*: senior center program recommendations for healthy aging. Themes, corresponding core categories, and categories are presented in Table 4 and described in detail with illustrative quotes below.

**Table 4. Themes, core categories, and categories identified from focus groups with older adults conducted at two senior centers**

<b>Theme 1. “But, you do need to sit once in a while”: what older adults really think about sedentary behavior</b>	
Benefits of sedentary behavior	<ul style="list-style-type: none"> <li>• Psychosocial &amp; cognitive health</li> <li>• Restoration (rest, meditation)</li> <li>• Adapting to physical limitations</li> <li>• Structuring daily routines</li> </ul>
Detriments of sedentary behavior	<ul style="list-style-type: none"> <li>• Bodily aches and stiffness</li> <li>• Guilt, depression, boredom</li> <li>• Lack of productiveness</li> </ul>
<b>Theme 2. Barriers and facilitators to less sitting: an ecological view</b>	
Factors encouraging engagement in sedentary activities	<ul style="list-style-type: none"> <li>• Personal characteristics (beliefs, routines, comfort, mobility limitations/pain)</li> <li>• Interpersonal interactions</li> <li>• Physical environment (bad weather, uneven terrain)</li> <li>• Modern society (labor-saving devices, passive transport)</li> </ul>
Factors discouraging engagement in sedentary activities	<ul style="list-style-type: none"> <li>• Personal characteristics and responsibilities (physical symptom relief, beliefs, motivation, life roles)</li> <li>• Interpersonal interactions</li> <li>• Availability of/Access to facilities and programs</li> </ul>
<b>Theme 3. Social determinants of health in aging populations</b>	
Personal/Developmental factors	<ul style="list-style-type: none"> <li>• Physical, cognitive, and psychosocial health</li> <li>• Personal habits, beliefs, and health behaviors</li> <li>• Retirement and life transitions</li> </ul>
Interpersonal, community, and neighborhood factors	<ul style="list-style-type: none"> <li>• Negative attitudes of peers</li> <li>• Infantilization &amp; negative aging stereotypes</li> <li>• Proximity of neighborhood opportunities</li> <li>• Senior center as key community resource</li> </ul>

Broad societal factors	<ul style="list-style-type: none"> <li>• Aging policy and funding</li> <li>• Advocacy and inclusion in decision-making</li> <li>• Affordable transportation to local amenities</li> </ul>
<b>Theme 4. “Just ask us”: senior center program recommendations for healthy aging</b>	
Recommended Program Type	<ul style="list-style-type: none"> <li>• Exercise and movement programs</li> <li>• Social programs</li> <li>• Cooking and nutrition programs</li> <li>• Community outings</li> <li>• Aging transitions, health literacy, and memory programs</li> <li>• Computer and technology classes</li> <li>• Intergenerational programs</li> </ul>
Recommended Program Feature	<ul style="list-style-type: none"> <li>• More lively and vigorous classes</li> <li>• Modified for ability and fitness level</li> <li>• Mixed-age groups</li> <li>• Flexible scheduling</li> </ul>

**4.4.1 Theme 1. “But, you do need to sit once in a while”: What Older Adults Really Think About Sedentary Behavior**

**4.4.1.1 Perceived Benefits of Sedentary Behavior**

Participants discussed the positive aspects of sedentary behavior and the ways these activities support psychosocial and cognitive health by providing enjoyment, mental stimulation, and opportunities to socialize with others:

*“The reason I enjoy talking on the phone is because I learn from the person and hopefully they learn from me.” (Female participant, Center B)*

*“Doing the activities that I do – solving puzzles and at the same time talking to others at my table – helps me stay sharp.” (Male participant, Center B)*

*“As far as sitting activities, I spend a lot of time on the internet, especially. Various activities that keep me better informed that allow me to study and grow. Learning languages is one... [Also], I’m an administrator on one of the non-English Wikipedias.” (Male participant, Center B)*

In addition to viewing sedentary activities as supportive of mental health and social wellbeing, participants also perceived these sedentary activities as a form of rest and restoration, allowing them opportunities to relax, cope with daily life stressors, and recover from other more strenuous activities:

*“I listen to music, and when I do I might sit up, or I could be lying down, you know, listening to music. But it makes me feel good. I’m relaxed, energized.” (Female participant, Center A)*

*“I like to be able to sit back and actually meditate for a little while. It’s really important. Especially in New York, where it’s noisy.” (Male participant, Center B)*

There was a strong desire to remain engaged in meaningful activities despite the physical declines associated with aging. Participants discussed ways they managed chronic health conditions by modifying how they performed certain activities, becoming conscious of their limitations, and adopting other more sedentary behaviors:

*“I don’t know about anybody else but certain exercise I can’t take...certain exercise I can do, certain exercise I can’t do.”* (Female participant, Center A)

*“One reason why I pursue all these intellectual activities [is] because I can do it, and I like to do it, and it seems to return itself to me and my getting a little more able to do things.”* (Male participant, Center B)

Finding themselves with more leisure time in retirement, participants discussed how routine sedentary activities provided structure in their day:

*“...book reading is limited to just before going to sleep. I might spend anywhere from 1 – 2 or 2 ½ hours in bed reading before putting my [CPAP] mask on.”* (Male participant, Center B)

*“Mostly, my sedentary [time] is listening to the radio in the morning. I lie in bed and listen to it. I like to listen to it. Gospel music or some type of spiritual mediation, and then after a while, I’ll get up and move about.”* (Female participant, Center B)

#### **4.4.1.2 Perceived Detriments to Sedentary Behavior**

Participants also discussed perceived detriments to prolonged sedentary behavior and the adverse effects they felt as a result, including bodily aches and stiffness; weakness and weight gain; guilt, depression, and boredom; and a lack of productiveness. Short-term effects like stiffness, aches, pain, and poor circulation were frequently cited as adverse consequences to too much sitting:

*“Sometimes, it bothers my eyes after looking at the screen for so long. Then, when I look away, I have to, like, focus – try to refocus – because things tend to be blurry. And then, my body, my bones feel tired...you can feel some aches and some stiffness...”* (Female participant, Center A)

*“If you sit too long, you get stiff, and sometimes you get dizzy getting up.”*  
(Female participant, Center A)

Some participants also discussed their understanding of the effect sedentary behavior has on their functional ability and energy expenditure, which can lead to long-term health consequences:

*“...this sedentary life would destroy me because it weakens your bones and your muscles and you can't get up... So, for me, I have to stay active...”*  
(Female participant, Center B)

*“I think, as we become more sedentary, the great fear is putting on more weight.”* (Male participant, Center B)

In addition to experiencing physical symptoms, prolonged sedentary time was also perceived as contributing to low mood and boredom. Certain activities like TV watching or computer gaming had negative connotations attached to it at times. Some participants also expressed guilt over extended periods of sedentary time:

*“There's a kind of guilt associated with sedentary activities and my limitations to sedentary activities.”* (Female participant, Center B)

*“My brain gets weary sometimes because I'm there [at the computer] so long, and then it stops me from moving around. Which I need to do – which is important.”*  
(Female participant, Center A)

*“It's TV because, for me, my TVs in my bedroom. So, I'm in my bed looking at T-V, you know... I can stay in my house all weekend and stay in my bed all weekend. I have no trouble with that. But [sometimes I'm] like, “No, you need to get your body up out this bed!”* (Female participant, Center A)

Participants also expressed feeling unfulfilled and unproductive after spending an extended time in solitary or non-purposeful sedentary activities at home:

*“Being in the house, not doing anything, ...not accomplishing anything. You get stiff, and you get heavy.”* (Female participant, Center A)

*“I agree that the thing we all should do less of is sitting down watching TV for a long time – like I used to do – and find other things because when you're watching TV, you're really not doing anything.”* (Female participant, Center A)

## 4.4.2 Theme 2. Barriers and Facilitators to Less Sitting: An Ecological View

### 4.4.2.1 Factors Encouraging Engagement in Sedentary Activities

In addition to the perceived benefits and detriments of sedentary behavior, participants discussed determining factors that influenced how sedentary they were. Several factors that encouraged engagement in sedentary activities were identified across socioecological domains, including personal characteristics (e.g., pain, mobility limitations, beliefs, daily routines, comfort); interpersonal interactions; physical environment (e.g., bad weather, uneven terrain, low neighborhood walkability); and modern society (e.g., labor-saving devices, passive transport). Personal factors such as chronic pain and mobility limitations were reported by participants as significant barriers to reducing sedentary time:

*“I have difficulty walking since I had that stroke. I used to walk a lot. Now, I paint, I work at a computer. I write... My vision is not good enough for me to read – and so, I listen to tapes.”* (Male participant, Center B)

*“I’d like to sit less. But, due to my spinal problems, I can’t stand for so long.”*  
(Female participant, Center B)

In addition to physical ailments, developmental factors and personal beliefs were identified as contributors to sedentary behavior. Participants who identified as not being an ‘active person’ discussed how comforting their sedentary activities were and how it was a deeply embedded part of their daily routine:

*“I do spend a certain amount of time in the evening after dinner, watching the new shows on TV. I could spend sometimes I could spend an hour to two watching that.”* (Male participant, Center B)

*“I do watch TV. I have certain BBC shows that I love. But I could sit for 4 hours in the evening.”* (Female participant, Center B)

Activities that provided enjoyment and social connection were valued at a premium among participants, regardless if the activity was considered sedentary:

*“We have TV discussions here. So, something that we might have watched last night. Everybody comes in and we’re all up about it, ‘Did you see so and so and so?’. You know, that kind of stuff. I just love it. And if I missed something, somebody else could tell me what I miss. It’s fun.”* (Female participant, Center A)

For some, their own perceived mortality and the limited amount of time they had left was a significant motivator to engaging in sedentary activities that gave them pleasure:

*“At this age, I want pleasure. And so, I make my choices.”* (Female participant, Center B)

Practical considerations within the physical environment such as weather and steep or uneven terrain were also discussed as barriers to engaging in community-based activities and outdoor recreation:

*“When it snows, and it’s real bad outside, you have to sit home because you’re in the house and you can’t get out – and I like to get out.”* (Female participant, Center A)

*“...walking up slope[s], especially, is extremely painful... I tend not to get around as much as I used to and it used to be that walking was my primary exercise.”* (Male participant, Center B)

Participants continued to discuss the environment by expressing how technological advancements in society and modern conveniences actually encouraged more sedentary behavior:

*“...Most of the things we do every day do not involve movement [to any] extreme degree at all...we don't walk great distances...we don't have very much opportunity as a society when we're living in urban and even rural areas...everything is automated – to the point where it leaves you with your only options for exercise is something that's structured exercise.”* (Female participant, Center B)

#### **4.4.2.2 Factors Discouraging Engagement in Sedentary Activities**

In contrast to the determinants that encourage sedentary behavior, several determinants that discourage engagement in sedentary activities were identified across socioecological domains, including personal characteristics and responsibilities; interpersonal interactions; and availability of and access to facilities and programs. Intrapersonal factors such as symptom relief was discussed as a strategy to avoid the aches and stiffness of prolonged sitting:

*“...I have trouble sitting at all because of pain... if I'm standing still or standing in one place, I have pain. I find that I have to get up constantly.”* (Male participant, Center B)

*“...I do little things with my legs and stuff. I do a little exercise in my seat because getting up when you're stiff ain't no joke.”* (Female participant, Center A)

Furthermore, participants described self-perceptions, personal beliefs, and the internal drive to engage in non-sedentary activities as a way to minimize the amount of sitting accumulated in a day:

*“...I've always been an outdoors person. I can't sit in my house every day. That's just not me. You know, I have to be always doing something.”* (Female participant, Center A)

*“...and the reason I became more active is: I recognized that if I don't, my body's gonna deteriorate.”* (Female participant, Center B)

*“...I motivate myself also. I used to get up and go to work – I'm a retired nurse. I used to go in the snow, the rain sleet, whatever. So now, let me go out and do something for myself.”* (Female participant, Center B)

Caregiving was also reported as a facilitator for less sitting. Participants described caring for grandchildren, aging family members and neighbors, and pets as activities that keep them busy and active at home and in the community:

*“...I also have my dog that I walk...I'm helping take care of this senior citizen in my building, and I help my mom. So, between [them], I'm running back and forth...”* (Female participant, Center A)

*“...I have a lot more things to do because of my brother... he's staying the whole year with me and I have to do everything. I have to cook and he wants to have lunch, he wants supper... So, it's a lot more because I have to be cooking and I don't want to do that anymore...”* (Female participant, Center B)

In addition to intrapersonal factors that discourage sedentary behavior, participants discussed how their social circle and interpersonal relationships acted as a determinant for engaging in non-sedentary activities:

*“I love art. I go to art museums...and that opens up my social life. I go with friends most of the time.”* (Female participant, Center B)

*“I went from being very, very, very active to being completely out of it, to now, I'm back and I have friends now that keep me busy.”* (Female participant, Center A)

Participants also discussed environmental factors such as the availability and accessibility of neighborhood leisure opportunities as influential in discouraging sedentary behavior. Community institutions such as senior centers and places of worship as well as adequate funding for senior programs were highlighted for their significance:

*“Since I found the center here, I became more active.”* (Female participant,  
Center A)

*“Well, I walk a mile to get here and a mile to get home. So, that just for  
starters and I just did one of the exercise classes... It makes me less sedentary to  
come here [to the center].”* (Male participant, Center B)

*“I got more involved as a member of the church. I got more involved in doing  
a lot of things at the church.”* (Female participant, Center B)

#### **4.4.3 Theme 3. Social Determinants of Health in Aging Populations**

In addition to identifying key determinants that encourage or discourage sedentary behavior, participants elaborated on several multi-level factors that influence their overall health and wellbeing as they age. Wide-ranging perspectives about perceived supports and barriers to healthy aging and how sedentary behavior may influence functional ability in late adulthood were shared. Personal and developmental factors such as physical, cognitive, and psychosocial health; personal habits, beliefs, and health behaviors; and retirement and life transitions were identified as key influences to aging successfully.

##### **4.4.3.1 Personal and Developmental Factors**

Participants discussed their physical capacity and health concerns as it related to modifying their activity patterns because of age-related physical decline. Specifically, musculoskeletal issues affecting hip and knee joints contributed to declines in physical activity with age:

*“I started getting arthritis, you know, in my hips and knees, and also, COPD. So, that's really slowed me down. I mean, I try to walk but not that far.”* (Female participant, Center A)

*“I still walk up and down, subway stairs. But, I miss terribly the fact that I can't really dance [anymore], and after my first hip joint replacement I couldn't jump on my artificial hip. I had to do low impact aerobics – and I love to jump and leap, and it's the hardest thing that has happened to me at my age. Cutting back, cutting back. Every year cutting back a little of my ability for physical activity.”* (Female participant, Center B)

The issue of cognitive decline dominated one of the focus groups as memory loss was described as a worrisome barrier to functional independence:

*“I think the thing that most of us are concerned about...is the word ‘Alzheimer’s’. Because as soon we [realized we forgot something] – there it is [a possible sign of dementia]! It's terrifying, absolutely terrifying.”* (Male participant, Center B)

*“I think I've been blessed mentally. I mean, of course my memory isn't where it used to be. But nobody's is. So, I'm not exactly thinking about that too much. Although, Alzheimer's is my worst fear because I see what it does to people.”*  
(Female participant, Center B)

Given possible declines in health and the omnipresent feelings of mortality, participants choose activities and maintain social connections that supported their emotional wellbeing, provided enjoyment, and reinforced a positive self-perception in their late stage of life:

*“My mother passed. Her last 15 years, I was right there [taking care of her]. So, when I came [to the center], it was like being around [my mom again] and that helped me tremendously, and it still does really.”* (Female participant, Center A)

*“The Double Dutch I stopped because – it was fun, I did it for 30 years – but my knees were about to give out. But, I wanted to exercise...so I continue to do dance classes, which is less work for your knees.”* (Female participant, Center A)

*“I just recently started with the cane... I can see people, the sympathy, or empathy for me. When I see this with my friends, I sing the song, ‘Don't Cry For Me Argentina’ because I'm pushing myself, because there are mornings that I get up and I feel stiff and things.”* (Female participant, Center B)

The personal beliefs, habits, and health behaviors participants maintained were also discussed. Participants strongly believed that one's attitude towards aging was an important factor in aging well. These attitudes may serve to motivate (or hinder) participants from continuing to engage activities despite health issues and age-related changes. Many participants maintained a positive view of aging and held higher expectations of their aging self, asserting they had ultimate

control over their health. Many felt personal accountability played an important role in healthy aging:

*“I always envisioned myself that at [age] 90, I’ll be able to do jumping jacks. I can do it now at 75... my point is, it’s your perception. I always said I perceive I’m going to have my teeth – these are my teeth. [My] mind is sharp, and I’m going to do what is necessary to keep my mind sharp.”* (Female participant, Center B)

*“Well, some of us, as we age, we cause our own deterioration because we tell ourselves, ‘Oh, I can’t do this again because I’m a certain age and I can’t do that’. So, it’s just easier to deteriorate.”* (Female participant, Center B)

As such, participants viewed healthy aging as, in part, due to an accumulation of healthy habits and behaviors (i.e. staying active, proper nutrition) that were developed over the years:

*“I do walk and I do take care of myself. I eat well and I don’t eat a lot. I have certain things that luckily keeps me going.”* (Female participant, Center A)

*“...that’s why I try to get out – and to tell you the truth, I almost 94 years old. Even due to my age, I don’t sit back. I watch what I eat. I think it’s important...”*

(Female participant, Center A)

In addition to healthy habits and behaviors, transitioning from full-time employment to retirement was also discussed as a key period in life that influenced present activity levels and perceived health. Retirement was seen as an opportune time for participants to engage in more

activities, both sedentary and non-sedentary, that they found enjoyable but did not have the time or energy to do when working full-time. Participants expressed that the senior center played an important role during this transition by providing opportunities to meet new people and be more active:

*“...as I became a senior citizen, my life really changed because it used to be a very routine life of going to work, going home, and watching TV, make a quick dinner. But now it changed because I retired, and I needed to find more things to do to keep busy. I started coming here [to the center] and began to socialize more, get to know more people, different things that I didn't do before like exercise classes, computer classes...”* (Male participant, Center B)

*“[When] I worked, it was always sitting down in the chair. I'm more active than anything now. I can't sit down! I keep moving. I sat up there [at home] when I retired and didn't have nothing to do. I was looking out the window. I walked past [the center] and somebody said, 'Why don't you join the center?' and I've been here ever since. I love it here.”* (Female participant, Center A)

The increased amount of leisure time following retirement also meant participants had more time to spend in sedentary activities. Some participants discussed how the change in activity level was related to the type of job they had before retiring. Participants who had a physically demanding job reported an increase in sedentary time after retirement, whereas those with a more sedentary position described a decrease in sedentary time after retirement:

*“Yes, I [have become more sedentary] because before I worked in the field every day – every day. So now, I don’t get up as much as I used to, you know. Once I get up, I’m at the TV.”* (Female participant, Center A)

*“Yeah, since I’m not working in an office, I sit up less, not more.”* (Female participant, Center B)

*“I worked. It was always sitting down in the chair. I’m more active than anything now.”* (Female participant, Center A)

#### **4.4.3.2 Interpersonal, Community, and Neighborhood Factors**

In addition to personal considerations, more distal influences such as interpersonal, neighborhood, and community-level factors were also identified as contributing to healthy aging. Specific factors mentioned by participants included negative attitudes of peers, infantilization, and negative aging stereotypes; proximity of the center and neighborhood opportunities; and the importance of senior centers within the community. Negative attitudes of peers within the center were discussed as a stressor that potentially impacted interpersonal relationships and participation in center activities:

*“Sometimes, people bring their problems here, and that’s just not right. It brings you down. If you are down, go sit somewhere, go talk to somebody, don’t come in here with that attitude. I don’t like attitudes at all. That’s not a good thing. I think it’s very unhealthy.”* (Female participant, Center A)

*“Negative people. They don’t like this, they don’t like that. They kind of bring you down. Complainers – the energy: never happy.”* (Female participant, Center A)

Participants also encountered negative aging stereotypes more broadly in the community and shared stories of how they felt infantilized by family and friends despite their best intentions. Participants discussed societal expectations to become sedentary with age and how they strongly rejected these ideas:

*“When I turned 70, my grandson said to me, ‘You don’t act like an old lady.’ ... I mean, just because I’m 70 – well, now I’m 71 – doesn’t mean I was supposed to run up in my room, fall back in my chair, put my little robe on, and crochet.”* (Female participant, Center A)

*“The biggest question is how to keep ourselves from getting shoved into that ‘you’re old now’, ‘it’s time to rest’, ‘you can’t’, ‘don’t push yourself too hard’ [category].”* (Female participant, Center B)

The social climate was viewed as an integral part of *healthy aging* as it impacted expectations of what is thought to be developmentally appropriate activities for older adults, and sometimes this did not fit with participants’ idea of they considered suitable at their age. Some participants described feeling constrained by social norms to do certain activities sitting down:

*“I want to spend the rest of my life playing. I really don’t have that much time left and whatever that play means, you know, it means it’s whimsical... I mean, I kept wanting to get into things and different colors and throw them up in the air here [at*

*the center]. But, I was thinking I can't do this, I can't do that. Then I realized, 'No!', those are the things I wanted to do.*" (Female participant, Center B)

Some participants, however, were critical of the term *healthy aging* altogether, stating:

*"I think [healthy aging] is a negative term in the first place... It's like when you see the shirts girls wear 'Girls Can Do Anything'. Well, the only reason [they're] wearing that is the same reason people used to wear 'Black is Beautiful' shirts. It's because [they're] trying to push back – healthy aging implies that aging is not healthy."* (Female participant, Center B)

Participants found proximity to facilities was an important environmental factor that supported healthy aging:

*"The proximity of having an exercise class [nearby]... has been wonderful. But I think proximity does make a difference. You know, closeness, how close the opportunity or the encouragement is..."* (Female participant, Center B)

As such, participants viewed their senior center as a key community resource that supported continued engagement in life activities and encouraged them to remain active and flourish:

*"Instead of staying home, just watching TV. I didn't have to cook for nobody but myself. So, I [came to the center] twice a week."* (Female participant, Center A)

*“I strongly feel, based on my experiences, that the center is par excellence [because it] promote[s] aging, give us the opportunity to grow physically, mentally – you name it –, educationally.”* (Female participant, Center B)

But, participants also recognized that the acceptability of available opportunities within the community is an important consideration. The variety and quality of programs may depend on the available resources in their neighborhood:

*“That’s one thing about this place. They have so many physical things to offer us. The one I just went to yesterday, Stretching for Arthritis, really helped!”* (Female participant, Center B)

*“One of the things that bothers me about being a senior is that a lot of activities are structured for people who can’t: can’t walk, can’t balance...”* (Female participant, Center B)

*“...but I’ve also seen the Bingo-bingo-bingo, and if I lived near the Bingo-bingo-bingo that, you know, would be all I had.”* (Female participant, Center B)

*“I joined [a memory] group... What bothers me is the extent to which the professional leadership of the group keeps pushing puzzles at us... First of all, this is a group where over half of it has PhDs. So, we like to talk...There’s so many things you could do to really objectively benefit us. If I want to do puzzles, for crying out loud, I could open up the New York Times...”* (Male participant, Center B)

#### 4.4.3.3 Broad Societal Factors

Participants also discussed some of the broad societal factors within the macro-environment that created a setting for healthy aging to occur. These factors included public policy and funding directed to improve the wellbeing of older adults; access to affordable transportation to local amenities; and advocacy and the desire to be included in decision-making. Participants commented on the ground-level impact of policy initiatives that aimed to improve the health and wellbeing of older adults. Many acknowledged the important role municipal subsidies have in making low-cost meals and senior programming available:

*“I’m saying, we have to thank the government, or the city, to have a center – a senior citizen center. They think about us having a meal, which is offered here. They offered exercise to keep us active, and I think it’s great.”* (Female participant, Center A)

However, some participants who viewed healthy aging through a socioecological lens called for policymakers to take greater action in ensuring older adults have the security needed to age well:

*“If they don’t have enough food, they’ll be less healthy. They don’t have good health care, they’ll be less healthy. Well, to me, this is pretty obvious... if we need more food, then help with food stamps, and if we need better housing, then make laws that make housing more stable.”* (Female participant, Center B)

Participants observed the availability of funding and policy support for senior programs influenced the range of subsidized community activities accessible to them:

*“Before we used to [have community outings]. But, we’re not doing that now, and that’s what we’d like to know! [The center] gets money here for us every year too. It seems like they not spending it on the seniors... We need some activities to go out...not just here at the center, but in the broader community.”* (Female participant, Center A)

*“[Our center is an] activist agency. So, my sense is, to take the top [center] and assume that the [other centers] have these things would be a bad mistake. There probably is a wide range [of programs available to older adults].”* (Female participant, Center B)

Another environmental factor that was discussed by participants was transportation. Participants felt that access to low-cost transportation enabled them to venture out in their local neighborhood and beyond to engage in community activities. Participants believed older adults living in areas without affordable transportation were more likely to remain at home and engage in sedentary behaviors:

*“Being in New York, it's much easier to get around. You don't have to spend a whole lot of money to get someplace, and there's so many things that are available for seniors here in New York City compared to elsewhere.”* (Female participant, Center A)

*“Like in Maryland, [my friend’s mother has] a bus that comes and picks [her] up and brings her back. Down in North Carolina...not having public transportation also factors in a whole lot.”* (Female participant, Center A)

#### 4.5 Theme 4. “Just ask us”: Senior Center Program Recommendations for Healthy Aging

With the recognition that organizational and aging policies impact available resources, many participants felt strongly about the need to advocate and be included in local decision-making:

*“I think it's very important that we have a voice in what's going to happen at our local center, and that it does not happen from top down.”* (Female participant, Center A)

*“Instead of doing things on your own, ask them, ask the seniors how and what they want here [at the center], and how they feel about it. They want to treat you like a little kid or something, like you done lost all of your senses... But, we can still think for ourselves. Just ask us.”* (Female participant, Center A)

Participants were asked to recommend additional senior center programs that may help break up long periods of sitting and encourage more physical activity. Responses were mixed as some participants were satisfied with current offerings while others suggested new initiatives or called for a return of past programs. Recommendations were not limited to just programs targeting sedentary behavior or physical activity, but instead included a range of concurrent activities that support healthy aging such as proper nutrition, social engagement, and mental wellbeing. Opinions about reducing sedentary time differed widely, ranging from a firm refusal to a clear interest in sitting less, particularly in low-value seated activities like sitting passively watching TV. When asked whether there are any sedentary activities they would like to do less of, some participants rejected the idea or questioned the intent by stating:

*“No, we can’t do that. We wouldn’t do nothing [then].”* (Female participant,  
Center A)

*“Especially if it’s good for you – why would you want to do less of it?”*  
(Female participant, Center A)

Program recommendations can be described by type and feature of center activities. Participates shared the kinds of programs they wanted including a wide variety of exercise, dance, and movement programs; social activities (e.g., board/card games, knitting quilting, Wii bowling); cooking and nutrition classes; community outings (e.g., bowling, museums, Broadway plays); aging support groups, health literacy, and memory classes; computer and technology classes; and intergenerational programs.

Recommendations also underscored certain features that may enhance the acceptability of new and existing programs. Participants suggested livelier music and activities at the center based on their experience at other local centers where there were themed gatherings and events. Other participants called for more vigorous exercise and dance classes that could challenge their balance and cardiovascular endurance. While some supported this idea because it went against the aging stigma of feebleness, many acknowledged the need for classes to be able to accommodate a wide range of abilities and fitness levels. Participants recommended a more flexible scheduling of class times so that participants have an opportunity to attend either a morning or afternoon session. Another suggestion included activity classes with mixed age groups. Some participants had previous experience with intergenerational programs and cherished the exchange of knowledge across generations, particularly with regards to learning new skills:

*“So, [technological] knowledge as basic mental activity for seniors, I think, is critical and I would like to see some partnership between young people and seniors on a regular basis.” (Female participant, Center B)*

## 5.0 Discussion

### 5.1 Overview of Key Findings

The present mixed-method needs assessment had three inquiry questions:

- What perceptions do community-dwelling older adults residing in an urban, socioeconomically, ethnically, and racially diverse setting have regarding sedentary behavior and its association with successful aging?
- What are the factors that encourage and discourage sedentary behavior among these older adults?
- What recommendations do these older adults have regarding programs to reduce sedentary behavior at the senior center?

It is clear that although participants understood the physical costs of engaging in prolonged sedentary activity, they also perceived many psychological, cognitive, and social benefits that support their health and wellbeing. The factors that influenced their engagement in sedentary behavior were multidimensional and could be mapped across socioecological domains. Personal motivation, daily habits and routines, and factors within the physical and social environment were frequently cited as key determinants of sedentary behavior and healthy aging. Participants provided key insights that can aid the development of messaging strategies and health education programs within senior centers to limit engagement in prolonged sedentary activities. Key findings are discussed in greater detail below.

### 5.1.1 Knowledge of Sedentary Behavior Terminology and Health Effects

In exploring the perceptions of sedentary behavior, a major finding was that participants understood the term *sedentary behavior* differently from the definitions published in the literature. In anticipation of this, the definition and examples of sedentary activities were provided at the beginning of each focus group. Participants were also prompted to reflect on the unique aspects of prolonged sitting during discussions. However, sedentary behavior continued to be interpreted along a continuum of physical activity as opposed to a distinct behavior independent of physical activity. This finding is consistent with previous studies (Compernelle et al., 2019; McGowan et al., 2019; McGowan et al., 2020; Warren et al., 2018) where participants often viewed being physically inactive (i.e., not meeting recommended guidelines for daily physical activity) as being sedentary.

Participants did demonstrate prior knowledge of the term based on information gathered from media sources and other health educators that too much sitting is detrimental to health. As such, they were able to engage in discussions about sedentary behavior using examples of activities like sitting or lying around at home watching television or listening to music. However, when prompted to discuss the seated activities that they would like to do less of as part of an effort to limit their sedentary time, some participants expressed a strong disinterest in giving up their sedentary activities or suggested physical activities they could do more of. Similarly, findings from McGowan et al. (2020) on how older adults construed sedentary behavior also showed participants struggled to identify suggestions to reduce sedentary behavior that did not involve moderate-to-vigorous physical activity (MVPA). While time spent in higher-intensity physical activities may displace time available for sedentary pursuits when the finite period within a 24-hour day is considered, a reduction in sedentary behavior can also be achieved through activities other than

MVPA such as standing to break up sedentary time, postural shifts (i.e., sit-to-stand transitions), and light-intensity physical activity (i.e., household chores and other instrumental activities of daily living) (Biddle et al., 2019; McGowan et al., 2020). The ambiguity between sedentary behavior and physical activity demonstrated during focus groups highlights the need for clear messaging with older adults regarding the distinct risk factors associated with sedentary behavior and strategies to reduce it. Messages should specifically target a reduction in sedentary behavior by incorporating language that includes examples of how to decrease sedentary time without large increases in MVPA.

### **5.1.2 The Paradox of Sedentary Behavior**

A second key finding from this inquiry was that participants regularly engaged in sedentary activities over extended periods despite knowledge of the associated negative health outcomes. Like previous qualitative studies (Chastin et al., 2014; Greenwood-Hickman et al., 2016; Leask et al., 2016; McEwan et al., 2017; Palmer et al., 2018; Tam-Seto et al., 2016), the present findings revealed participants were keenly aware of the short-term consequences and cautious of some the potential long-term effects prolonged sitting has on physical health. Bodily aches and stiffness, as well as potential weight gain and decreased physical capacity, were frequently reported as disadvantages to engaging in sedentary activities. Physical health (e.g., pain, mobility limitations, and illnesses and chronic health conditions) was identified as an important personal determinant of the amount of sedentary time older adults accumulated. This finding is consistent with a recent systematic review and thematic synthesis of 15 qualitative studies on sedentary behavior that found physical limitations were frequently cited as a key reason to engage in sedentary activities

(Compernelle et al., 2019). Strategies to reduce sedentary behavior should consider the range of physical capacities and offer older adults modified forms of participation.

The current inquiry also revealed the adverse emotional reactions older adults had to some of their sedentary activities in terms of guilt, boredom, and unfulfillment. This phenomenon is described in more detail in a study by Asztalos and colleagues (2015), who found significant associations between increased sitting and higher levels of anxiety, depression, and psychological distress. It's important to note that a lowered sense of mental wellbeing may depend on the context of sitting and the amount of social engagement. As in the current inquiry, participants mainly reported a decreased mood during solitary, sedentary activities like computer gaming or TV watching as opposed to more social sedentary activities.

Despite the perceived physical and mental costs, participants generally viewed their sedentary time as a positive contributor to their health and wellbeing. Paradoxically, these older adults valued their sedentary activities despite knowledge of the adverse health effects. Although participants had the first-hand experience with the physical and emotional costs of prolonged sitting, seated activities such as reading, computer use, crosswords/puzzles, crafts, and socializing with others were valued because of the perceived psychological, cognitive, social, and restorative benefits. This finding is supported by previous qualitative studies that show some sedentary activities are positively associated with psychosocial health and wellbeing among older adults (Chastin et al., 2014; O'Neill & Dogra, 2016; McEwan et al., 2017; Palmer et al., 2018), primarily because of the perceived social and mental benefits.

When mobility limitations and gradual decline in physical function is factored in (as was the case with many of the participants), activities such as listening to an audiobook, sitting and socializing with peers, or going on the computer can be viewed as positive adaptations to physical

limitations that enable continued engagement in meaningful activities. This sentiment is shared with that of Chastin et al. (2014) who found older adults did not perceive their sitting as unhealthy, but rather as a way to cope with changes related to chronic conditions and remain functionally independent. These findings suggest future programs should also consider seated activities that offer opportunities for mental stimulation, social connection, and relaxation.

### **5.1.3 Motivation, Habits, and Daily Routines**

A third key finding from this inquiry was that enjoyment was identified as a significant motivator among participants. Activities that provided enjoyment and social connection were highly valued, irrespective of whether the activity was considered sedentary or physically active. Participants shared how activity choices such as watching educational documentaries, socializing with friends and family, and going out to a museum were enjoyable and gratifying. This finding has been previously established in the literature with McGowan and colleagues (2019), who revealed through qualitative analysis of a sample of socioeconomically diverse older adults that enjoyment and social engagement were key motivating factors in activity selection. Similarly, retirement was viewed by participants as an excellent opportunity to meet new people and do more of the sedentary and non-sedentary activities they found enjoyable but did not have the time or energy for previously. Previous qualitative studies by Van Dyck et al. (2017) and Tam-Seto (2016) confirm this finding of the important role life transitions play in older adult sedentary behavior.

Participants tended to be motivated less by the prospect of future health benefits than more immediate interests, such as enjoyment or pain avoidance. In previous studies, older adults have reported placing value on activities that they perceived to be purposeful (McGowan et al., 2019) or offer social, cognitive, and restorative benefits (Palmer et al., 2018). Therefore, contrived

activities like standing at regular intervals during a seated activity to break up long sitting bouts may not be acceptable among older adults if the purpose is detached from the goal of the activity. Older adults may find it more acceptable if programs targeting a reduction in sedentary behavior provided a sense of achievement, enjoyment, or social connection.

While focus group discussions revealed some participants might have been consciously aware of their daily sedentary and non-sedentary activity choices, others discussed their sedentary behavior in terms of temporal patterns of activity that organized their day. Whether it was mediation and listening to the radio in the morning, sharing a meal or activity seated at the table, or reading in the evening, participants revealed these activities were deeply embedded into their daily routines. Palmer et al. (2018) identified determining factors that shaped the development of these sedentary routines were related to psychosocial and physical health.

Activity choices made by older adults may also be understood based on the habitual nature of sedentary behavior. Participants who shared feelings of guilt and unfulfillment after extended periods of solitary, sedentary activities like computer gaming or TV watching indicated they were generally not aware of the amount of time that had passed and suggested that they frequently engaged in these activities out of habit. Other participants who described the comfort and enjoyment gained from their sedentary activities shared similar sentiments. Greenwood-Hickman and colleagues (2016) found participants felt their preferred sedentary activities were inherently meaningful and were resistant to changing these habits. A dual-process model of older adults' sedentary behavior (Maher & Conroy, 2016) provides a useful framework to understand these habitual choices. The model emphasizes the automatic (i.e., nonconscious, effortless) and reflective (i.e., intentional, volitional) processes that exert influence on older adults' sedentary behavior. Findings from the present inquiry show that automatic motivation is a strong facilitator

of sedentary behavior engagement, which is also confirmed by Compernelle et al. (2019) in a systematic review of previous qualitative sedentary behavior studies where it was found that seated activities were viewed as an essential part of the day and contributed to wellbeing.

Participants in the present inquiry discussed reflective motivations used to limit sedentary behavior and increase physical activity. The cue-behavior pattern, as described by Maher and Conroy (2016), was leveraged by participants to relieve stiffness and other physical symptoms of prolonged sitting by taking standing breaks during commercials or walk around while talking on the phone. Additionally, findings revealed aging expectations and a resolve to remain active, caregiving responsibilities, and interpersonal relationships were as determining factors in discouraging sedentary behavior.

In sum, these findings suggest programs aimed to reduce older adult sedentary behavior should account for the habitual nature of sedentary behavior by targeting the external cue to disrupt the automatic behavior (Compernelle et al., 2019) or by raising conscious awareness sedentary habits with self-monitoring strategies (Compernelle et al., 2018). Additionally, strategies that target the intrinsic motivation by ensuring activities are mentally and socially engaging may also be a viable pathway to older adults integrating less sitting into their daily activities. Lastly, leveraging existing patterns within daily routines through an asset-based approach, as suggested by Leask and colleagues (2016), may also help modify older adult sedentary behavior.

#### **5.1.4 Ecological Influences on Sedentary Behavior and Healthy Aging**

The fourth and final key finding from this inquiry revealed participants were conscious of the ways the social and physical environment encouraged and discouraged sedentary behavior and healthy aging. Owen and colleagues' (2011) ecological model of sedentary behavior posits that

the behavior setting in which adults live and experience it are important determinants of sedentary behavior. In the present inquiry, participants discussed ways the social and physical context influenced sedentary behavior as well as healthy aging. Within the social context, societal norms and the social climate were perceived as an integral part of healthy aging, and they shaped participants' understanding of activities that are thought to age-appropriate for older adults. Participants felt constrained and stigmatized by the social and cultural expectation to sit.

Similarly, these findings are confirmed by a systematic review by Compennolle and colleagues (2019), which reveals older adults often experienced social pressure to sit in certain situations. Some participants shared experiences where they felt compelled to be more sedentary than they desired to be because of the labor-saving features of modern society, paternalistic attitudes of family members, or the low appeal of available community activities. These participants also lamented about older adult activities designed to be performed in sitting and what they perceived as an antagonizing standard. There was a strong desire to challenge these negative perceptions of aging by exerting their independence and vitality through the activities they engaged in.

Social support and feeling valued within the community were cited as factors that contributed to less sedentary behavior (McGowan et al., 2019). In the present inquiry, some participants discussed how engaging in socially-valued roles such as volunteering as an advocate at the center or assisting an older neighbor with grocery shopping created a sense of worth and promoted more activity into their day. Conversely, a lack of support and feeling undervalued may increase older adult sedentary behavior as a result of spending more time at home (McGowan et al., 2019). These findings suggest that access and availability to social programs and enjoyable

community activities likely would promote healthy aging and help older adults limit sedentary behavior.

The physical environment was the other behavior setting found in this study to be a salient influence on older adult sedentary behavior. Participants lauded their access to affordable transportation and community amenities, such as the senior center, as it allowed them to be mobile and engage in activities outdoors. The majority of participants lived in proximity and either walked or took public transportation to their local center. Differences in transportation mode among participants may be representative of the location of each center, and the population served. For example, one center is centrally located within a large low-income housing development where the majority of participants reported walking to the center. Previous research has confirmed the importance older adults placed on proximity to community activities and access to affordable transportation in reducing sedentary behavior (Compernelle et al., 2019). The ecological model also draws attention to the features of the built environment and transport infrastructure as determinants of sedentary behavioral choices (Owen et al., 2011).

A significant finding in this inquiry is the appreciation participants shared for their local senior center as they felt it had an essential role in promoting their wellbeing. Participants discussed the range of opportunities they had at the center to continue to engage in more of their favorite sedentary and non-sedentary activities. For some, just the act of getting out of the house to attend the center was an important part of their desire to remain physically active and socially connected. Participants viewed the senior center as a vital neighborhood resource where they can establish social relationships and engage in activities that support healthy aging. Being a member of the senior center likely fosters a stronger sense of community belonging, which may have helped participants be less sedentary (Anderson et al., 2016). Senior centers are excellent sites for health

promotion because of the range of programs that promote physical health, cognitive stimulation, and social engagement, helping older adults maintain an independent lifestyle and avoid premature institutionalization (Aday et al., 2019).

The role of senior centers in the community also illustrates the potential of senior centers as a *third place* (Oldenburg, 1999), or an informal community gathering space where people spend their leisure time interacting and exchanging ideas with others. As lifelong social networks get smaller with age because of retirement, widowhood, and divorce – while simultaneously becoming an expansive system of loose connections in a virtual world – the senior center is ideally suited as a third place where older adults can have meaningful opportunities to have fun and socialize in a physical space where they can exercise autonomy and self-determination (Hutchison & Gallant, 2016). Here, occupational therapists can advocate for community-level interventions, such as funding and policies that support the access and availability of senior centers as a way to reduce older adult sedentary behavior and promote healthy aging.

## **5.2 Strengths and Limitations**

This mixed-methods needs assessment provides detailed insight from a diverse group of older adults drawn from two senior centers in New York City regarding their perceptions of sedentary behavior and healthy aging. A major strength of this study was the rich, detailed views on sedentary behavior and healthy aging gathered from older adults. These views can inform the development of sedentary reduction messages and programs with the two center centers. Participants also expressed appreciation for the solicitation of their input on activities at their center. In sharing their recommendations, participants were able to exercise control and self-

determination in their lives – key pillars of healthy aging (Hutchinson & Gallant, 2016; Aday et al., 2019). An additional strength of this study was the diverse demographic composition of participants, which enabled a broader range of perspectives to be explored.

Findings from this inquiry should be interpreted with caution, however, as there are important limitations to consider. First, this inquiry used a convenience sampling method that limits the transferability to other senior centers and broader populations, including those that may be more sedentary and isolated because of health issues. Further, participants may have been more motivated and socially-engaged, and thus their experiences may not be representative of other individuals at the centers who did not participate. Second, activity patterns and sedentary behavior were self-reported by participants, which introduces the risk of social desirability bias. Additionally, the survey included the use of an adapted sedentary behavior questionnaire that combined two previously validated instruments but was not validated itself. While the principal investigator adhered to ethical guidelines for conducting research, the trustworthiness of this inquiry may be questioned as the lead researcher also administered study protocols and collected and analyzed data.

### **5.3 Implications for Practice**

There are some key implications from this inquiry that will aid ongoing fieldwork collaborations to better support student learning and enhance the delivery and acceptability of an occupational therapy health promotion program targeting older adult sedentary behavior. The findings of this inquiry support the development of a health education workshop focusing on a

reduction in sedentary behavior in older adults and revisions to the senior center fieldwork orientation manual used by students.

It is important to increase older adult knowledge of the detrimental health consequences of prolonged sitting and its distinction from a lack of physical activity. This could be achieved by piloting a tailored sedentary behavior reduction workshop at the senior center that would be delivered by occupational therapy fieldwork students. Participants in this study were found to conflate reducing sedentary behavior with increasing physical activity. To educate older adult participants, this workshop could meet weekly throughout the students' fieldwork rotation (6 weeks or 12 weeks) and provide an engaging group experience consisting of didactic education, group problem-solving, opportunities for personal reflection, and direct experiences in reducing sedentary behavior. Sessions would focus on refining the messages older adults receive on sedentary behavior reduction, highlighting some important considerations: (1) Standing is important. But, prolonged static standing is just as harmful as prolonged static sitting. The refrain, "the best posture is the next posture" (Biddle et al., 2019, p. 14), can be used to draw attention to the use of postural transitions to break up extended periods of sitting. (2) It is important to emphasize recommendations to sit less *and* be physically active, as these are distinct behaviors (Biddle et al., 2019).

In this weekly workshop, the messaging will be equally as important as the message. Participants in the current inquiry expressed there were many social and cognitive benefits to the sedentary activities they engage in, providing meaning and structure in their lives. Attempts to eliminate these activities are likely to be received negatively. Instead, positively-framed messages might be more persuasive. Older adults can be asked to stand up at regular intervals, or on other triggers, during seated activities to break up extended periods of sitting. This approach is better

suited to be tailored to fit individuals' circumstances, emphasizing the integration of activity into sedentary time as opposed to discontinuing the activity altogether. Through goal setting and action planning process, older adults can be supported in identifying ways they can use purposeful and enjoyable activities (i.e., volunteering, caregiving, home management, social activities) and incidental disruptions (i.e., refreshment and bathroom breaks) to limit engagement in sedentary activities. This is in line with an asset-based approach described by Leask and colleagues (2016; 2017), where personal resources and existing routines can be leveraged to modify sedentary practices.

Additionally, the workshop design would be grounded in health behavior theory (e.g., social cognitive model, transtheoretical model) to integrate specific behavior change techniques to address habitual sedentary behavior. Journaling and other forms of self-monitoring would be incorporated to provide feedback and increase awareness of cue-behavior patterns to disrupt automatic processes of sedentary behavior (Compernelle et al., 2019). Furthermore, the group facilitator – the fieldwork student(s) in this case – would play a key role in helping older adult participants manage their sedentary behavior. The fieldwork students would help in creating personal action plans, setting attainable and client-centered goals, and creating a social and enjoyable group dynamic where participants feel supported 'try on' new behaviors and role-play individualized behavior change strategies. Therefore, future fieldwork students would be oriented in the methods of the workshop and supported by fieldwork supervisors as they apply health promotion knowledge and skills into practice.

#### **5.4 Implications for Ongoing Fieldwork Collaboration with Senior Centers**

A core issue within the problem of practice was previous LIU OT fieldwork students cited role confusion and difficulty managing unstructured time during their fieldwork experience. The development of a sedentary behavior reduction workshop will ultimately lead to more structure and direction for future LIU OT fieldwork students assigned to these senior centers. With the support of senior center administration, this workshop can be delivered as a complement to the other healthy aging educational programs, thereby creating clear directives of tasks fieldwork students should execute on their fieldwork days. The workshop syllabus and weekly session content will be added to the students' fieldwork orientation manual for implementation during fieldwork. Furthermore, with expectations delineated, the on-site and off-site supervisors can provide fieldwork students with the necessary support and guidance. Also, focus groups and surveys with older adult participants can be revisited as part of a process of continuous improvement to elicit their insights and feedback.

The process of the present inquiry and its findings have significantly contributed to the understanding of health promotion program development in community settings, guiding the ongoing fieldwork collaboration with the senior centers. Study findings and program recommendations will be disseminated to senior center staff and senior leadership as well as the LIU OT program director and fieldwork personnel. Participants shared they appreciated the current selection of programs and offered suggestions for new initiatives (e.g., healthy living seminars, intergenerational programs, technology classes) that they felt would support their health and social engagement. Also, the feedback obtained may enhance the acceptability of certain features of center activities such as adding livelier, age-integrated, and vigorous activities as well as more flexible scheduling of class times.

Communicating these findings will help senior center staff and leadership sharpen their understanding of occupational therapy's role in facilitating healthy aging through lifestyle programs related to sedentary behavior and physical activity. Sharing the scholarship on sedentary behavior, findings from focus groups and program recommendations will strengthen the relationship, foster a collaborative approach, and optimize the university-community partnership. While members of the leadership and site champions may find current occupational therapy services acceptable, continuing to develop trust through information sharing and regular communication may increase others' perceptions of acceptability, thereby solidifying roles and expectations of occupational therapy fieldwork students.

## **5.5 Summary**

The purpose of this mixed-method needs assessment was to explore the perceptions community-dwelling older adults maintain about sedentary behavior and its influence on healthy aging. This was an important initial step in addressing the problem of practice that was discovered during a review of occupational therapy student feedback regarding their community-based fieldwork experience at senior centers. Through surveys and focus group discussions, participants shared their perceptions of sedentary behavior and healthy aging, revealing the multidimensional determinants and socioecological influences of older adult sedentary behavior. Participants acknowledge the physical costs of extended periods of sitting. However, they also perceived many psychological, cognitive, and social benefits to the sedentary activities in which they engaged. These activities are habitual and provide meaning to day-to-day routines that can ultimately be understood as supportive of continued engagement in life activities. Health promotion messaging

strategies targeting a reduction in sedentary behavior should incorporate these findings in the design of senior center programs that older adults will find acceptable. This needs assessment provides the foundation for the development of a sedentary behavior reduction workshop for older adults, associated syllabus, and continued evaluation that can be used to guide the fieldwork experience of future LIU occupational therapy students assigned to these senior centers. The inclusion of older adult voices in the program development process is, in itself, health-promoting and empowering. Planning more effectively for fieldwork collaborations with community partners ensures occupational therapy-led senior center programs can better support the health and wellbeing of the older adult population.

## Appendix A Introductory Script

**Purpose of the Research:** The purpose of this research study is to determine perceptions older adults hold regarding sedentary behavior and how it may influence the ability to age well. Insights gained from this study may help improve healthy aging programs offered by occupational therapy students here at the center.

**Description of Procedures:** This study involves an in-person one 1-hour small group interview. In this study, a total of 5 – 7 focus groups will be conducted in all. All focus groups will be moderated by the principal investigator, who will ask group members several questions on sedentary behavior and healthy aging in order to facilitate discussion. As approved through the University of Pittsburgh's Institutional Review Board, focus groups will be audio-recorded and transcribed by a third-party following the sessions. Additionally, at the end of the focus group interview, you will be asked to complete a brief 10-minute survey about your overall health and the types of activities you engage in as part of your daily routine.

**Duration of Procedures:** Each focus group will last approximately 1 hour and the survey will take no more than 10 minutes to complete. The data collection part of this study is expected to be completed by April 2020.

**Risks and Discomfort:** Every effort will be made to protect your research study data. There is, however, always the possibility of a breach of confidentiality. Electronic research data including audio recordings will be stored on a password-protected server. Paper forms will be stored in a locked cabinet. Only approved research team members will have access to data sources. Any identifiable information collected will be stored separately from research data using a linking code to de-identify the data.

If you feel uncomfortable with any questions or discussion, you have the right to decline participating without penalty. In the event of a withdrawal from the study, information already collected from you during this study may only be used with your permission. Please note that for focus group interviews, it will not be possible for you to withdraw the information already shared in the focus group up until that point.

**Benefits:** There are no obvious or direct benefits to you by participating in the study. However, your time is greatly appreciated. Your insights will contribute to the greater good by increasing understanding of important aspects of sedentary behavior and healthy aging.

**Statement of Participation:** Participants must be at least 60 years old to participate in this study. Participation in this project is voluntary. Compensation will not be offered for participation. However, light refreshments will be available during the focus group.

**Statement of Confidentiality:** The group interview will be conducted in a private or semi-private area to ensure privacy and confidentiality of participants. Notes will be taken during the focus group interviews. Given the nature of focus groups, anonymity cannot be guaranteed because we will be discussing this topic in each other's presence. Participants will be reminded to respect the privacy of fellow participants and not repeat what is shared in the focus groups to others.

Both survey and interview responses will remain confidential. No names or personally identifiable information will be included in the final report which will be published in the form of a doctoral dissertation and/or professional presentations. De-identified data from the study will be shared with a transcription service to convert the audio files into text. All responses and findings of this study will be kept secure, under lock and key, in password-protected files, and/or in encrypted electronic storage during and after the

completion of the study. It is the policy of the University of Pittsburgh that all research records must be maintained for at least 7 years following final reporting.

In the event of an unexpected breach of confidentiality, the likelihood that the unauthorized party accessing that data would be able to connect a participant to their responses would be minimal based on data security procedures (linking code, storing identifiers separately from data, etc.). Any breaches in confidentiality will be reported to the University of Pittsburgh's Institutional Review Board.

If you have any questions regarding the research, you can contact Efekona Nuwere at (XXX) XXX-XXXX or my research advisor, Sharon Ross, Ph.D. at (XXX) XXX-XXXX.

If you have any questions about your rights as a research subject or wish to talk to someone other the research team, please call the University of Pittsburgh Human Subjects Protection Advocate toll-free at XXX-XXX-XXXX.

The above information has been explained to me and all of my current questions have been answered. I understand that I am encouraged to ask questions, voice concerns or complaints about any aspect of this research study during the course of this study, and that such future questions, concerns or complaints will be answered by a qualified individual or by the investigator at the telephone number(s) given.

## Appendix B Focus Group Discussion Guide

<b>Opening</b>	<p>First, I'd like us all to introduce ourselves. Let's go around the room, share your first name only, and your favorite class or activity at the center.</p>
<b>Introduction</b>	<p>Today, I would like to get your thoughts on sedentary behavior and how it influences our ability to stay healthy as we get older.</p> <p>When I say the term <i>sedentary behavior</i>, I am referring to any activity that involves sitting, reclining, or lying down over a period of time and requires very little exertion of energy.</p> <p>For example, activities like reading, watching TV, playing bingo, using a computer/tablet, and sitting and having coffee at a café with a friend are all considered sedentary behaviors.</p>
<b>Sedentary activities</b>	<p>Tell me about the activities you engage in during a typical day that involve sitting.</p> <p><i>Probe:</i> Describe how you feel (physically, emotionally) when you have been sitting for a long stretch of time in a given day?</p>
<b>Sedentary behavior and aging</b>	<p>How has your activity level has changed over the years?</p> <p><i>Probe:</i> In what ways have you become more active? In what ways have you become more sedentary?</p> <p>Tell me about the reasons that led to these changes in your activity level?</p>
<p><i>Transition sentence: "I'd like to explore your perceptions of these activities a bit more with you..."</i></p>	
<b>Benefits of sedentary behavior</b>	<p>What do you find beneficial about the seated activities you typically engage in?</p> <p><i>Probe:</i> What role do these activities play in your social life? Physical health? Mood? Mental capacity?</p>
<b>Costs of sedentary behavior</b>	<p>Are there any sedentary activities you would like to do less of? If so, why?</p>
<b>Factors that discourage sedentary behavior</b>	<p>Tell me about the things that cause you to sit less and be more active during the day.</p> <p><i>Probe:</i> Social climate? Physical surroundings? Mood?</p>
<b>Influence of senior center</b>	<p>How does coming to the center as part of your routine cause you to sit less in your daily life?</p> <p>In what ways has coming to the center contributed to you sitting more during the day?</p>

<i>Transition sentence: “I would like to continue to get your input on what healthy aging means to you...”</i>	
<b>Healthy aging</b>	<p>When you hear the term “healthy aging”, what words come to mind?</p> <p><i>Probe: How do you think healthy aging can be achieved? What helps you stay healthy as you get older? What gets in your way of staying health as you get older?</i></p>
<i>Transition sentence: “Before we end today, I would like to continue to get your input on the programs at center...”</i>	
<b>Senior center programs to reduce sedentary behavior</b>	<p>Would you like to see added programs here that may help break up sitting for longer periods and encourage more activity during the day? If so, what kind of added programs would you like to see?</p>
<b>Final thoughts</b>	<p>Is there anything else that you want me to know, that I did not ask, with regards to your understanding of sedentary behavior and how it influences healthy aging?</p>

## Appendix C Survey of Older Adult Sedentary Behavior

The following questions ask about activities **you did over the past 7 days** while sitting or lying down.

*\*\*\*For each activity, count only the time when it was your main activity. For example, if you were watching television and eating a meal, count it as television time or eating a meal, but not as both\*\*\**

On a typical day in the past 7 days, how much time do you spend:

	None	15 minutes or less	30 minutes	1 hour	2 hours	3 hours	4 hours	5 hours	6 hours or more
<b>LEISURE TIME</b>									
1. watching television, DVD or streaming videos									
2. sitting listening to music, radio, or audiobooks									
3. sitting reading a book or magazine									
4. using the Internet (e.g., Facebook, online games, shopping)									
5. sitting and talking with friends or family (including talking on the phone)									
6. doing hobbies, e.g. artwork/crafts, knitting, crosswords, musical instrument									
7. sitting outside in garden or park									
8. sitting and eating meals or drinking tea/coffee at cafes and restaurants									
9. doing puzzles or playing board games									
<b>WORK &amp; VOLUNTEERING</b>									
10. driving for work									
11. using a computer for work									

12. doing administrative tasks for work									
<b>TRANSPORTATION</b>									
13. driving or riding in a car, bus, or train									
<b>HOUSEHOLD</b>									
14. performing household administrative tasks (e.g., sorting paperwork, managing medication, paying bills)									
15. sitting and eating meals or drinking tea/coffee									

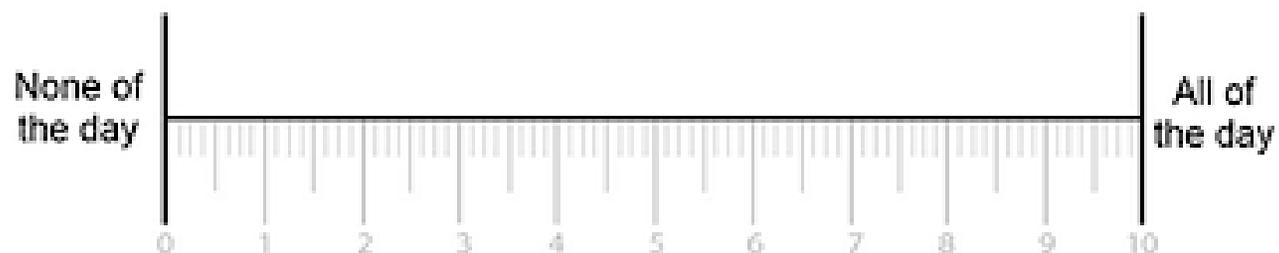
### Appendix D Sedentary Behavior Visual Analog Scale

**In the past week, on average, what proportion of each day did you spend sitting?**

**Please mark an X on the line.**

Yesterday, what proportion of the day did you spend sitting?

Please mark an X on the line.



## Appendix E Survey of Health Status, Daily Activity Patterns, & Demographic Characteristics

We aim to help individuals remain active and healthy in the community by offering a range of programs and services. These include workshops, fitness classes, informative presentations, community outings, and other services to help you stay healthy.

We want to learn more about you and the activities you regularly engage in. Please take a few minutes to fill out this survey. Your input is greatly appreciated!

All of your responses will be kept confidential.

### 1. How often do you usually come to this center?

- a) Less than once a month
- b) A few times a month
- c) Once a week
- d) A few times a week
- e) Daily

### 2. How do you usually get to this center?

- a) Private car
- b) Access-A-Ride
- c) Public subway or bus
- d) Walk or bike
- e) Other (specify): \_\_\_\_\_

### 3. Would you say that, in general, your overall physical health is:

- a) Excellent
- b) Very Good
- c) Good
- d) Fair
- e) Poor

### 4. Would you say that, in general, your overall mental health (including stress, depression, and problems with emotions) is:

- a) Excellent
- b) Very Good
- c) Good
- d) Fair
- e) Poor

The next questions are about physical activities that you may have done over the past 30 days. First, you will be asked about activities that are related to transportation. Then you'll be asked about physical activities that you do for work or at your leisure.

**5. Over the past 30 days, have you walked or bicycled as part of getting to and from work or to do errands?**

- a) Yes
- b) No
- c) Unable to do activity
- d) I don't know

**6. Over the past 30 days, did you do any vigorous recreational activities for at least 10 minutes that caused heavy sweating, or large increases in breathing or heart rate? *Some examples are running, lap swimming, aerobics classes or fast bicycling.***

- a) Yes
- b) No
- c) Unable to do
- d) Don't know

**If yes, how often did you do this?**

- a) Once a week
- b) A few times a week
- c) Most days in the week
- d) Everyday
- e) I do not know

**7. Over the past 30 days, did you do moderate recreational activities for at least 10 minutes that caused only light sweating, or a slight to moderate increase in breathing or heart rate? *Some examples are brisk walking, bicycling for pleasure, golf, and dancing.***

- a) Yes
- b) No
- c) Unable to do
- d) Don't know

**If yes, how often did you do this?**

- a) Once a week
- b) A few times a week
- c) Most days in the week
- d) Everyday
- e) I do not know

**8. Over the past 30 days, did you do any tasks in or around your home or yard for at least 10 minutes that caused heavy sweating, or large increases in breathing or heart rate? *Some examples are raking leaves, gardening, or heaving cleaning.***

- a) Yes
- b) No
- c) Unable to perform
- d) Don't know

**If yes, how often did you do this?**

- a) Once a week
- b) A few times a week
- c) Most days in the week
- d) Everyday
- e) I do not know

**9. Compared with most adults my age, I would say that I am:**

- a) More physically active
- b) Less physically active
- c) About the same

*Thank you very much for your time and cooperation! Your response will help us better understand sedentary behavior within the community.*

**1. What is your age? \_\_\_\_\_**

**2. What is the zip code where you currently live? \_\_\_\_\_**

**3. What is your gender?**

- a) Female
- b) Male
- c) Other \_\_\_\_\_

**4. Which one or more of the following would you say is your race/ethnicity? (select all that apply)**

- a) Asian
- b) Black or African American
- c) Hispanic
- d) White
- e) American Indian or Alaskan Native
- f) Pacific Islander
- g) Other (specify): \_\_\_\_\_

**5. What is the highest degree or level of school you have completed?**

- a) Less than high school degree
- b) High school degree or equivalent (e.g., GED)
- c) Some college
- d) College degree or higher

**6. What is your marital status?**

- a) Single, never married
- b) Married/committed relationship
- c) Widowed
- d) Divorced
- e) Separated

**7. Do you live alone?**

- a) Yes
- b) No

**If you do not live alone, who do you live with:**

- a) Spouse/partner
- b) Children/grandchildren
- c) Siblings or relatives
- d) Other \_\_\_\_\_

**8. Of the following categories, which best describes your employment status?**

- a) Employed for wages
- b) Self-employed
- c) Retired
- d) Out of work and looking for work
- e) Out of work but not currently looking for work
- f) Disabled, unable to work

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