



UNIVERSIDADE D
COIMBRA

Suellen Pereira da Costa

**DAILY MOBILITY AND SOCIAL INTERACTION
OF OLDER ADULTS' DOG OWNERS:
A SCOPING REVIEW**

**Master's dissertation in Social Intervention, Innovation and
Entrepreneurship, advised by Doctor Helena Luz and co-advised
by Doctor Liliana Sousa presented to the Faculties of Economics
and the Faculty of Psychology and Educational Sciences of the
University of Coimbra.**

October, 2021



FEUC FACULDADE DE ECONOMIA
UNIVERSIDADE DE COIMBRA

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*In memory of Nílzio Pereira and Zenalva Castro (Nega),
Forever my "Vovis".*

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Giving thanks is always an overflowing act.

My desire is to spill over to all who were and are part of my days.

To you, my heart full of gratitude.

I appreciate the kindness, simplicity, love and understanding of my parents Aster and Helia, thank you for letting me be, what a joy to be your daughter.

Thank you Alan and Carla my brother and sister-in-law, your existence makes me happy.

...

To my friends, thank you for always pushing me, listening to me and welcoming me. I'm so privileged to have you. Thanks for the encouraging words helping me see possibilities when I no longer see them.

For being a "walker" alive between comings and goings, but it's good that our friendship persists.

....

I crossed the ocean, and in this foreign land

I met people of mine...

Teresa and Guedes you were essential! Thank you for giving me so much love and affection, necessary support and for being more than friends with this stranger.

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...

Getting here was a path with many embarrassments
And I certainly didn't do it alone, the above list is just a summary of the immensity
of belonging to God.

In this belonging, being strong and courageous was the only thing He asked of
me.

I live the rest that You are enough, Eternal.

My departure and my north.

For You
my whole life.

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When God restores, we are like a dreamer.

(Psalm 126.1)

ABSTRACT

Life expectancy indicators in Europe show a rapid growth in the number of people very old persons (aged 85+ years old). In 2019 there was 90.5 million people aged 65+ years old living in the EU-27, 38.2% living in urban areas. Achieving longevity is good, in particular if accompanied by health and well-being. Maintaining mobility and fostering social interaction are essential aspects included in the active and healthy aging paradigm. The human-animal relationship is an area of study that is gaining space in investigation and intervention, due to its potential to provide health benefits, in particular by strengthening social interactions and the processes of rehabilitation. However, the impacts of interactions between older adults and companion dogs (non-therapeutic situations) have not been examined extensively. Therefore, this scoping review aims to map the existing evidence regarding the impact that having a companion dog has on the daily mobility and social interactions of older people living in urban areas. Main findings, overall, indicate that dog ownership results in positive impacts on mobility and social interaction of the older adults. The dog is a stimulus for the owner to move around at home and outside; this last contributes to the social interaction of the older individual through the social contacts that are built mainly in the neighborhood.

Keywords: Community; Companion Dog; Senior; Social Interaction; Daily Mobility;

RESUMO

Os indicadores de esperança de vida na Europa mostram um rápido crescimento do número de pessoas com mais de 85 anos. Em 2019, havia 90,5 milhões de pessoas com mais de 65 anos a viver na UE-27, 38,2% a viver em áreas urbanas. Alcançar a longevidade é bom, especialmente se for acompanhado de saúde e bem-estar. Manter a mobilidade e promover a interação social são aspectos essenciais do paradigma do envelhecimento ativo e saudável. A relação homem-animal é uma área de estudo que tem vindo a ganhar espaço na investigação e intervenção, pelo seu potencial de trazer benefícios para a saúde, nomeadamente através do reforço das interações sociais e dos processos de reabilitação. No entanto, os impactos das interações entre adultos mais velhos e cães de companhia (situações não terapêuticas) não foram examinados exaustivamente. Portanto, esta análise de escopo, mapeou as evidências existentes quanto ao impacto que ter um cão de companhia, reflete na mobilidade diária e nas interações sociais de pessoas mais velhas que vivem em áreas urbanas. E concluiu que as evidências dos estudos analisados, apontam que a posse de cães resulta em impactos positivos para a mobilidade e para a interação social de adultos mais velhos. O cão é um estímulo para o dono se movimentar em casa e durante os passeios com o cão, e contribui para a interação social dos idosos por meio dos contatos sociais que são construídos na vizinhança.

Palavras-chave: Comunidade; Cão de Companhia; Senior; Interação Social; Mobilidade Diária;

ABSTRACTO

Los indicadores de esperanza de vida en Europa muestran un rápido crecimiento en el número de personas mayores de 85 años. En 2019, había 90,5 millones de personas mayores de 65 años viviendo en la UE-27, 38,2% viviendo en áreas urbanas. Lograr la longevidad es bueno, sobre todo si va acompañado de salud y bienestar. Mantener la movilidad y promover la interacción social son aspectos esenciales del paradigma del envejecimiento activo y saludable. La relación humano-animal es un área de estudio que ha ido ganando terreno en la investigación e intervención, debido a su potencial para aportar beneficios a la salud, concretamente mediante del refuerzo de las interacciones sociales y los procesos de rehabilitación. Sin embargo, los impactos de las interacciones entre los ancianos y sus perros de compañía (situaciones no terapéuticas) no se han examinado a fondo. Por lo tanto, esta revisión del alcance mapeó la evidencia existente sobre el impacto que tener un perro de compañía refleja en la movilidad diaria y las interacciones sociales de las personas mayores que viven en áreas urbanas. Y concluyó que la evidencia de los estudios analizados indica que tener un perro tiene como resultado impactos positivos en la movilidad y la interacción social de los adultos mayores. El perro es un estímulo para que el dueño se mueva en casa y durante los paseos con el perro, y contribuye a la interacción social de las personas mayores mediante los contactos sociales que se construyen en el barrio.

Palabras-llave: Comunidad; Perro de Compañía; Mayor; Interacción Social; Movilidad Diaria;

ACRONYM LISTS AND ABBREVIATIONS

AAS - Animal Assisted Activities

AAT - Animal Assisted Therapies

ADL - Activities of Daily Living

CEC - Commission of the European Communities

COPD - Chronic Obstructive Pulmonary Disease

FEDIAF - The European Federation of the Pet Food Industry

HAI - Human-Animal Interaction

IADL - Instrumental Activities of Daily Living

INE - Instituto Nacional de Estadística

SDGs - Sustainable Development Goals

UE - Union European

UN - United Nations

UNDESA - Population Division of the UN Department of Economic and Social Affairs

UNECE - United Nations - Economic and Social Council

WHO - World Health Organization

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INTRODUCTION

This research is based in the understanding that dogs as companion animals are active participants throughout their owners' lives. Currently, the paradigms about aging are distancing from disease-focused approaches and redirecting towards conceptions of capacity and increasing quality of life. Active and healthy aging supports the optimization of the older individual's participation in society (WHO, 2002).

People age and their mobility and opportunities to socially interact and form relationships tend to diminish (Lefrançois et al., 1998). Several factors contribute to the lower daily mobility and social interaction of the older people; (i) the retirement process, which means that there is no need to go out every day and leads to the loss of daily contact with co-workers (Glass et al., 1995; Handley et al., 2021); (ii) the health problems then often come as people age (Shumway-Cook et al., 2005); (iii) the physical frailty that can affect mobility and contribute to the reduction of social interactions (Gardner, 2014; Metz, 2000); and/or (iv) mourning the loss of relatives, especially spouses and close friends (Holt-Lunstad et al., 2015). The daily social interactions contribute to well-being of older adults and to improve their physical and mental health; in fact, the lack of daily social interactions and the reduced mobility is related to social isolation, loneliness, and greater functional dependence (Krause-Parello, 2012; Krause-Parello et al., 2019; Stanley et al., 2014). Therefore, some studies have emerged with the hypothesis that a pet (particularly a dog pet) can be an important companion for older people (Bennett et al., 2015; Himsforth & Rock, 2013; Kojima et al., 2020).

This scoping review aims to understand the relationship between having a companion dog and daily mobility and social interactions of older people living in urban communities. Daily mobility is a multidimensional concept that encompasses both aspects of the individual and the ability to move around the house; as well as the opportunities and possibilities to leave home, use transport, access equipment and services (Webber et al., 2010). Social interaction comprises the various contacts and relationships that the older adults maintain in their daily lives, in the

most diverse environments, involving relatives, friends, service providers and the neighborhood (Dall et al., 2017; Kim & Kaplan, 2004).

The structure of this dissertation is presented in six parts: the first chapter presents a theoretical framework on longevity and active and healthy aging; the second chapter outlines aspects of mobility and social interaction involved in functional skills of the older adults; the third chapter, focus the relationship and importance of the bond among human and animal, with emphasis on pets; the fourth chapter presents the objective and methodology (including the methods of search and selection of papers, as well as the data extraction process); the last two chapters are the presentation and discussion of the results, respectively.

CHAPTER 1 - DEMOGRAPHY AND LONGEVITY

Population aging is a trend with global expression: "Persons aged 65 years or over outnumbered children under five years of age worldwide" (United Nations, 2019, p. 16). The UN (2019) show that in Europe, the region with the largest proportion of aged people, population aging has achieved exceptional characteristics, translated in the increasing longevity of the population. In Portugal, the fourth most aged country in the world, "life expectancy at age 65 reached 19.61 years for both sexes in the 2017-2019 triennium. Men aged 65 can expect to live an average of 17.70 years and women over 21.00 years" (INE, 2019, p. 81). Therefore, it is essential to understand the heterogeneity in the older population, and its impact on economic unsustainability (CEC, 2002). This aging process in Europe is demographically explained by three aspects: the "decrease in birth rates, increased longevity and migration of young adults" (Padeiro, 2021, p. 25).

Life expectancy indicators in Europe show a rapid growth in the coming years in the number of people aged 85+ years old. It is estimated that in 2019 there will be 90.5 million people aged 65 and over living in the EU-27 and, of these, 38.2% living in urban regions (European Union, 2020). The economic impact of the increasing older population is a concern that has long been discussed by international organizations. In contrast to the reduction in birth rates in developed and developing countries, it is estimated that the number of older people will soon surpass the number of populations in labor activity (Quaresma, 2007; WHO, 2002). Therefore, increase in life expectancy raises a series of challenges regarding social and physical barriers that affect the health and quality of life of the older adults. And it is through the implementation of policies and services, consolidated medical, social and technological advances, that the older population, especially in developed countries, may obtain better quality of life (WHO, 2002).

1.1 Contemporary aging societies: Challenges

Aging presents challenges to contemporary society, evoking attention to long-term care that is not limited to basic health needs, but that include aspects related to physical and social environments that are friendly to the older person, in addition to the importance of having specialized professional training (WHO, 2018).

Furthermore, there are issues that are directly related to urban mobility, such as the limitations and risks that the older people face, for instance regarding falls, and diseases that affect their physical and/or cognitive capacities (WHO, 2019). By reaffirming the right that everyone should have to live a long and healthy life, the WHO signals the role played by the environments (physical and social), exposure to health risks, and access to services (WHO, 2018). Currently there are at least three major challenges that have fostered emergency actions by world organizations, which are the social isolation and loneliness of the older people, the “ageism”, and the technological advances of the digital era. The isolation and loneliness of the older adults is a public and political health problem (WHO, 2021b), and already accounts for approximately 6.3 million cases of depression in the world (WHO, 2020a, p. 51). The theme is already part of the main areas of action of the Healthy Aging Decade 2020-2030 as it affects older people around the world. Ageism permeates societies, and directly affects the older people. The WHO in a specific report on the subject (2021a) highlights the harm of this type of conduct, which is intrinsic to society (organizations, service providers, professionals from different segments, policies) and outlines strategies to overcome this challenge,

For older people, ageism is associated with a shorter lifespan, poorer physical and mental health, slower recovery from disability and cognitive decline. Ageism reduces older people’s quality of life, increases their social isolation and loneliness (both of which are associated with serious health problems). (WHO, 2016, p.3)

The report calls for quick action to implement strategies to overcome this type of discrimination, which has several negative effects on the health of the older adults, namely by affecting the mental health. Social isolation and loneliness, together with ageism have a devastate impact the quality of life during longevity. Technological advances bring benefits to the advancement of medicine, offer improvements in the provision of services, by optimizing processes, automating information and improving interventions that partially justify the increase in longevity. However, are also one of the main causes of stress and exclusion for the older population. The fast-paced globalized world and generational differences weigh directly on the cognitive difficulties and slower learning processes that affect many older individuals. Older people face everyday situations without knowing how to handle technological equipment and without receiving guidance and information

about it, especially when they are in situations of social vulnerability (UNDESA, 2021; UNECE, 2021).

All these challenges were aggravated by the Covid-19 pandemic. Longevity has been affected. Preliminary and recent studies carried out in England, Wales and the USA have found that the current pandemic has affected life expectancy at birth and at age 65 years. The decline is up to 1.7 years in women and 1.9 years in men in England and Wales at birth (Aburto et al., 2021); and a reduction of 1.13 (women) and 0.87 (men) years in life expectancy at age 65 in the USA. This is due to the high fatality rate of the disease in the older adults (Andrasfay & Goldman, 2021). The social isolation and loneliness of the older adults was aggravated, in consequence of social distancing measures, which affected the social interactions, raised the social isolation of several older people who already had it and of those who started to live it (Sepulveda Loyola et al., 2020; Wu et al., 2020). In addition, age prejudice (ageism) was reinforced in the discourses regarding COVID-19 (Stange & Roos, 2020), as well as the digital exclusion that gained greater dimensions when social relationships and activities were transferred to virtual rooms.

The COVID-19 pandemic has highlighted the unequal access to digital technologies across and within populations. Older persons are more likely to be digitally excluded and to experience barriers accessing goods and services that are increasingly provided online. Digital exclusion reduces opportunities for active and healthy ageing, including social and economic participation (Europe, 2021, p.1).

Dr. Etienne Krug, Director of the WHO Department of Social Determinants of Health, in an interview with the UN (2020b) reaffirms the need for a "comprehensive UN approach in support of healthy aging capable of galvanizing international action to improve the lives of older people, their families and communities, both during and after the COVID-19 pandemic". In this context of constant changes in population dynamics, and unpredictable factors such as the emergence of diseases on a global scale, there are great challenges in society. This is imposing the need to adopt an integral perspective of aging, considering health, economy, social and political factors (Luz, 2020; WHO, 2002). It is necessary to "deconstruct the concepts that associate old age with states of incapacity and decline and the configuration of a more plastic approach, capable of facing the older people from a different perspective and of social (re)valuation" (Luz, 2020, p. 808).

Thus, where individuals with dependence and/or loss of autonomy and others more autonomous and independent coexist, it is necessary to consider the socioeconomic inequalities that affect the course of life and are accentuated in old age, and the determinants:

...personal (biological, genetic and psychological factors), behavioral (mental health, social participation and healthy lifestyle choices), economic (income, decent work opportunities and social protection), social (social support and access to resources social, educational and fundamental rights), social and health services (oriented towards health promotion and disease prevention) and physical environment (accessibility to basic services) (Luz, 2020, p.811).

It is important to adopt a concept of positive aging and activation of the older people to increase their well-being, quality of life and prevent deterioration in the aging process. The heterogeneity of this population should be considered, as well as the balance and multidimensionality of the determinants that surround them, to build a comprehensive, inclusive, and integrated conception of aging (Luz, 2020).

1.2 Active and Healthy Aging

1.2.1 Background: psychosocial theories of aging

Active and healthy aging are results of a process of discussion of theories of sociological origin that emphasize the psychosocial aspect of individuals and of the aging process. Two main theories are relevant: activity theory and the continuity theory. Activity theory was originally theorized by Havighurst and colleagues in 1961, pointing to the existence of a positive relationship between activity and life satisfaction, i.e. the greater the loss of social role, the lower the satisfaction with life. So, successful old age is attached to the discovery of new roles in life (Lemon et al., 1972). The continuity theory proposed Robert Atchley (1989) emphasizes aging as an extension of our existence, a part of the life cycle. It emphasizes that aging is more than a final stage, since older adults continue to have life habits, endowed with their personality and preferences.

These theories were main drivers for the concept of successful aging. The main components of successful aging are "the low probability of diseases and

disabilities related to diseases, the high cognitive and physical functional capacity and active involvement with life" (Rowe & Kahn, 1991, p. 433). The concern with the low probability of disease implies the "presence or severity of risk factors for the disease" (Rowe & Kahn, 1991, p. 433). About the high functional level, there are the physical and cognitive components; and regarding the active involvement with life, there are several points of attention, such as: interpersonal relationships (or social interactions), support and direct assistance and productive activity (remunerated or not; anyway, creating value for society) (Rowe & Kahn, 1987; Rowe & Kahn, 1991). The understanding of successful aging influenced the development of health policies that were designed and implemented in different countries (Rowe & Kahn, 1987). At the end of the 1990's, with the intention of implementing a broader action on aging, in addition to physical health as an engine of success, the WHO proposed the Active Aging paradigm centered on the well-being, quality of life and independence of the older adults (Riva et al., 2014; WHO, 2002).

1.2.2 The Paradigm Active and Healthy Ageing

The WHO defined active aging as "the process of optimizing opportunities for health, participation and security to improve the quality of life as people age" (2002, p. 11). The term "active" considers the continuous participation of the older adults in social, economic, cultural, spiritual, and civic life, which surpasses the productivity related to physical and professional condition.

The quality of life of the older adults is conditioned by the risks and opportunities they experience throughout their life cycle, as well as by the way further generations provide help and support when necessary. The quality of life is "... a broad and subjective concept that includes, in a complex way, the person's physical health, psychological status, level of independence, social relationships, personal beliefs and convictions and their relationship to aspects of the environment" (WHO, 1997, p. 1). Quality of life has been often related exclusively of physical and mental health; however, there are other factors, more complex and comprehensive, that affect its promotion, such as: financial well-being, support, and psychosocial integration. As well as individual's self-awareness about the various aspects of life, their cultural context, values and their relationship with their goals, expectations, standards and concerns (WHO, 1997). These factors can be affected

by changes and challenges (normative and unexpected) that occur throughout life, such as: retirement, widowhood, divorce, health problems, loss or separation from a close person, migration (Brandão et al., 2016; Casado et al., 2020). Active aging implies the goal of living longer and healthier lives; however, promoting active aging is not just about promoting healthy behaviors.

Active aging is a fundamental aspect for the development of policies that underline the need for adjustments in the services provided by the municipalities and the expansion of opportunities for participation and social engagement of the older population (Riva et al., 2014; WHO, 2002). Thus, it is necessary to consider environmental and personal factors, economic, social, and cultural determinants, the physical environment, the health system, gender and other that permeate the life course. As well as the family, community and society that have a strong impact on aging (Paúl et al., 2017; Seguin et al., 2014). In 2015, in the global report on aging and health, the WHO expands the concept of active aging, using the term healthy aging that values the promotion of the functional capacity of the older adults and focused their well-being along the life course, in order to capture the multidimensional character that permeates the aging process (WHO, 2015a).

The healthy aging, as well as quality of life, is not limited to the state of presence or absence of diseases, but comprises the process of development and maintenance of functional capacity. Functional capacity is developed throughout life and contributes to the well-being of the older people. It is a concept that pays attention to well-being in aging, from genetic inheritance to personal characteristics combined with health characteristics (WHO, 2015a, 2018). Therefore, the formulation of strategies, policies, and actions should be inclusive, and considering dependent and independent individual. Healthy aging reflects daily life habits, support and opportunities, that should be guaranteed by society, to maintain the functionality and allow older individuals to live up to their value (WHO, 2015a). The second plan of action of the WHO Global Strategy on Aging and Health for the Decade for Healthy Aging 2021-2030 (2020a) come from these knowledges. It was recently launched, based on the United Nations Madrid International Plan of Action on Aging (2002b) and aligned with the calendar of the United Nations 2030 Agenda for Sustainable Development (2020a) and the Sustainable Development Goals (UN,

2020c). The United Nations Decade for Healthy Aging is a global collaboration that brings together diverse sectors such as: governments, civil society, international organizations, professionals, academic institutions, the media, and the private sector to improve the lives of older people, their families and communities (WHO, 2020a). This collaboration focuses on four action areas that are strongly interconnected:

...changing how we think, feel and act towards age and ageing; developing communities in ways that foster the abilities of older people; delivering person centred integrated care and primary health services responsive to older people; and providing older people who need it with access to long-term care. (WHO, 2020a, p. 6)

The WHO, as well as the UN, aligned with the Sustainable Development Goals (SDGs), directed global strategies to meet the demands of the increasing older population (Nations, 2020). Highlighting the need for planning for population aging, ensuring "the well-being of older people by protecting their human rights and economic security and ensuring access to age-appropriate health services, lifelong learning opportunities and networks formal and informal support" (UN, 2019, p. 37). The SDG-3 highlights the conditions of good health and well-being and, in line with this objective, the WHO formulated the Age Friendly Cities Communities program, as a strategy that guides municipalities and communities to promote a good public service, in terms of accessibility and infrastructure, namely: facilitated transport, housing options, access to public services and commerce, social participation (encouraging that aging locally can be better in friendly environments), facilitate mobility and promote basic participatory activities that are safe and easily accessible (Arbillaga-Etxarri et al., 2017; Dzhambov, 2017; Koohsari et al., 2020; Moniruzzaman et al., 2015). This perspective highlights the need for the social intervention model "Aging in place" a strategy valued by the WHO (2015a).

1.3 Ageing in Place

Aging at home, in the poorest countries, assumes perspectives guided by the precariousness of social security systems, social institutions and/or the high cost of private facilities. In those cases, aging at home may be the only viable alternative (Fonseca, 2020; Fonseca et al., 2021). However, in developed countries, when the older adults begin to lose autonomy and functional capabilities, institutionalization is a common alternative. This process has been discussed due to the psychosocial

impact that the rupture with the usual community causes to the older people who move into aged care facilities. Therefore, the "Aging in Place" has become a model of social policies for the older people, with a focus on enabling those who want and have support to stay in their homes and local communities (Fonseca, 2020; Fonseca et al., 2021). Rogers et al. (2020) carried out a critical study on the diversity of conceptions about the ideal place for aging. The authors argue that aging in place needs to permeate the discussion and questioning about "what is this place?", and "what is the right place?" Thus, it is necessary to propose a more comprehensive and individualized conception. The authors suggested a definition for the concept: "One's journey to maintain independence in one's place of residence as well as to participate in one's community" (Rogers et al., 2020, p. 9). This concept highlights the intersection between time, person, and space, emphasizing the perspective of Ageing in Place as a process. Space is related to both the place of residence and the community. In fact, the place transcends the physical perspective of the house, also encompassing the community where it is located. This includes physical spaces such as buildings, transport network, and availability of services. Therefore, physical places contribute to a truly participatory aging that respects the dynamics of the individual capacities, allows for preservation of the meanings of life, including the social identity (Fonseca, 2020; WHO, 2018, 2020a). WHO points out that maintaining a healthy life as one ages is only viable if the infrastructure and the natural environment are prepared "Ageing in place can be further enhanced by creating age-friendly environments that enable mobility and allow older people to engage in basic activities, such as shopping" (WHO, 2015b, p. 36). Ageing in Place (WHO, 2015b) stands for the promotion and appreciation of aging at home and in the community as a model of social intervention. At the 2nd Global Forum on Innovation for Ageing Populations (WHO, 2015b), the WHO identified the five main areas of intervention for the aging in place process: people, places, products, personalized services, and social support policies that minimize social isolation and promote mobility. It is a process of adaptation with social, psychological, and environmental implications, where the older person's willingness to remain in with the family and community is respected for as long as possible (Fonseca, 2020).

From these perspectives, some strategic care models have emerged, such as tele-assistance technological innovations, home tele-care, and other innovations

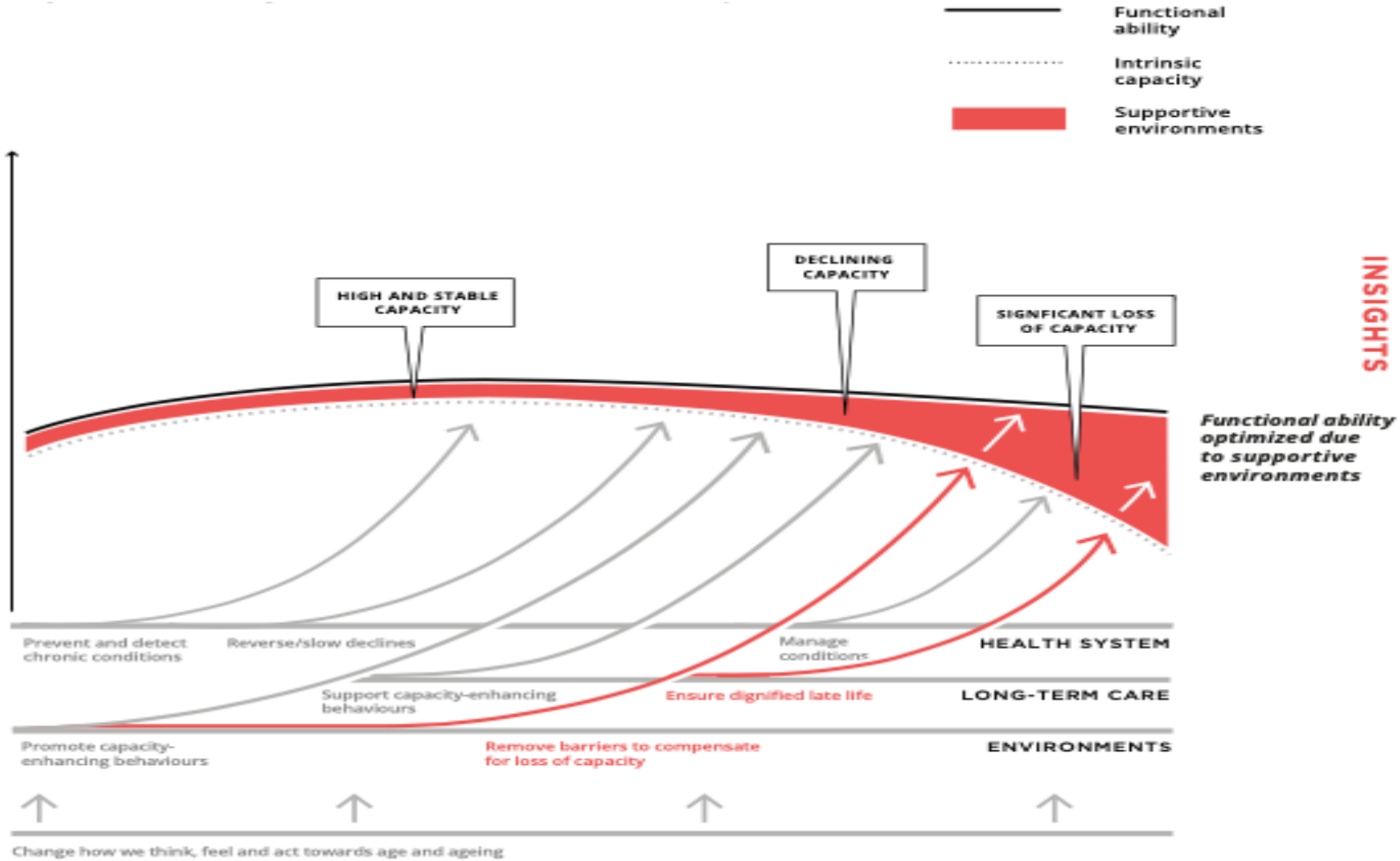
in gerontotechnologies (Fonseca, 2020; Gil, 2020). As well as the policies and interventions that come from the program age-friendly cities (WHO 2018), that aims to promote the physical and psychosocial well-being of this population.

CHAPTER 2 - HEALTHY AGING AND FUNCTIONAL CAPACITIES

Healthy Aging is approached by the WHO as a holistic concept, a process of development and maintenance of functional capacity that allows for the well-being of the older adults, which includes happiness, satisfaction, and fulfillment. The functional capacity is determined by the physical and mental conditions (intrinsic abilities) when combined with the environment (physical, social, and political) acting in favor of the older adult's well-being. The functional capacities include: 1) ability to meet basic needs; 2) ability to learn, grow and make decisions; 3) mobility; 4) ability to build and maintain relationships; and 5) ability to contribute (WHO, 2020a). The functional capacity as a vehicle of well-being in old age, that involves the attributes that will allow individuals to be and do what they value. It comprises autonomy to perform basic and instrumental activities of daily living (such as: taking a shower, dressing), the ability to memorize information, make decisions and be resilient (Santos & Sousa, 2013; WHO, 2020a). The Figure 1 shows the intersectionality that constitutes functional capacity, which consists of three main aspects: i) the intrinsic capacity composed of the individual's physical and mental capacities, ii) the relevant environmental characteristics that make up the context of life (includes the home, community, and society) and iii) the interactions between the individual and the environment.

The World Report on Aging and Health (WHO, 2015) proposes the perspective that intrinsic capacity and functional capacity are seen as trajectories that occur throughout life. The intrinsic capacity is difficult to be measured, since it is influenced by the biology, socioeconomic, and cultural differences of each person development. A study on the genetics of healthy aging and longevity shows that approximately 25% of the diversity of intrinsic capacity in old age is due to genetic factors and the other 75% is due to the impact of the person's development of behaviors, experiences, and relationships throughout life (Brooks-Wilson, 2013). Longevity should understand aging as an aspect to be thought of in a demographic, social, economic, political and health way, which must be managed with attention to the promotion of the functional capacities and social participation of the older.

Figure 1. Trajectories of healthy ageing



Source: (WHO, 2020a, p. 17)

2.1 The Five Functional Abilities

The WHO (2015b) defined five key functional abilities for healthy aging, based on the objective of maintaining functional capacity of the older population: meet basic needs; learn, grow and make decisions; be mobile; build and maintain relationships; and contribute to society. These abilities are linked to intrinsic capabilities and the environment, allowing older individuals to do what they value.

The basic needs include financial security, personal security and safety, health care and health challenges, mental health, and self-actualization. The ability to learn, grow and make decisions allows the older adults to continue to apply the knowledge acquired throughout life in decision-making and problem solving (such as using new technologies, relearning a new routine, and in cases of widowhood, learn to live alone) (WHO, 2015b). The ability to be mobile refers to movement in all forms, from move around the house without assistance (such as sitting and standing up) to walking out of house, using means of transport, explore and access services in the neighborhood and move for longer distances (WHO 2015b). The ability to build and maintain relationships is the capacity to manage relationships with family and friends, at a stage of life where diseases and/or impairments may restrict access to social meeting spaces, weakening opportunities to strengthen social ties (WHO, 2015b). Regarding the ability to contribute to society, there is the engagement in social and cultural activities. The social participation, whether through paid work or volunteering, is proven to have an impact on the maintenance of intrinsic and functional abilities (WHO, 2015b). However, the impact is related to the conditions that each environment offers. For example, in low-income countries these conditions are generally dangerous and precarious, which can have a negative impact on the individuals' health. In more structured countries and in more favorable socioeconomic situations, older individuals may benefit from paid work and volunteering opportunities (WHO, 2015b, 2020).

These abilities are interconnected and interdependent, which makes their full appropriation strengthened or weakened according to the older person's ability in each. Therefore, it is necessary that the autonomy and social participation of the older adults and their rights are ensured. This review will pay specific attention to

the mobility skills and social interactions of older residents in cities and who have a dog. The next topic will go further into two of the five functional abilities relating to pet dog ownership.

2.2 The dimensions of daily mobility

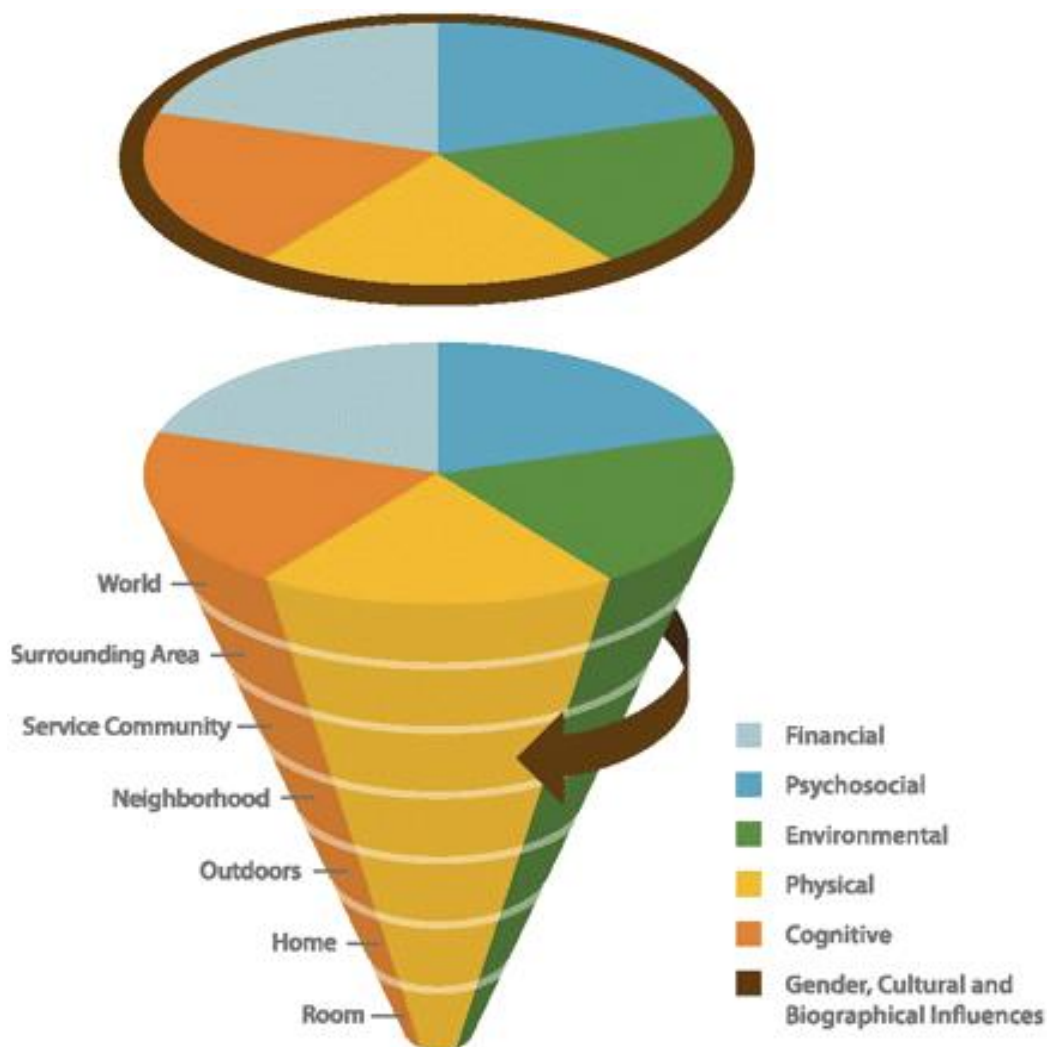
The progressive loss of functional abilities is common with advancing age, generally intensified by illnesses and falls, the main generators of dependence demanding support from others (family and/or professional caregivers). This social disadvantage that limits and takes the individual from a place of participation and autonomy to the need for help from other people (Brandão et al., 2016) restricts access to the diversity of spaces and hinders the involvement of the older adults in physical activities essential for active and healthy aging.

Mobility capacity comprises movement in all forms, whether moved by the body with or without an auxiliary device (walkers, canes, wheelchairs) or by a private vehicle. Actively moving is a skill that allows the individual to have a healthy life, a dynamic and independent daily life, which will add to the expected physical, psychological, and social well-being. With the increased ageing of the population, mobility has been the object of study in different scientific fields (McNicholas, 2014; Taniguchi et al., 2018; Toohey et al., 2018; Webber et al., 2010). There are several studies and interventions that use the interaction with animals, as a therapeutic stimulus and for physical and cognitive rehabilitation. Studies have identified that pets are potential motivators for a healthy lifestyle and improved mobility in the older adults (Curl et al., 2017; Dall et al., 2017; González Ramírez & Landero Hernández, 2014; Knight & Edwards, 2008; Thorpe et al., 2006a).

Webber et al. (2010) refers to the concept of mobility for the older people, starting from a critical perspective of fragmented conceptions of mobility, and considering that the perspectives of compartmentalized mobility are critical. The concept is usually approached from a disciplinary perspective (with an emphasis on physical and/or environmental determinants); however, the authors considerer that the concept should be thought in an integrative and interdisciplinary way, which portrays the reality of both independent and dependent older people. Thus, the concept of mobility comprises five fundamental factors and determinants of mobility:

physical, environmental, financial, cognitive, and psychosocial. These factors are pointed out in previous studies, but not in an integrated way. Figure 2 shows the factors in a three-dimensional conical model (Webber et al., 2010), that highlights the integration and influence among the determinants of mobility in the different spaces that the older adults occupy. The figure emphasizes three implications that cut across the fundamental determinants of mobility: gender, culture, and biography. And for each space it portrays them acting systemically to emphasize and criticize their determining aspects. The model invites this logic to be considered in research, policy making and pro-mobility interventions.

Figure 2. *Conical model of mobility*



Source: (Webber et al., 2010, p. 446)

In brief, “mobility capacity” is the union of determining factors (environmental and physical; financial; cognitive and psychosocial) that will define the individual's mobility potential (Metz, 2000). In this scoping review we will focus the determinants of mobility in relation to dog ownership. However, before proceeding, we will clarify each determinant of mobility.

A. Environmental and physical determinants

The physical and environmental mobility zones are spaces that extend from the bedroom and the house, departing from the ability to get out of bed and detach from the bedroom to other spaces. As for access and autonomy to explore other spaces surrounding the house include access stores, services, and facilities in the community, such as parks; and participating in sociocultural activities (such as events), spaces for physical activity and group leisure. The ability to move can be built, and the environments (accessibility to infrastructure) have the power to encourage or restrict the possibilities for person's mobility. Access to support instruments, and having the residence and neighborhood adapted to restricted mobility are crucial to avoid mobility constraints (Webber et al., 2010; WHO, 2015b).

B. Financial determinants

Financial factors affect the overall mobility status of older people. The lower the individual's income, the greater risk that their mobility will be reduced. Changes in income and increased expenses, resulting from new health needs and personal services related to self-care and home care, reduce the socioeconomic power in old age (Sluzki, 2000). The socioeconomic power is a key determinant for the spaces that the individual may access (such as theatre, gym, restaurants) and the means of transport to be used. Income has also a big influence in determining where we live. Poorer neighborhoods are characterized by low-income residents and these locations suffer from precarious conditions of infrastructure and availability of leisure spaces (Webber et al., 2010; WHO, 2015b). The psychosocial status is also affected, since maintaining relationships, friends and family members who reside at a considerable distance depends on finances (Shumway-Cook et al., 2005).

C. Cognitive and psychosocial determinants

Cognitive determinants operate on a variety of factors. For example, directed attention, memory and concentration are essential to perform activities, communicate and perform everyday actions. In addition, information processing, spatial perception, mental state, and executive functioning are aspects that directly affect mobility, especially the ability to drive vehicles. Psychosocial factors impact behaviors, such as fear, anxiety, depression, resilience, and motivation on interpersonal relationships and with the environment (Webber et al., 2010). Below it is presented a synthesis of the main factors that promote and enhance the mobility of the older adults in favor of autonomy and participation (Table 1).

Table 1. *Mobility promoting factors*

Assistive technologies	Financial limitations can prevent seniors from accessing quality mobility equipment, such as walking sticks and wheelchairs. The availability of these devices, accessible and suitable, can help and improve the quality of life and well-being.
Reduce barriers in the built environment and improve transport availability and accessibility	The public administration and the city need to be friends with the older adults, aware of the complexity and needs of this population and maintain access to the city and the environment in an inclusive and attractive way. It is relevant to ensure that the city has accessibility equipment, such as ramps, handrails, and spaces for pedestrians. Buildings such as public facilities, cultural spaces (theatre, museums, cinema) need to think about the public with reduced mobility and offer elevators and signs to encourage the inclusion, autonomy and independence. Studies on the environment perceived by the older population indicate that the aspects that are attractive to this population are safe outdoor spaces, which offer public restrooms and places for rest, which have an attractive aesthetic (also clean, and organized). Public transportation should be planned with accessible stops and times, involving free or reduced rates; providing priority seating for people with reduced capacity and operators instructed to respect passengers who need help or more time to get on or off.
Strengthen the older people's ability to move	Physical activity is an excellent tool to improve the physical and mobility capabilities, it has the potential to strengthen the muscles, improve flexibility and balance. A simple walk may prevent diseases, such as cardiovascular ones. Another way to strengthen the older people's ability to move is through medical rehabilitation and therapies, especially in cases of recovery after trauma from falls and accidents. An important aspect is to identify when the older adults begin to lose the ability to drive safely. Research must broadly consider the determinants of mobility and the interactions among them, and then identify the reasons that govern mobility deficiencies in living spaces and develop possible compensatory strategies.

Create opportunities for older people to be participative	Enable the participation and social engagement of the older adults needs to occur according to their interest, whether through entertainment activities, volunteering, religious activities, events and even some paid work. These are opportunities that can motivate seniors to maintain their mobility and social interaction. Social participation is a determining factor for well-being and when related to urban dimensions, it is a component that can potentially be used to improve healthy aging.
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Based on (Brown & Jensen, 2020; Cohen, 2011; de Vries et al., 2007; Evenson et al., 2016; Hooper et al., 2020; Kelly, 2015; Powell et al., 2020; Webber et al., 2010).

Daily mobility is an important aspect of social interactions. The ability to be mobile promotes the autonomy and independence that allows the older people to move to meetings and social activities (Metz, 2000). Given the complexity that involves mobility, infrastructure of the surrounding environments is relevant for interaction social:

access- ibility is defined as the potential of opportunities for interaction. This definition differs from the usual one in that it is a measure of the intensity of the possibility of interaction rather than just a measure of the ease of interaction. In general terms, accessibility is a measurement of the spatial distribution of an activity (opportunities for interaction) adjusted for the ability and desire of people or firms to overcome spatial separation. (Hansen, 1959, p. 4)

The lack of accessibility to environments can limit and prevent habitual social interactions, even if the individual has physical and mental conditions to move around.

2.3 Ability to build and maintain relationships

Relationships are important in all spheres of life and built throughout life, whether in the family, with friends, colleagues, neighbors, and acquaintances, and/or relationships arising from service providers. The ability to relate is strongly interconnected with the other functional abilities (WHO 2015). The lack of a good social network leads often to social isolation, loneliness and depression (Howell & Bennett, 2011; Ikeuchi et al., 2021; Krause-Parello et al., 2019; Sluzki, 2000). Kim and Kaplan (2004) define social interaction as a relationship that can be formal or informal, where the opportunity for social contact can come from scheduled or unscheduled encounters. The opportunities for older people living in cities to build and/or maintain non-familiar social networks are found in everyday activities such as: going to stores, participating in religious and social activities, walking the dogs,

going to green spaces and squares (Dall et al., 2017). Social interaction can occur in the neighborhood daily life, through casual encounters between strangers (for instance, when walking with the dog, performing physical activities or shopping). And in support networks, such as groups of friends and family where the sense of care for each other is present (Kim & Kaplan 2004).

Studies based on data from the “Berlin Aging Study” on the social interaction and social participation of the older adults (Bukov et al., 2002; Fiori et al., 2007) propose some perspectives on these concepts. Social networks for Fiori et al. (2007) can be divided into six types (family; supportive friends; non-supportive friends; older people without support network, socially isolated; and non-supportive strangers). The concept of social networks differentiates supportive and non-supportive interactions. The main findings in the studies in suggest that network types reflect varied patterns that may be associated with well-being (Bukov et al., 2002; Fiori et al., 2007). The term social network refers to the web of social relationships that involves individuals. Thus, different functions and types of support (emotional and instrumental) occur among these networks due to the different needs of the older adults. The construction and maintenance of social networks has an impact on the progression of aging (Fiori et al., 2007; Sluzki, 2000).

In old age, often individuals have to deal with physical frailty, in consequence of diseases, accidents/falls, that will affect their possibilities to interact socially. The lack of mobility can reduce and even extinguish their social life and weaken their roles and social bonds. This *social dying* (Bukov et al., 2002, p. 516) involves the reduction of forms of social participation, and “can be considered a prelude and companion to biological dying”. The strengthening of social ties, support networks and social participation must be seen as determinants for healthy aging. The quantity and quality of these environments and interpersonal relationships as well as the levels of trust and sense of belonging strongly influence the functional abilities (Antonacopoulos & Pychyl, 2015; Mali, 2014).

It is important to consider that social participation (Bukov et al., 2002) comprises three types: collective (provided by leisure activities/events, group travel), productive (work and volunteer activities) and political (decisive and leadership roles politics, being part of political parties, councils, associations). The

changes that are making possible a better occupational distribution and a revolution in educational access and participation, will foster social participation of older adults in the future. Literature indicates that very older people with health problems were more likely to decrease their social participation (Bukov et al., 2002). The social networks and social support can act as a buffer against biopsychosocial stressors. Considering the importance of social interactions and social participation for the construction of social networks for the health and well-being of this population, there are several studies on the relationships between the forms of social participation and social interaction, that show a interdependence between the health conditions and active participation in social activities (Bukov et al., 2002; Casado et al., 2020; Gohn, 2019; McNicholas & Collis, 2000).

The ownership of dogs has the potential to be a catalyst for social interactions and a motivator for mobility, arising from walking with the dog. It has been perceived as a strategy for promoting social interaction and encouragement for the mobility of the older people (McNicholas & Collis, 2000). Considering the challenges of longevity, maintaining mobility in all its dimensions, respecting the capabilities of the older adults, and promoting and maintaining social interaction are essential aspects for the active and healthy aging (Gee et al., 2017). Mobility is an important aspect for the maintenance of functional abilities, that allow the older people to do what they value (autonomy, independence, decision making, contributing). Promoting and maintaining the mobility of older people, whether enabling accessible environments or allowing for participation and social engagement, is a necessary condition for their well-being and quality of life. The positive results the human-animal relationship is an area of study that has been gaining space for investigation and intervention, due to its potential to provide mental health benefits, but also for contributing, enabling, and strengthening social interactions and the processes of rehabilitation, physical, cognitive, and emotional, in addition to maintaining autonomy and social inclusion (Barker & Wolen, 2008; Baun & Johnson, 2010; McCune et al., 2014). So, there is a considerable increase in research focusing the human-animal bond in healthy aging, whether through the older adults who own pets or those who have tried animal-assisted interventions and therapies (Gee et al., 2017). In the next chapter, we will focus on this area of study, emphasizing companion dog.

CHAPTER 3 - HUMAN-ANIMAL INTERACTION (HAI) AND ANIMAL-ASSISTED ACTIVITIES - OLDER ADULTS

Human-Animal Interaction (HAI) is an area of study that seeks to understand how relationships with animal's impact human and animal health (McCune et al., 2014). Vitztum (2013) considerer the term in its broadest sense, as the synthesized of the potential role animals may play in the health and well-being of humans. HAI constitutes the “mutual and dynamic relationships between people and animals and the ways in which these interactions can affect health and physical and psychological well-being” (as cited in Vitztum, 2013, p. 3 Esposito et al., 2011). Therefore, HAI can be conceptualized as:

An interaction that takes place between humans and animals, which facilitates activities, situations and treatments that influence the physical and psychosocial determinants of human health, resulting from an improvement in well-being. The interface is characterized by a concrete and structured environment for interaction and a psychological component of positive affect associated with behavior. (2013, p. 3)

The animal can be a pet in its traditional sense, but it can also be characterized as non-animals, such as therapy robots (Hudson et al., 2020; Kitt et al., 2021) that are also capable of providing interaction. Some animals that are not pets, act in the individual's life eventually through assisted activities (AAAs) and assisted therapies (AAT) (Gee et al., 2017). The impact of pet ownership and others forms of human-animal interaction in healthy aging are discussed and investigated (Enders-Slegers & Hediger, 2019). With regard to the therapeutic stimulus for cognitive and physical rehabilitation of individuals who have lost their functional capacity (usually due to stroke or car accidents), animal-assisted therapies emerge. In addition to the therapies, which we will see below, the human-animal relationship related to pet ownership and/or everyday interaction are emerging areas of study, due to the potential for psychosocial support, and the positive effects of pet attachment on owners' mental health (Peacock et al., 2012; Wu et al., 2018).

3.1 Therapeutic Pets

Animals are enhancers for the practice of physical activity, as well as excellent companionship and socio-emotional supporters. Studies based on therapeutic interventions with older institutionalized individuals indicate that contact with dogs influence the mobility and social interaction of the residents. The benefits

included “sensory stimulation, emotional stimulation and opportunities for social interaction, reminiscence of childhood experiences and were supported by the development of some new social relationships” (Jain et al., 2021, p.1456). A survey with non-institutionalized older people who received dog-assisted therapy at home, shows that pet therapy significantly reduced individuals' blood pressure and heart rate (Krause-Parello & Kolassa, 2016). A study comprising treatment with animal-assisted therapies involving older schizophrenic individuals, showed improved mobility, interpersonal contact, and communication, as well as better performance in activities of daily living (Rodrigo-Claverol et al., 2020). This scoping review will map the literature on companion dog in non-therapeutic settings.

3.2 Pets Owning

The term pet is understood as an animal that is kept in the house for a pleasure relationship and not for utility (Jorgensen, 1997 as cite in Vitztum, 2013). In this relationship, animals can promote the owner's socialization, as well as physical safety and be a social-emotional support. The impact of pets on the lives of the older people is characterized in research by an accumulation of physical and psychological health benefits. Particularly, companion dog, that tend to be incentives for the owner in several dimensions, namely the practice of physical activity, mainly by carrying out walks that improve physical health (for example, cardiovascular health), and mobility (Bibbo et al., 2019; Cutt et al., 2008; González Ramírez & Landero Hernández, 2014; Headey et al., 2008). Regarding affective and social dimensions, three main social functions have been reported:

the projective function (where the pet serves as a symbolic extension of the social self), the sociability function (where the pet facilitates interpersonal interaction by acting as social lubricant), and the surrogate function (where the presence of the pet, who is anthropomorphized, serves as a surrogate for human companionship). (Veevers, 2008, p. 459)

Studies have reported that pet animals bring benefits in the way we deal with stress, promote the reduction of depression, anxiety, loneliness and social isolation (Gee & Mueller, 2019; Mičková et al., 2019; Ng et al., 2021; Park et al., 2021; Wu et al., 2018). Furthermore, studies have also identified that older adults believe that walking dogs improve their social interactions (Knight & Edwards, 2008). And pets can act as catalysts for human social interactions (McNicholas & Collis, 2000), promoting a sense of community (Wood et al., 2015). Therefore, walking dogs is a stimulus to interact with new people and strengthen communities

(social capital) (Barker & Wolen, 2008; Baun & Johnson, 2010; Curl et al., 2020; Resnick & McCune, 2019). This positive relationship with pets, especially dogs, also impacts urban environments. There are already spaces designed for dog walkers and technological means to encourage this practice. Dog parks have become common in many urban centers. These places are built for the comfort and safety of the dogs and the owners. In dog parks, the animal that often inhabits in an apartment, can be unleashed and play and socialize with other dogs. The owners have the opportunity to exercise and socialize with other users of the park, and also watch the dog playing and feeling happy (Evenson et al., 2016). Walk the dog arises from the dog's need (the basic needs as well as to exercise and socialize with other dogs), but may act as a precipitant for the initial contact and interaction among dog owners and enable friendly relationships, new contacts and social support (Antonacopoulos & Pychyl, 2015; McNicholas & Collis, 2000). From this interaction, sometimes groups of dog walkers are formed. A study showed that these interactions may be found on social networks such as Facebook and Twitter, for mobilization activities, organization of events and scheduling outings (Schneider et al., 2014). Owning a pet is a support strategy, since it favors the owner's autonomy, social inclusion and physical and psychological health.

However, much have been affected by the public health pandemic caused by Covid-19. The population mobility and social relations was restricted to prevent and contain the spread of the virus (WHO, 2020a). Still, studies indicate that companion dogs during the pandemic were an emotional and social support, and promoters of their owners' mobility (since walking the dogs was allowed) (Christley et al., 2021; Knight & Edwards, 2008). Pet owners reported that during the pandemic the access to veterinary care was limited, creating difficulties in situations of illness/death of animals, aggravating the owners' feelings of loneliness (Applebaum et al., 2021; Christley et al., 2021; Oliva & Johnston, 2021; Shoesmith et al., 2021).

The older population lives with complex aspects related to quality of life and healthy aging in terms of mobility and ability to maintain and cultivate social relationships, that preceded the Covid-19 pandemic, but were aggravated by it. To respond more systematically to the impacts of having a companion dog on the daily mobility and social interactions of older people living in urban communities, we conducted a Scoping Review.

CHAPTER 4 – OBJECTIVE AND METHODOLOGY

This scoping review aimed to map the impacts (including benefits, challenges and risks) that owning a pet dog has on the mobility and social interaction of older individuals. This evidence will provide a better understanding of human-animal (specifically dogs) interaction and its impact on daily mobility and social interaction of older adults. In addition, gaps in the literature will be identified for future research.

The methodology in this dissertation is a scoping review, a literature review approach. The scoping review is a structured and validated method, that began with the studies by Arksey and O'Malley (2005) and advanced with Levac et al. (2010). A scoping review is a research strategy similar to a systematic review in terms of methodological rigor and should be transparent and replicable. It is a tool used to “determine the scoping or coverage of a body of literature on a given topic and give clear indication of the volume of literature and studies available as well as an overview (broad or detailed) of its focus” (Munn et al., 2018, p. 2). Systematic reviews are known as a research synthesis conducted by groups of researchers with specialized skills to identify and find international evidence that is relevant to a particular topic, ideal for evaluating and synthesizing research results, informing practices, policies and suggest additional research (Munn et al., 2018). Systematic reviews are aimed to test hypotheses, while the scoping reviews are understood as a hypothesis generating tool, in addition to map relevant evidence in a topic. Scoping reviews emerged from a need perceived by those performing systematic reviews, who identified conflicts in the method because it does not sufficiently address broader research questions and with poorly defined hypotheses, which is useful for analyzing emerging research areas, as is the purpose of this research. This methodology is also guided and used to define key concepts and identify gaps in the literature (Tricco et al., 2016). Table 2 shows the main differences between these two methodologies:

Table 2. *Systematic review and scoping review*

SYSTEMATIC REVIEW	SCOPING REVIEW
Specific research question.	Broad research question.
Hypothesis testing.	Hypothesis generator.
Answer specific questions based on specific criteria.	It can be used to identify topics for future systematic reviews.
PICO guiding acronym (Population, Intervention, Comparisons, results/"outcomes").	PCC guiding acronym (Population, Concept, Context).
Essential to assess the quality of included studies.	Quality assessment not mandatory.
To evaluate, synthesize and summarize existing knowledge	To summarize and disseminate research results;
Find "all" evidence relevant to an issue.	To examine the extent, volume, scope and nature of research activity
To inform practices, policies and sometimes indicate additional research.	To identify research gaps.

Source: Adapted from Arksey and O'Malley (2005); Tricco et al. (2016).

Overall, there are five methodological steps described by Arksey and O'Malley (2005), reinforced by Levac et al. (2010) that constitute the framework for a scoping review. The Joanna Briggs Institute outlined and improved these methodological guidelines in its Reviewers Manual (2020) following the PRISMA-ScR (Tricco et al., 2016). The manual provides standardized guidelines for the preparation of the scoping review protocol, an essential procedure to be performed before initiating a scoping review. These guidelines were recently updated, which we used to guide this review, and which go through the following steps:

- a) identify the research question
- b) identification of relevant studies
- c) study selection
- d) data mapping
- e) group, summarize and report the results

4.1 Protocol

The development of a review protocol is essential, it should be prepared at the beginning of the review. As with systematic reviews, the protocol will pre-define

the review objectives and methods, which favors the transparency and clarity of the process. It must be done before the review, as it is important to limit the risk of bias. This is a separate document from the scoping review report (Peters et al., 2020). Our protocol was developed using the scoping analysis methodological framework proposed by the Joanna Briggs Institute (JBI, 2020) and further refined by the Inplasy platform registration guidelines (Canellas et al., 2021). The final version is available on the Inplasy platform under registration INPLASY202190111¹.

4.2 Review question

The elaboration of the research question is a guiding component for the elaboration of the protocol, since it directs the inclusion and exclusion criteria and establishes the pathway to reach the objective. The research question is made through the incorporation of the PCC strategy, mnemonic for Population, Concept and Context. In scoping reviews, it is not necessary that the results, interventions, or phenomena of interest are explicit and stated in the review question, but they can be implicit in the concept element. Table 3 presents the elements we considered to define the question for this scoping review.

Table 3. *Strategy description Population, Concept and Context*

PCC	DESCRIPTION
Population	Community-dwelling older adults (≥ 65 years of age).
Concept	Mobility and Social Interaction.
Context	Urban areas.

This scoping review aims to map the impact of having a companion dog on the daily mobility and social interactions of community-dwelling older adults (≥ 65 years old) living in urban areas. Therefore, the question that guides this research was: “How does having a companion dog impacts the daily mobility and social interaction of the older adults (owner/guardian ≥ 65 years old) who live in an urban community?”

¹ <https://inplasy.com/inplasy-2021-9-0111/>

4.3 Identification of relevant studies

After formulating the review question, we searched for the studies to be included. First, we went through the choice of research databases; definition of the inclusion and exclusion criteria; types of publications that would be part of the review and the time frame. The Joanna Briggs Protocol (2020) describes that "the reviewer may wish to impose limits on the types of sources they wish to include". As the theme chosen for this review is little explored ("mobility and social interaction of older people with dogs" is a conceptual relationship that has been built in an emerging debate), it was decided to include multidisciplinary and disciplinary databases. We defined that only scientific papers would be selected, and we decided not to restrict the temporality of publications to obtain the maximum reach in published scientific articles.

In this scoping review a three-step search strategy was used to identify published articles. Firstly, we used selected English search terms after analyzing the most used keywords in articles published in Scopus within our research theme, that were tested in the indexed keywords relevant to this review from the Medical Subject Headings (MeSH). Secondly, the search strategies were checked with the university librarian to adapt the keywords and index terms according to the needs of each database. The database was SCOPUS, Web of SCIENCE, PubMed and Academic Research Completed. Thirdly, additional references and citation search also was be conducted. Reference lists of articles identified during the search was manually checked to identify potential papers for inclusion.

4.4 Study Selection

The preliminary search strategy included search terms (Table 4) related to the PCC acronym: (i) Population, community-dwelling older adults, aged ≥ 65 years who had at least one companion dog. Older people were defined as those aged 65+ (developed countries) or 60+ (in emerging countries) (WHO, 2002); however, we included other ages in cases where the studies identified the participants/sample as older people; (ii) Context, urban communities regardless of country of origin; (iii) Concepts, daily mobility, and social interaction.

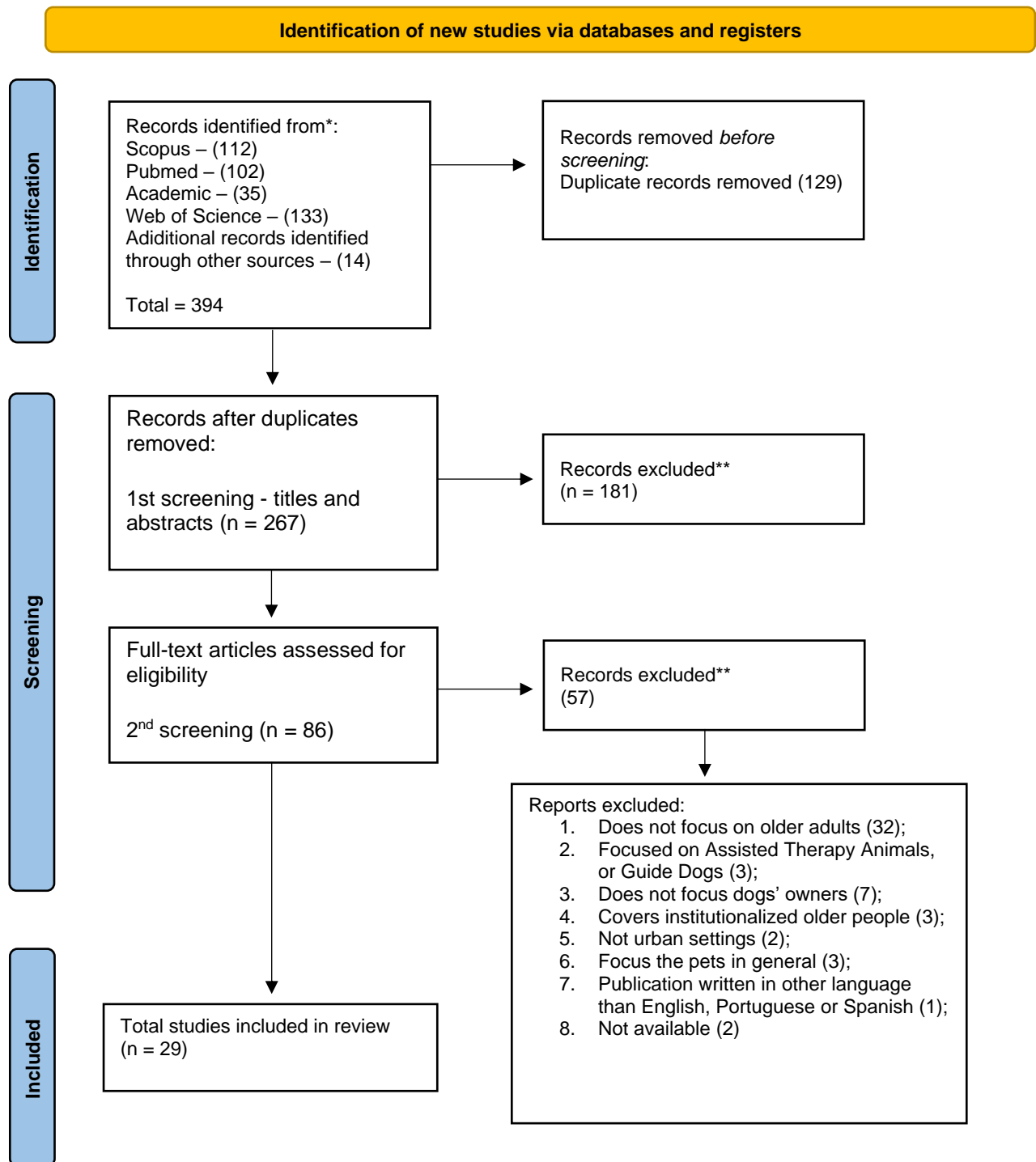
Table 4. Search Strategy

SEARCH	POPULATION	CONCEPT	CONTEXT
Query	"older people"	"daily mobility"	"urban community"
	"older adult*"	walking	
	"old-aged"	"social interaction"	"community-dwelling"
	aging		
	age*	interpersonal relationship	
	ancient		
	elderl*		
	senior*		
	"dog ownership"		
	"dog owner*"		
Excluded	"dog tutor*"		
	"companion dog*"		
	"guide dog*"	"animal-assisted interventions"	"therapeutic setting*"
	"service dog*"		"therapeutic environment"
			"therapeutic residences"
		"residence for the older adults"	

Studies were excluded when the context was animal-assisted interventions, and/or aged care facilities and/or involving guide or therapeutic dogs. Studies other than peer-reviewed were be excluded (e.g., gray literature, letter to the editor and abstracts published in proceedings). Only studies published in English, Spanish and Portuguese were considered for inclusion. Following the guidelines of PRISMA (2020), the following steps were established. First, titles and abstracts were selected by two independent reviewers (the author and the co-supervisor) for evaluation according to the inclusion criteria. Data from each relevant publication were imported into the reference’s management software (Mendeley version 1.19.8). Second, before the initial screening, the same program was used to automatically delete any duplicate documents. Third, the author exported the titles and abstracts of the selected articles into a spreadsheet (Excel version 2016, Microsoft Corporation, Redmont, WA), to identified the studies to be excluded (not meet the inclusion criteria). The second reviewer (co-supervisor) did the same, and

disagreements were resolved through discussion or with an additional reviewer (supervisor). Four, the full text of the selected articles was read by the author. The co-supervisor evaluated the extracted data and also read the full text to verify the accuracy of the inclusion process. Any disagreement was be addressed through discussion or consultation with the supervisor.

Figure 3. Literature search flow diagram and PRISMA selection criteria



PRISMA (2020)

4.5 Mapping the data

At this stage, we systematized the most important information to gather from the included papers, guided by the review question. This process allowed the

construction of the table of data extraction that facilitates the access to the information, as well as its analysis. The mapping of the most important information in the studies selected in the research and included in this review will follow an approach similar to that developed in the narrative reviews (Pawson, 2002), that is, it will bring a broader view of the theme. It is part of this step to decide on the information that should be recorded from the studies. As recommended by Arksey and O'Malley (2005), an analytical framework common to all retrieved primary research reports was applied and we collected standardized information from each paper. The mapped data was entered in a specific form in attach, which includes general information about the studies and specific information to the review question. The data extraction comprised the following components;

- a) Author, year, country
- b) Objective(s)
- c) Geographical context
- d) Sample (age and sex – descriptive statistics when provided)
- e) Design/methodology
- f) Instruments/indicators regarding mobility
- g) Instruments/indicators regarding social interactions
- h) Results: mobility
- i) Results: social interaction
- j) Results: other variables

This information has been prepared under the guidance of the Joanna Briggs Institute manual (JBI, 2020).

CHAPTER 5 - RESULTS

The selected studies are summarized in table 5, categorized by the following points: first author, year, and country of publication; objectives; methods; sample; and geographic context where the study was carried out. As there are some studies where there is no information on the specific geographic context, we use the observation “Nacional wide” or “No information”.

Table 5. Objectives, Methods and Samples

1st author; year; country	Objective	Methods/design	Sample*	Geographic context
Carr et al.; 2021; USA	To assess whether walking the dog helps older adults avoid increased feelings of loneliness when facing the consequences of the COVID-19 pandemic.	Quantitative (longitudinal)	N= 466 Age: ≥ 60 years old Women: 66%; Men: 34% DO: ≈ 40% NDO: ≈ 60% DW; NDW; OPO: None information	Florida
Koohsari et al.; 2021; Japan	To determine the differences in social capital by dog ownership and dog walking status among young-to-middle-aged adults and older adults in Japan.	Quantitative (cross-sectional)	N= 3606 Age: 20 to 87 years old [1722 ≥ 65] Women: 1912; Men: 1694 DO: 507 NDO: 3099 DW: 282 NDW: 225 OPO: None	Minami-Izu (Shizuoka Prefecture)
Ikeuchi et al. 2021; Japan	To examine the psychological health of older adults (socially isolated and not socially isolated) with or without the experience of pet (dog or cat) ownership.	Quantitative (cross-sectional)	N= 9.856 Age: 65 to 84 years old Women:51,5%; Men: 48,5% DO: 31,8% NDO: 68,2% DOW, DOWN: None information OPO: 17,5%	Ota Ward (Tokyo metropolitan area)
Curl et al.; 2020; USA	To examine the relationships between dog ownership, dog walking, and the emotional bond with a dog with neighborhood engagement and life satisfaction among adults aged 50+ years old.	Quantitative (cross-sectional)	N=476 Age: ≥ 50 years old Women and Men DO: 39% NDO: 61% DOW: 24,57% DONW: 15% OPO: None	National wide

Friedmann et al.; 2020; USA	To examine pet ownership patterns among healthy community-dwelling older adults; and the relationship of pet ownership to cognitive and physical functions and psychological status.	Quantitative (cross-sectional)	N=378 Age: ≥ 50 years old Women: 56.9%; Men: 43.1% DO: 14% NDO: 86% DOW: 9,8% DONW: 4,20% OPO: 15%	Baltimore City
Mičková et al.; 2019; Czech Republic	To evaluate the effect of dog ownership on physical activity in the older adults, as well as its positive impact on the perceived health and sleep quality.	Quantitative (cross-sectional)	N=44 Age: 60 to 79 years old Women: 26; Men: 18 DO: 60% NDO: 40% DOW: 100% DONW: 0% OPO: None	No information
Taniguchi et al.; 2019; Japan	To examine whether past or present dog/cat ownership is a protective factor for incident frailty.	Quantitative (longitudinal)	N=6197 Age: ≥ 65 years old Women:53,6%; Men: 46,4% DO: ≅ 22% NDO: ≅ 67,4% DOW, DONW: None information OPO: ≅ 6,2%	Ota City, Tokyo
Mein; 2018; UK	To explore associations between pets, and specifically dog ownership and sleep quality, health, exercise, and neighborhood.	Quantitative (cross-sectional)	N=6575 Age: 59 to 79 years old Women and men DO: 11% NDO: 89% DOW, DONW: None information OPO: 25%	Whitehall (business center), London
Taniguchi et al.; 2018; Japan	To examine physical function, physical activity, social function,	Quantitative (cross-sectional)	N=11233 Age: ≥ 65 years old	Ota City, Tokyo

	and psychological function of a population of community-dwelling older Japanese cat and dog owners.		Women: 51.5%; Men 48,5% DO: 13,8% NDO: 56,80% DOW, DONW: None information OPO: 27,9%	
Arbillaga-Etxarri et al.; 2017; Spain	To assess the relationship between novel socio-environmental factors (namely dog walking, grandparenting, neighborhood deprivation, residential surrounding greenness, and residential proximity to green or blue spaces) and amount and intensity of physical activity in COPD patients.	Quantitative (cross-sectional)	N=410 Age Mean: 69 years old Women: 15%; Men: 85% DO: 18% NDO: 82% DOW: 12% DONW: 6% OPO: None	Barcelona, Badalona, Mataró, Viladecans and Gavà
Curl et al.; 2017; USA	To explore the associations between dog ownership and the animal's attachment to walking behavior and health outcomes in older adults.	Quantitative (cross-sectional)	N= 771 Age: ≥ 50 years old Women: 51.2%; Men: 48.8% DO: 35,15% NDO: 64,85% DOW: 48,54% DONW: 47,53% OPO: None	Florida
Dall et al.; 2017; UK	To evaluate the influence of dog ownership on improving health, physical activity and sedentary behavior in independently-mobile community-dwelling older adults.	Quantitative (longitudinal)	N=86 Age: ≥ 65 years old Women: 66%; Men: 34% DO: 50% NDO: 50% DOW: 99,99% DONW: 1% OPO: None	Lincolnshire, Derbyshire, and Cambridgeshire.
Dzhambov et al.; 2017; Bulgaria	To examine dog walking older adults' practices and their	Quantitative (cross-sectional)	N=265 Age: 65 to 87 years old	Plovdiv

	perceived health status; and to determine how they relate to the quality of green space, park planning and its geomorphology.		Women: 53.6%; Men: 46.9% DO: 100% NDO: 0% DOW: 100% DONW: 0% OPO: None	
Wu et al.; 2017; UK	To investigate the role of dog ownership and walking as a means of supporting the maintenance of physical activity in older adults during periods of inclement weather.	Quantitative (cross-sectional)	N=3123 Age: 49 to 91 years old (mean=69.5) Women: 57%; Men: 43% DO: 20% NDO: 80% DOW: 14% DONW: 6% OPO: None	Norfolk
McCormack et al.; 2016; Canada	To estimate differences in perceptions of the neighborhood-built environment among non-dog-owners, owners who walk their dogs (dog-walkers) and owners who do not walk their dogs (non-dog-walkers).	Quantitative (cross-sectional)	N=1955 Age: ≥ 65 years old (59.6%) Women: 1216; Men: 736 DO: 34,3% NDO: 24,6% DOW: 9,7% DONW: 25,3% OPO: None	Calgary
Garcia et al.; 2015; USA	To examine associations between dog ownership and physical activity measures in a sample of postmenopausal women.	Quantitative (cross-sectional)	N=152629 Age: 50 to 79 years old Women: 100% DO: 35% NDO: 65% DOW: 10% DONW: 25,3% OPO: None	National wide
Moniruzzaman et al.; 2015; Canada	To examine the relation between trip distance and socio-	Quantitative (multilevel model)	N=145 Age: ≥ 65 years old	Metropolitan area of Metro Vancouver

	demographic attributes and accessibility features of lower income older adults; *Dog ownership is a variable.		Women: 64.83%; Men: 31.17% DO: 10,34% NDO: 89,66% DOW: 100% DONW:0% OPO: None	
Feng et al.; 2014; Scotland	To examine whether dog ownership among older adults living in the community is associated with objectively measured physical activity.	Quantitative (cross-sectional)	N=547 Age: ≥ 65 years old Women: 54%; Men: 46% DO: 9% NDO: 90% DOW: 75% DONW: 25% OPO: None	Tayside
Gretebeck et al.; 2013; USA	To identify factors that influence older adult walking and compare physical activity, functional ability, and psychosocial characteristics by dog ownership status.	Quantitative (cross-sectional)	N=1091 Age: 65 to 95 years old Women: 587; Men: 504 DO: 14,66% NDO: 85,34% DOW: 48,12% DONW: 51,8% OPO: None	Midwest USA
Shibata et al.; 2012; Japan	To examine the association between owning a dog, walking the dog, and physical activity in older adults.	Quantitative (cross-sectional)	N=1410 Age: 65 to 74 years old Women: 944; Men: 982 DO: 14% NDO: 86% DOW: 71% DONW: 29% OPO: None	Bunkyo (central Tokyo); Fuchu (suburban area of central Tokyo); Oyama (local small town)
Rijken et al.; 2011; The Netherlands	To analyze the relationship between pet (cats and dogs) ownership and several health-	Quantitative (cross-sectional)	N=1926 Age: ≥ 65 years old Women: 58%; Men: 42%	National wide

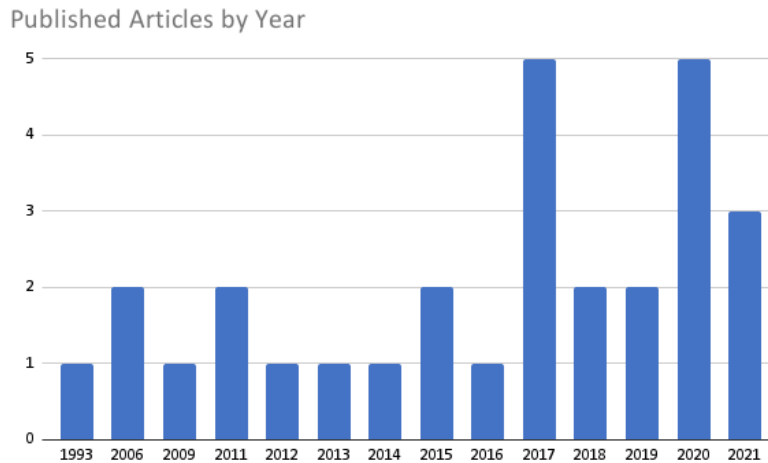
	related outcomes of community-dwelling older people, all suffering from chronic illness or disability.		DO: 7,7% NDO: 79,9% DOW, DONW: None information OPO: 7%	
Harris et al.; 2009; UK	To assess physical activity levels measured objectively in community-dwelling older people and to examine the associations with health, disability, anthropometric measures, and psychosocial factors.	Quantitative (cross-sectional)	N=238 Age: ≥ 65 years old Women: 114; Men: 124 DO: 98% NDO: 2% DOW: 21,6% DONW: 71,5% OPO: None	Oxfordshire
Thorpe et al.; 2006a; USA	To examine dog walking among dog owners and the relationship between walking behavior of dog owners and non-dog owners and maintained gait speed.	Quantitative (cross-sectional and longitudinal)	N=2533 Age: 71 to 82 years old Women: 52%; Men: 48% DO: 15,7% NDO: 84,36% DOW: 36% DONW: 64% OPO: None	Memphis, Tennessee and Pittsburgh (Pennsylvania)
Thorpe et al.; 2006b; USA	To determine whether dog owners were more likely to engage in physical activity than non-dog-pet or non-pet owners.	Quantitative (cross-sectional)	N=2533 Age: 70 to 79 years old Women: 1224; Men: 1309 DO: 15,63% NDO: 7,81% DOW: 43,4% DONW: 38,6% OPO: 8,3%	Memphis, Tennessee and Pittsburgh (Pennsylvania)
Chen et al.; 2020, China	To explore how companion dogs are involved in reconstructing the everyday life of urban empty nesters and how can they achieve	Qualitative (participant observation and semi-structured interviews)	N=14 Age: 60 to 88 years old Women: 9; Men: 3 DO:100% NDO: 0%	Huashida Community, Guangzhou

	active aging of the older people through leisure interaction.		DOW:100 DONW: 0% OPO: None	
Gan et al.; 2020; Australia	To explore pet ownership in community-dwelling older adults and its influence on mental health.	Qualitative (semi-structured interviews)	N=14 Age: ≥ 60 years old Women: 8; Men: 6 DO, NDO, DOW, DONW, OPO: None information	No information
Janevic et al.; 2020; USA	To explore how pet ownership promotes the use of pain self-management strategies in everyday life.	Qualitative (focus group)	N=25 Age: ≥ 70 Women: 68%; Men: 32% DO: 72% NDO: 0% DOW, DONW: None information OPO: 40%	No information
Scheibeck et al.; 2011; Austria	To examine the human-dog relationship from a gerontological perspective.	Qualitative (social research)	N=39 Age: ≥ 70 years old Women: 29; Men: 10 DO: 100% NDO: 0% DOW: 100% DONW: 0% OPO: None	Tyrol (dog cemeteries in Munich, Salzburg, and Vienna)
Rogers et al.; 1993; USA	To compare exercise levels, general social and psychological functioning of dog owners and non-dog owners while walking.	Qualitative (walking interview)	N=12 Age: 65 to 78 years old Women: 5; Men: 7 DO: 50% NDO: 50% DOW: 29% DONW: 21% OPO: None	California mobile home parks, in Sacramento and Yolo

*DO: Dog Owners /NDO: Non-Dog Owners /DW: Dog-Walkers/NDW: Non-dog-walkers; OPO: Other Pets Owners.

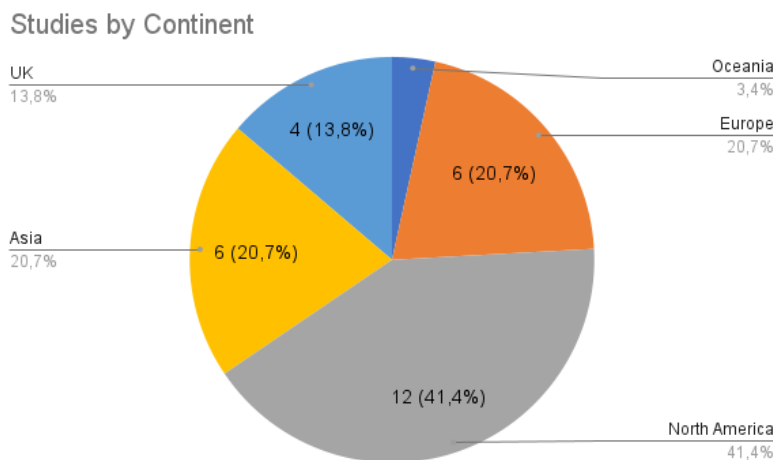
Papers were published from 1993 to 2021. As shown in Figure 4, there was an increase in the number of publications from the year 2017.

Figure 4. *Studies by Year*



Regarding the country, most of the studies come from continents North America (USA and Canada), Europe (Austria, Bulgaria, Czech Republic, Scotland, Netherlands, Spain) and Asia (Japan and China) with approximately 75% of studies selected. In figure 5 are the continents according to the number of publications.

Figure 5. *Geographic context of publications*

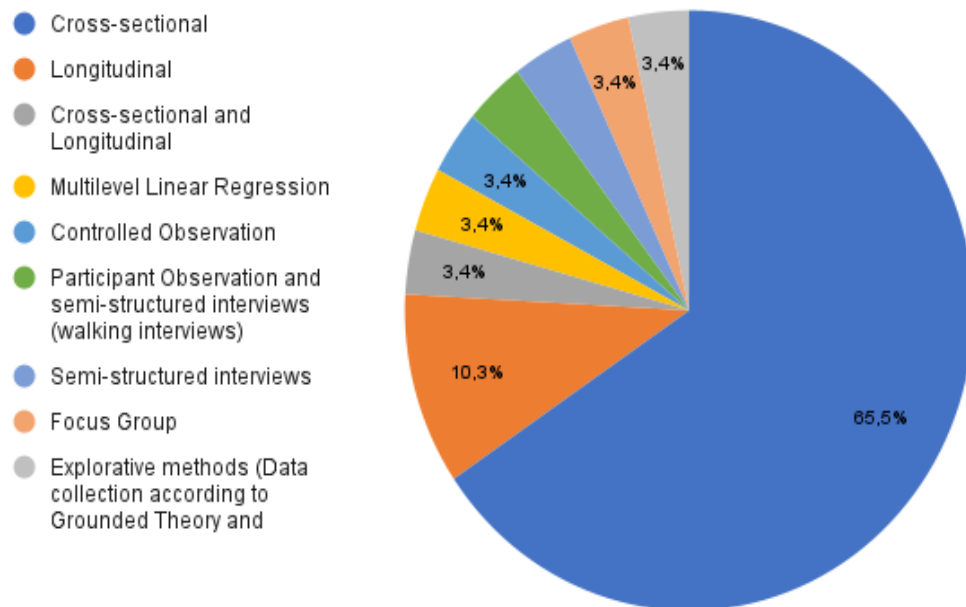


Regarding the sample sizes, it ranged from a minimum of 12 to a maximum of 152,629 participants. The age range of the samples had as lower limit: in five studies the participants 50 years; in five studies it was 60 years old; 12 papers 65 years old; and in three studies it was 70 years old. Two studies covered the adult population (≥ 18 years old), but both analyzed the sample for older people (≥ 65 years old). Most participants were women, with an average percentage of 57% of the total samples.

Regarding the objectives, the studies cover different aspects. However approximately 50% aim to examine patterns of physical activity such as quantity, intensity, walking behavior, exercise practice, physical function, functional capacities, all associated with dog ownership and walk with the dogs (Arbillaga-Etxarri et al., 2017; Chen et al., 2020; Dall et al., 2017; Feng et al., 2014; Garcia et al., 2015; Harris et al., 2009; Mein & Grant, 2018; Mičková et al., 2019; Moniruzzaman et al., 2015; Rijken & van Beek, 2011; Shibata et al., 2012; Thorpe et al., 2006a; Thorpe et al., 2006b; Wu et al., 2017). In these cases, some observed the degree of perceived health, the health levels of the older adults or incident frailty. One study investigated older people diagnosed with COPD (Arbillaga-Etxarri et al., 2017), to examine the amount and intensity of physical activity of patients with dogs. In another study, the objective draws attention to the gender approach in the analysis of measures of physical activity in menopausal women associated with the habit of walking dogs (Garcia et al., 2015). Sleep quality was examined in two studies related to older adult dog owners (Mein & Grant, 2018; Mičková et al., 2019). Ten studies aimed to analyze emotional aspects such as psychological function, mental and psychological health, the attachment to the dog, the satisfaction with life and the loneliness. In eight studies, social aspects such as social capital (Koohsari et al., 2021), social function (Taniguchi et al., 2019; Y. Taniguchi et al., 2018), involvement with the neighborhood (Curl et al., 2020; Ikeuchi et al., 2021; Mein & Grant, 2018) and social isolation (Carr et al., 2021) are approached. Concerning economic aspects, one study targeted the low-income older population (Moniruzzaman et al., 2015). Finally, in some articles the environment was the guiding aspect of the research objectives, as well as themes such as accessibility of means of transport, quality of parks and perceptions of the built environment.

Regarding the methodology, 24 were quantitative and five qualitative. The figure 6 shows that the quantitative ones are 23 (65.5%) cross-sectional, three longitudinal, one exploratory and one multilevel regression. Of the five qualitative studies, one used the walking interview during the walk with the dogs as a data collection instrument, in order to analyze the contents of the conversation of the pet owners, if they refer to their dogs and how they do it (Chen et al., 2020). The others used focus groups, semi-structured interviews and an ethnographic study in a cemetery for dogs (Gan et al., 2020; Janevic et al., 2020; J. Rogers et al., 1993; Scheibeck et al., 2011).

Figure 6. *Studies design*



The design, methods and instruments of the studies are systematized in detail in table 6.

Table 6. *Methods and instruments/indicators*

1st author; year; country	Methods/design	Mobility: instruments/indicators	Social interaction: instruments/indicators	Other variables
Carr et al.; 2021; USA	Longitudinal Survey, based on the Health and Retirement Study (HRS).	-	Instruments: UCLA Loneliness Scale Lifestyle Questionnaire. Indicator: “How much is the COVID-19 outbreak impacting your sense of social connection?”	-
Koohsari et al.; 2021; Japan	Cross-sectional data of the epidemiological study.	Indicators: Dog walking: yes or not.	Instruments: Questionnaire about Social Capital, Social Cohesion, Activities with neighbors (Likert scale).	Indicators: Dog ownership: yes or not.
Ikeuchi et al. 2021; Japan	Cross-sectional data from the Ota Genki Senior Project (logistic regression models).	-	Instruments: Five-item scale about pet ownership experience. How often they interact with other people.	Instrument: Five-item scale World Health Organization Well-Being Index (WHO-5).
Curl et al.; 2020; USA	Secondary data from the 2012 Core, which included an experimental Human-Animal Interaction (HAI) module.	Indicator: Frequency and number of walks with the dogs.	Indicator: Average number of social contacts per week.	Indicators: Life satisfaction; Ownership of dogs and degree of bonding.
Friedmann et al.; 2020; USA	Cross-sectional (cohort design) with prospective health data obtained in the Baltimore Longitudinal Study of Aging (BLSA).	Instruments: Short Form-12 Physical Health Subscale (PCS); Physical function (speed of walking fast and level of daily activity).	-	Instruments: Lexington Pet Attachment Scale (LAPS); California Verbal Learning Test (CVLT); Digit Symbol Substitution Test (DSST);

				SF-12 Mental Health Subscale (MCS); Center for Epidemiological Studies Depression Scale (CES-D); Perceived Stress Scale (PSS).
Mičková et al.; 2019; Czech Republic	Cross-sectional	Instruments: Accelerometer (Step Count, Activity Time, Distance, and Calorie Count); IPAQ (International Physical Activity Questionnaire).	-	Instruments: SF-36 (subjective perceived health). Indicator: Sleep Qualities.
Taniguchi et al.; 2019; Japan	Longitudinal	Instruments: Kaigo-Yobo Checklist 15 Frailty Index; Motor aptitude scale; Indicators: Questions about fall during the previous year; Body mass index; Exercise habit; Frequency of outdoor activities.	Indicator: Questions about Interaction with neighbors.	Instrument: Geriatric Depression Scale (GDS). Indicators: Health situation (history of chronic diseases, history of hospitalization, alcohol consumption, smoking, variety of foods consumed, self-assessment of health).
Mein; 2018; UK	Cross-sectional and exploratory: data from the phase 9 of the Whitehall II study.	Indicators: Exercises practice and frequency. Instruments: Metabolic Equivalents (METs).	Instrument: Perceptions of local neighborhood (Likert scale).	Instruments: Centre for Epidemiologic Studies Depression Scale (CES-D); Mini Mental State Examination (MMSE); Short Form (SF36); General Health Questionnaire (GHQ); Self-realization and Pleasure (CASP); Sleep (Scale of Jenkins).

Taniguchi et al.; 2018; Japan	Cross-sectional: data from the Ota Genki Senior Project.	Instruments: International Physical Activity Questionnaires-Short Form; TMIG-IC; Motor Aptitude Scale; Frailty status for Kaigo-Yobo Checklist.	Indicators: Frequency of interaction with neighbors and level of relationship.	Instruments: Food Variety Score; World Health Organization [WHO-5] Well-Being Index.
Arbillaga-Etxarri et al.; 2017; Spain	Cross-sectional: randomized clinical trial.	Instruments: Accelerometer Dynaport; intensity of physical activity to Metabolic Equivalent Tasks (METs).	-	-
Curl et al.; 2017; USA	Cross-sectional: data from the 12th wave (2012) of the Health and Retirement Study.	Indicators: Frequency of dog walking.	-	Instrument: Lexington Attachment to Pets Scale (HRS) - Pet Bonding. Indicators: Physical Health and Health Behaviors, Dog Property Variables.
Dall et al.; 2017; UK	Longitudinal: case-control.	Instruments: Activity monitor (activPAL), frequency walking and physical activity; measures of sedentary behavior; measures of moderate and vigorous physical activity (MVPA); Walking diaries of waking times.	-	-
Dzhambov et al.; 2017; Bulgaria	Cross-sectional survey: questionnaire and field observation.	Instruments: Questionnaire of 13-item to assess health-enhancing physical activity. Indicator: Dog walks frequency.	-	Instruments: Geomorphological and park quality assessment (Public Open Space Desktop Auditing Tool (POSDAT)).

				Indicators: Perceived general health status; sociodemographic factors.
Wu et al.; 2017; UK	Cross-sectional: data from the European Prospective Investigation into Cancer and Nutrition Norfolk cohort.	Instruments: Accelerometer (Actigraphy GT1M, Florida, USA); Questionnaire on dog ownership and walking.	-	Indicators: Environmental conditions: day length and weather.
McCormack et al.; 2016; Canada	Cross-sectional	Instrument: Telephone interviews and a follow-up questionnaire - Neighborhood Walkability Scale (NEWS-A).	-	Indicators: Psychosocial, health; dog ownership and perceptions of the built environment.
Garcia et al.; 2015; USA	Cross-sectional: data from in the Women's Health Initiative (WHI).	Instrument: Self-reported questionnaire walking and physical activity.	-	Indicators: Questions about dog ownership; General Health Subscale of the Rand SF-36 Item Health Survey.
Moniruzzaman et al.; 2015; Canada	Multilevel	Instrument: Walkability, Walk Score (able to walk 4 min).	-	Instruments: Trips were geocoded; record of start place, time, and end place. Time, reason, and mode of travel; companion (alone, spouse, brother, child, friend, neighbor, volunteer, other); accessibility of neighborhoods.

Feng et al.; 2014; Scotland	Cross-sectional: data from the Physical Activity Cohort Scotland (PACS).	Instrument: RT3 triaxial accelerometer; London Health and Fitness Questionnaire.	Instrument: Social capital questionnaire. Indicator: Number of people nearby to request help.	Instruments: Older people and Active Life Questionnaire (OPAL) about Dog Owners; Hospital Anxiety and Depression Score (HADS) depression subscale; general health status SF-36. Indicators: Geographic data using the Global Positioning System (GPS) and a Geographic Information System (GIS) to identify the type of area. Weather conditions were recorded from Mylnefield Weather Station.
Gretebeck et al.; 2013; USA	Cross-sectional survey.	Instruments: Activity Scale for the Elderly; Physical Functioning Questionnaire; Theory of Planned Behavior Questionnaire.	Instruments: Crown-Marlowe Social Desirability Index.	Indicators: Questions about Dog Owners.
Shibata et al.; 2012; Japan	Cross-sectional.	Instruments: International Physical Activity Questionnaire, short version (IPAQ-SV).	-	Indicators: Dog owners' variables; perceptions, domain from the SF-8; health-related variables.
Rijken et al.; 2011; The Netherlands	Cross-sectional: data from the National Panel of people with Chronic illness or Disability (NPCD).	Instrument: Level of physical activity (SQUASH).	Indicators: Report the frequency of social contacts.	Instruments: Perceived general health (RAND-36 Short-form Health Status Survey);

				Mental health by the General Health Questionnaire, 12-items version; UCLA Loneliness Scale.
Harris et al.; 2009; UK	Cross-sectional.	Instruments: Accelerometer (Actigraph) for 7 days; Zutphen Physical Activity Questionnaire; housework (light and heavy) PASE (Physical Activity Scale for the Elderly); Modified Townsend disability score; Indicators: Attitude about exercise; exercise-related self-efficacy.	-	Instruments: Geriatric Depression Scale (GDS- 15); MOS 36-item short form; self-reported checklist of doctor/nurse-diagnosed chronic medical conditions. Indicators: Question on dog-walking.
Thorpe et al.; 2006a; USA	Cross-sectional and longitudinal: a prospective cohort from the Health, Aging and Body Composition Study.	Instrument: Questionnaire on walking for exercise- and non-exercise-related walking; measures such as usual and rapid walking speed over 20 meters. Indicators: Mobility capacity.	-	Indicators: Questions about dog ownership and dog-walking.
Thorpe et al.; 2006b; USA	Cross-sectional and longitudinal: data from the Health, Aging and Body Composition Study.	Indicators: Exercise walking, non-exercise walking and vigorous activity, physical activity measures.	-	Indicators: Pet ownership questions.
Chen et al.; 2020, China	Walking Interviews: participant observation and semi-structured interviews.	Indicators: The activity range of the companion dog.	Indicators: Tracking of daily outdoor activities and the interaction during dog walking.	Indicators: Motivation for and experience of keeping companion dogs;

				relationship with the companion dog; special events in the raising process; personal beliefs and values related to keeping companion dogs; lifestyle.
Gan et al.; 2020; Australia	Phenomenological, semi-structured interview.	Indicator: Influence of pets on a daily routine.	Indicators: Social inclusion and participation.	Indicators: Mental health benefits of owning pets; relationship with pets.
Janevic et al.; 2020; USA	Focus group.	Indicators: Physical activity; behavioral activation.	Indicators: Social activation.	Indicators: Relaxation, distraction from pain; mood management; quality of sleep.
Scheibeck et al.; 2011; Austria	Exploratory: grounded theory and ethnographic.	Indicators: Activity patterns.	-	Indicators: Relationship between pets and the older single persons; importance of dogs for owners; importance of visiting the dog's grave; strategies to cope with the dog dead.
Rogers et al.; 1993; USA	Walking interview: controlled observation; interviews (based OARS).	Indicator: Walks by residents.	Indicators: Conversations during walks; social satisfaction.	Indicator: Well-being (social, mental, and physical satisfaction).

5.1 Summary of findings

The findings of each study are summarized in the table 7 and described considering: mobility, social interaction and other findings.

5.1.1 Mobility

In 27 (93%) papers, the findings were about the impact of dog ownership on mobility or physical activity of the older dog owners. In 26 studies, findings suggest that the size of the dog is a determinant for the motivation to practice physical activity (Arbillaga-Etxarri et al., 2017; Carr et al., 2021; Chen et al., 2020; Curl et al., 2017, 2020; Dall et al., 2017; Dzhambov, 2017; Feng et al., 2014; Gan et al., 2020; Garcia et al., 2015; Gretebeck et al., 2013; Harris et al., 2009; Janevic et al., 2020; McCormack et al., 2016; Mein & Grant, 2018; Mičková et al., 2019; Moniruzzaman et al., 2015; Rijken & van Beek, 2011; Rogers et al., 1993; Scheibeck et al., 2011; Shibata et al., 2012; Taniguchi et al., 2019; Thorpe, et al., 2006a; Thorpe, et al., 2006b; Wu et al., 2017). One study indicates that having a pet dog facilitates the older adults to overcome mental and physical challenges (Chen et al., 2020). Two studies show that walking a pet dog stimulates the older adults to leave the house and walk, even in adverse weather conditions, and with concerns about personal security and lack of social support (Feng et al., 2014; Wu et al., 2017).

Some studies used compared samples of dog owners, and non-dog owners; others considered ownership of other pets, such as cats. A study (Rijken & van Beek, 2011) pointed out that the ownership of cats can be adverse, as they are not animals that encourage their owners to walk, an action that would encourage them to be healthier and more active. What is similar to the findings by Taniguchi et al. (2019) who observed that the risk of incident frailty among older adults can be reduced if they carry dogs rather than cats, what was associated with the lower frequency of physical exercise of cat owners (Thorpe et al., 2006).

Scheibeck et al. (2011) found that responsibility and attachment to the dog gives owners a sense of purpose that comes from routine, with fixed times for meals and dog walks. In addition, the authors noted that there is a 40-minute difference in the average time spent walking with the dog, when comparing whether the owners

had a yard at home or not. Carr et al. (2021) realized that the attachment to the dog was a motivation for the older people to remain physically active, in order to meet the animal's needs.

In four studies, adverse effects on the mobility of the older adults, related to having a dog were described. Findings showed that the speed in walking and in the distance covered was lower in older adults with a dog (when compared with those walking without a dog) (Curl et al., 2017; Friedmann et al., 2020; Rogers et al., 1993). Garcia et al. (2015) found no association between dog ownership and walking to meet physical activity guidelines. Curl et al. (2020) point out that not all dog owners take their dogs for a walk and the justification was generally that they have a fenced yard where the animal are free or because the older adults had physical limitations and/or poor health.

One study indicates that being a dog owner per se does not influence mobility, but walking the dog contributes to increased physical activity (Shibata et al., 2012). Some studies distinguish the owners who walk the dog from those owners who do not walk dogs. Ten studies addressing mobility and physical activity did not distinguish dog owners who walk from those who do not walk their dogs (Gan et al., 2020; Garcia et al., 2015; Gretebeck et al., 2013; Ikeuchi et al., 2021; Janevic et al., 2020; Koohsari et al., 2021; Mein & Grant, 2018; Moniruzzaman et al., 2015; Rijken & van Beek, 2011; Taniguchi et al., 2018). Overall, the results suggest that the ownership of dogs by older adults has more positive than negative impacts on the mobility, especially when compared to owners of other pets.

5.1.2 Social interaction

Thirteen studies addressed social interaction related to older adults who have a dog pet (Curl et al., 2020; Friedmann et al., 2020; Ikeuchi et al., 2021; Koohsari et al., 2020; Mičková et al., 2019; Rogers et al., 1993; Scheibeck et al., 2011). Globally, having a dog pet contributes to increase the social support networks for the older adults (Chen et al., 2020; Taniguchi et al., 2019) and encourage the involvement of the older adults in social activities in the neighborhood and with friends and family (Gan et al., 2020; Mein & Grant, 2018; Taniguchi et al., 2018). Furthermore, owning a dog pet helps build and maintain relationships (Janevic et al., 2020).

Four studies refer found some adversities of dog ownership with regard to the social interaction of the older people. Friedmann et al. (2020, p. 12) found that 25% of the respondents “did not visit friends or family due to concern for the well-being of their pets”. Three studies (Carr et al., 2021; Gretebeck et al., 2013; Taniguchi et al., 2018) reported that pets (especially dogs) reduce the feeling of isolation and loneliness of the older people by acting as instruments of socio-emotional support for owners (not by facilitating interactions with other individuals). Rijken et al. (2011) found no significant differences between pet owners and non-pet owners with regard to social contacts and loneliness. Scheibeck et al. (2011) point out that in situations of mourning for the companion dog many older people were faced with no longer having social contacts, as their dogs had been their human substitutes. Koohsari et al. (2021) found no significant association between dog walking and neighbor activity among older adults and no significant association between dog walking and social cohesion.

The papers included reported positive and/or adverse impacts regarding the social function of older dogs’ owners. In general, studies point out that having a dog pet is a facilitator for social interaction and for engaging in neighborhood activities, thus improving the social function of the older adults.

5.1.3 Other Results

There are other aspects related to dog ownership and older adults that were analyzed in the studies. Mein et al. (2018) found in a sample of 6,575 older dog owners that having a companion dog helps them sleep better after walking the dog at night. Rogers et al. (1993) analyzed dog owners' conversations while walking the dog and observed that all dog owners communicated with the dog and “when they talked to other people it was about what was happening in the present, as opposed to non-owners where subjects reported past events” (p. 270). Two studies showed that dog ownership was a benefit to the mental health of the older people (Chen et al., 2020; Gan et al., 2020). Carr et al. (2021) analyzed the impact of dog ownership during the pandemic lockdown, to perceive aspects of loneliness in the older adults. Results suggested clinical benefits in the psychological wellbeing of older adults who regularly engage in dog walking: “those with high levels of social consequences experienced significant increases in loneliness, but if they took the dog for a walk at least once a day, they did not experience an increase in loneliness” (p.10).

Some studies associated walking the dog with the built environment and the use of public transport. Moniruzzaman et al. (2015) observed that dog walkers who like to walk cover greater distances than those who do not like to walk. In addition, responsibility of taking the dog for a walk is independent of the built environment. Arbillaga-Etxarri et al. (2017) found that, for older people with chronic obstructive pulmonary disease (COPD), the characteristics of the built environment related to green or blue spaces around their homes was not associated with physical activity; however, walking and interacting with dogs helped them with pain management. Dzhambov et al. (2017) characterized the preference of the older adults for parks to walk the dogs, and observed that the dog behavior (not behaving well on a leash) and the difficulty of the older people in collecting feces, affect the type of park that seniors choose to attend. Due to complaints from other users of these spaces (in particular, non-dog owners or younger owners), older dog owners often choose to walk their dogs in more isolated and lesser quality parks.

Table 7. Outcomes

1st author; year; country	Daily mobility	Social interaction
Carr et al.; 2021; USA	Attachment to a dog can explain different motivations for staying physically active and meeting the needs of the pet dog.	Those who reported that COVID-19 had a significant impact on their social lives reported higher levels of loneliness; but if they walked the dog at least once a day, they felt less loneliness.
Koohsari et al.; 2021; Japan	-	Modest support for the link between dog walking and activities with neighbors among young-to-middle-aged adults; no meaningful associations for older adults. No significant association between dog walking and social cohesion. The mean score of activities with neighbors was significantly higher among dog owner walkers than dog owner non-walkers.
Ikeuchi et al. 2021; Japan	-	Pets, especially dogs, can play a role in increasing opportunities to engage in physical and social activities and in providing emotional support, thereby reducing the sense of social isolation and loneliness, and improving psychological health.
Curl et al.; 2020; USA	Around 60% of the dog owners took their dogs for a walk (0–60+ min/day). Reasons for not taking the dog for a walk vary (e.g., having a fenced yard, individual's physical limitations).	Dog walking is associated with increased opportunities for social engagement. Have a stronger bond with one's dog increases the frequency of social contacts by increasing the length of time spent dog walking. More frequent social interactions were associated with greater life satisfaction.
Friedmann et al.; 2020; USA	Walking with a dog did not lead people to walk faster; in fact, most walked more slowly. Walking with a dog did not lead owners to walk for shorter distances, in comparison with walking without the dogs.	Having a dog was more likely (36%) than owning a cat (12%) to facilitate social interaction. Dog walkers spend more time walking when walking their dogs. Spending more time could lead to social interaction. About

		25% of respondents did not visit friends or family due to concern for the well-being of their pets.
Mičková et al.; 2019; Czech Republic	Walking the dog affects the general physical activity of the older individual. When comparing dog owners and non-dog owners, a statistically significant difference was observed in favor of dog owners in all monitored parameters (time spent performing all activities, calorie counting, step count, distance).	Older adults that walked the dog had significantly better results in the assessment of social functioning; significantly better values in the parameters related to the social area of the SF-36 questionnaire.
Taniguchi et al.; 2019; Japan	Taking care of a dog increases the owner's physical activity that play a key role in maintaining physical function (motor fitness scale) and exercise habit. Higher physical function through dog ownership can help reduce the risk of subsequent frailty among older adults.	Taking care of a dog increases the owner's social network and may play an important role in maintaining social function in later adulthood.
Mein; 2018; UK	Owning a dog requires giving the dog regular exercise usually through walking around the neighborhood. This enables the owner to familiarize with the neighborhood, at different times in the day, to engage in exercise and sleep better after walking the dog at evening.	Pet owners were more positive about their neighborhood and environment than non-owners; this association was more significant with dog owners than owners of other pets. Pet owners reported a greater number of social activities, even after adjusting for age and retirement, and there was no difference between dogs and other pets.
Taniguchi et al.; 2018; Japan	Dog ownership is associated with more light physical activity, over a wide age range. Dog walking increases total walking time for older persons and helps maintain their motor fitness.	Current and past dog/cat owners had greater interaction and trust with neighbors and were less likely to be socially isolated. Dog/cat owners have increased social function because of their greater opportunity to participate in pet-related social activities.
Arbillaga-Etxarri et al.; 2017; Spain	Dog walking and grandparenting are both associated with a higher amount and intensity of physical activity in Chronic Obstructive	-

	Pulmonary Disease (COPD) patients. The characteristics of green or blue spaces surrounding patients' homes were not associated with physical activity practice. Dog walking was significantly associated with an increase in moderate-to- vigorous physical activity and intensity.	
Curl et al.; 2017; USA	Dog walking was associated with lower body mass index, fewer limitations in activities of daily living, fewer visits to the doctor, and more frequent moderate and vigorous exercise. People with more attachment to their dog were more likely to walk the dog, and do it for more minutes; but for shorter distances than they walked without the dog.	-
Dall et al.; 2017; UK	Older adult dog owners walked on average 20 min a day longer than non-dog owners; Owning a dog, may motivate older adults to engage in appropriate levels of physical activity for health.	-
Dzhambov et al.; 2017; Bulgaria	Better access to greenery and bigger dog zone areas in the park were positively correlated with the perceived health and dog-walking time of the older adult citizens. Older people often received complaints about the dogs' behavior, possibly because they were less able to remove droppings and to control their dogs' behavior.	About a half of the participants reported that they would prefer to walk their companion dogs in more isolated parks and of lower quality, because of frequency of complaints against their dogs.
Wu et al.; 2017; UK	Short day length, heavy rain and low temperature were associated with lower physical activity and more time spent sedentary. Dog owners recorded higher activity levels and shorter sedentary time even in days with poor environmental conditions. In the shortest days, and those with lower temperatures and higher	-

	precipitation, regular dog walkers recorded physical activity levels that were typically 20% higher than non-dog owners. The dog owners who regularly walked their dogs were on average more active and less sedentary on days with the poorest conditions than non-dog owners were on the days with the best conditions.	
McCormack et al.; 2016; Canada	Older adults and those without dependents walked dogs more frequently compared to their counterparts.	-
Garcia et al.; 2015; USA	Dog owners were more likely to walk ≥ 150 min/wk and less likely to be sedentary than non-dog owners among older women, particularly those living alone; more likely to engage in casual strolling walking and less likely to walk fairly fast or very fast than non-dog owners. An association was not seen between dog ownership and walking to meet physical activity guidelines.	-
Moniruzzaman et al.; 2015; Canada	The interaction between dog ownership and walking had a positive association with trip distance, suggesting that those who own dogs and like to walk will walk further; while those who dislike walking, walk only short distances, despite owning a pet. Dog owners out of necessity assume the responsibility to walk their dogs; this does not depend on the environment.	-
Feng et al.; 2014; Scotland	Dog owners' physical activity level was 27% higher than non-dog owners. They were likely to have a high level of perceived behavioral control and physical activity intention, better physical function, and better overall health. Dog ownership can motivate physical activity and	-

	allow the older to overcome many potential barriers to physical activity, such as lack of social support, adverse weather conditions and concerns about personal safety.	
Gretebeck et al.; 2013; USA	The dog owners were more physically active than non-dog owners and reported more walking, more often and for longer duration. The dog owner/dog walker group had higher functional ability. As well they performed higher in specific tasks, such as heavy housework.	Social support, or companionship may be associated with dog walking.
Shibata et al.; 2012; Japan	It is not dog ownership per se, but dog walking that contributes to increased overall physical activity and the likelihood of compliance with public health guidelines for physical activity among adults older.	-
Rijken et al.; 2011; The Netherlands	Older adults who have a dog are more likely to get enough physical exercise than those without a dog. Having a cat does not have such a positive effect; the effect of owning a cat is adverse. 70% of older people living with a dog meet the standard of being healthy active.	Non-pet owners and pet owners do not differ significantly regarding social contacts and loneliness.
Harris et al.; 2009; UK	Dog- walking can result in approximately 1700 further daily steps, even after adjusting for confounders such as age, poor health, and disability.	-
Thorpe et al.; 2006a; USA	Dog walkers were more likely to walk at least 150 minutes a week and walk faster, exhibit better health practices, and have better mobility than non-walking dog owners. Dog walking was associated with meeting prescribed weekly goals for physical activity.	-

Thorpe et al.; 2006b; USA	Dog owners were more likely to engage in non-exercise-related walking than non-pet owners. Dog owners reported a greater frequency and duration of walks than non-pet or non-dog-pet owners, most of whom had cats. This shows the potential benefit of dog ownership, but not of a cat ownership. Owing a dog increases physical activity, particularly non-exercise-related walking.	-
Chen et al.; 2020, China	Companion dogs motivate owners to overcome mental and physical challenges. Feeding, calming, and walking with dogs are activities that benefit owners' mental and physical health.	Living and engaging in recreational activities with companion dogs is effective in channeling more support to the older adults through a broader social network. A dog gives non-human support and fosters interpersonal support through an extended social network that was developed by meeting friends on the dog walk.
Gan et al.; 2020; Australia	The responsibility of owning a pet meant that physical and cognitive tasks were performed, positively influencing the mental health of the older adults.	Pet ownership resulted in increased socialization with friends and families, providing a sense of belonging in their communities, which could positively impact on owner's mental health.
Janevic et al.; 2020; USA	Walking dogs (and, occasionally, cats) was the type of physical activity most often described as helping with pain or health. Pets provided motivation, and gave them no choice but to get up or to go outside.	Having pets increased social activity with people, helping to build or maintain relationships.
Scheibeck et al.; 2011; Austria	Dogs give owners a daily structure of fixed times for meals and walks and give seniors a purpose and a responsibility. Older adults dog owners travel a great deal of distance each day.	Dog ownership serves as a mean through which social contacts can be established in everyday situations. The absence or insufficiency of emotional or intimate social relationships is projected onto the pet or dog. In situations of mourning for the companion dog, it was observed that many older adults no longer had

		social contacts and that their dogs had been their human substitutes.
Rogers et al.; 1993; USA	Dog owners reported taking twice as many daily walks as non-owners. However, the estimated duration did not differ among the two groups.	Dog owners and non-owners exhibited a wide range of social interaction. Dog owners reported significantly less dissatisfaction with their social, physical, and emotional states.

CHAPTER 6 – DISCUSSION

The interaction between humans and dogs is historical. Several areas of study on this relationship have emerged over time (Laffoon et al., 2019; Souza Cabral & Savalli, 2020). Questions about how the dog influences human behavior, especially the older adults, and the benefits and challenges of this interaction, are some of the reasons that lead to therapeutic interventions with animals in social institutions. There are ways to support the older people to grow old at home with his/her pet dog. Research about the contributions of pets arises in multidisciplinary fields. In the scope of the active and healthy aging, the well-being and quality of life of the older adults are central aspects. The analysis of older adults who own dogs raises questions that need to be answered to ensure these individuals have the support they need to stay active, healthy, remain responsible for their dogs and value their choices and abilities. Next, we will discuss the main aspects in our results: i) bibliometric information; ii) findings of studies on the topic: mobility and social interaction; iii) and observed gaps.

Regarding the bibliometric data, most studies were published after 2015, corresponding to 20 out of 28 papers. There is a 13-year gap between the first published study (Rogers et al., 1993) and the second (Thorpe, et al., 2006a; Thorpe et al., 2006b). The emergence of studies on the human-animal relationship (HA) date back to 1962, with the study of Boris Levinson (as cite in Vitztum, 2013). Most research on the human-dog relationship, according to Rehn et al. (2016), are recent or still under development. The time lapse in the publications is evidenced by 67% of the studies being published from the year 2015. This data seems to sheds light on a relevant aspect, that it is the impact of policies and programs related to active and healthy aging, in which functional abilities of the older adults have gain visibility (WHO 2015b). It makes this theme a central and emerging part of current discussions and scientific production, especially when related to dog/pet ownership.

Europe is one of the continents with the highest number of older people in the world (UN, 2019). However, just 20.7% of the studies were carried out in Europe. Countries such as Italy and Portugal, that are among the 10 countries with the highest number of people over 60 years old by 2050 (United Nations, Department of Economic and Social Affairs, 2017), are regions where we did not find any research in the review topic. The absence of published studies in these countries is

a gap to be considered. In addition to the older population being expressive in this geographic context, the dog ownership index on the European continent is also high. The European Federation of the Pet Food Industry (FEDIAF, 2021) indicates 90 million dogs registered in Europe in 2021, and of these 38% are in Portugal and 24% in Italy. These data call attention to the promotion of research on mobility and social interaction related to the ownership of dogs by older adult's dogs in these countries.

Studies in this scoping review, overall, suggest the importance of routine and responsibilities with dogs (for example, walking, care with food and leisure) as a practice and positive motivation to keep the older adults moving (Curl et al., 2017; Gan et al., 2020; Janevic et al., 2020). This is relevant for the maintenance of the functional abilities and health of the older people (WHO, 2015b). Being on the move (Gretebeck et al., 2013; Taniguchi et al., 2019) associated to a companion dog, can develop a positive impact by reducing limitations of the daily life of the older people.

In addition to movement indoors, there are issues involving mobility that expand to spaces outside the home. This raises questions about the older adult's ability to leave home, have access to instruments such as public or private transportation, services in the neighborhood and travel longer distances (WHO, 2015b). These aspects related to accessibility can become potentiate, limit or even inhibit the mobility of the older individuals. Dzhambov et al. (2017) considered environmental aspects to characterize the preference and frequency of use of parks by older adult's dog owners. The authors found that reduced mobility due to age and generational difficulties, might take older adults to use less structured spaces, and parks that are more isolated. Still on environmental aspects, but regarding accessibility to transport, Moniruzzaman et al. (2015) analyzed the travel behavior in low-income older adults. The brief clipping the authors did on dog owners, showed that older people who like to walk with their dogs cover greater distances than other participants do. The included studies did not address the mobility as proposed by Webber et al. (2010), i.e. by considering the implications of the diversity of gender, culture and biography. The physical, environmental, psychosocial, and cognitive factors appear in the studies but not in an integrated manner.

Regarding social interaction, we rely on the conceptions of Kim and Kaplan (2004), Fiori et al. (2007) and Sluzki (2000) for theoretical considerations. The

impact of dog ownership was mapped to understand the influence of dogs on social formal or informal interactions. The studies included in this scoping review, in general, point out that older dog owners have an increased opportunity for contact and social interaction with new people and neighbors when walking the dog. Establishing social and support networks for the dog owner will contribute to their satisfaction with life (Curl et al., 2020) and overcoming the loneliness (Ikeuchi et al., 2021). Participation in neighborhood activities arising from dog ownership (Gan et al., 2020; Mein & Grant, 2018; Taniguchi et al., 2018) can be seen as an opportunity for community participation and involvement that enriches the sense of community and strengthens the social bonds and social capital of the older adults (Feng et al., 2014; Koohsari et al., 2021). These aspects reinforce the perspective that dogs act as catalysts for social interactions (McNicholas, 2014; Wood et al., 2015; Wood et al., 2005). Furthermore, the included studies suggested that the dog in the relationship with the owner occupies a space of companionship and emotional support to the point of replacing the owner's absence of social interactions (Ikeuchi et al., 2021). There is a tendency of dogs to occupy human spaces in their owners' lives. Dotson (2008) raises aspects about this theme when addressing the issue of anthropomorphizing that occurs among dog owners. Scheibeck et al. (2011) points out the relationship of owners with their deceased dogs. The authors describe that the rituals of mourning for the animal and tomb ornaments become similar to those made for humans. Rogers et al. (1993) analyzed the content of conversations that owners have with their dogs when walking alone and when meeting other people. They noted that on dog walks, owners communicate with dogs in the same way they communicate with children. When they meet other people, the subject is usually about the dog and in the present tense. These data strengthen the conceptions (Souza Cabral & Savalli, 2020) that the socio-emotional support that dogs provide to owners, especially in the West, tend to gain a space for satisfying the human need for affection, and strengthening the companionship and love acquired in the relationship with the dog.

FINAL CONSIDERATIONS

In this scoping review, we seek to map studies to understand how companion dogs affect the daily mobility and social interaction of older people living in urban communities. Overall, main findings suggest that the impacts tend to be more positive than negative, on both mobility and social interaction. In addition, that relationship is beneficial regarding other aspects such as sleep quality, social and emotional support, and chronic pain management. However, we noticed a gap in the studies in which the minority of selected research addressed the disadvantages of having a companion dog. Future research is needed to further understand the challenges that older adults dog owners face in their daily lives. The implications of having a companion dog can affect situations that range from taking a trip and being away from home for medical appointments, to receiving visits and interacting with friends and family who are afraid of dogs, for example (Friedmann et al., 2020). These issues, if not well managed, can interfere with the mobility and social interaction of the older people. The multidimensionality of mobility is another aspect that needs attention and to be studied to reach all the determining factors that enhance it. Not only with regard to physical performance promoted by routine dog walks, but also to consider interactions with the dog at home and examine cultural, social and gender variations, which are implications that permeate the potential for mobility (Webber et al., 2010). This scoping review demonstrates the importance of future research attention to distinguish in the sample older adults who own a dog and are dogs-walker from those who are non-dog walker. Dog owners' mobility is not just about taking dogs for a walk, dogs can encourage older people to move around indoors when caring and during entertainment times. It would be important to examine mobility and social interaction among older people who are suffering from the loss of their companion dog, noting the impact of the dog's absence on their mobility and interaction. In this scoping review, only one study addressed this topic (Scheibeck et al., 2011).

The results of this scoping review highlight that there is a need for more research on mobility and social interaction of older dog owners to be developed in qualitative methodologies to further explore this relationship. With 65.5% of quantitative studies with cross-sectional designs, it is important that more longitudinal analyzes to better understand the causal aspects that permeate the

relationship between dog ownership and the impact on mobility and social interaction. In addition, more research is needed to analyze aspects of built environments, accessibility and urban safety, support systems and services aimed at older people with dogs. Therefore, we consider that specific policies and programs for the older population with dogs need to be developed. Even aware that there is a need for more evidence on the impact that dog ownership has on mobility and social interaction. In this scoping review, it was possible to observe that evidence is emerging and finds that the ownership of dogs by the older people is a factor that impacts active and healthy aging.

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Appendix 1. *Inplasy Protocol*

International Platform of Registered Systematic Review and Meta-analysis Protocols

INPLASY PROTOCOL

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None declared.

Daily Mobility and Social Interaction of Older Adult Dog Owners: A Scoping Review Protocol

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Review question / Objective: This scoping review aims to map the impact of having a companion dog on the daily mobility and social interactions of community-dwelling older adults (≥ 65 years old) living in urban areas. The question in this scoping review is as follows: How does having a companion dog impact the daily mobility and social interactions of community-dwelling older adults (≥ 65 years old) living in urban areas?

Information sources: We will use electronic databases and will contact authors if necessary. From the search terms identified in item 11, specific search strategies will be developed with the help of a librarian to adapt to the chosen databases, namely SCOPUS, Web of Science, PubMed and Academic Search Complete. There will be no restriction on the publication date to avoid excluding articles not identified in the index.

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 30 September 2021 and was last updated on 30 September 2021 (registration number INPLASY202190111).

INTRODUCTION

Review question / Objective: This scoping review aims to map the impact of having a companion dog on the daily mobility and social interactions of community-dwelling older adults (≥ 65 years old) living in urban areas. The question in this scoping review is as follows: How does having a companion dog impact the daily mobility and social interactions of community-

dwelling older adults (≥ 65 years old) living in urban areas?

Rationale: The World Health Organization has launched the Active Aging paradigm that emphasizes the promotion of quality of life and the well-being of older adults. Active aging is the "process of optimizing opportunities for health, participation and safety for the consequent improvement in quality of life as people age" (WHO, 2002, p.

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12). The WHO (2020) launched the Healthy Aging Decade 2021-2030, underlining the functional abilities for healthy aging. This initiative involves society in its various sectors, such as universities, governments, and civil society, in favor of practical actions that guarantee the rights, well-being, and skills of older people. Human-animal interaction (HAI) is a field of study that is gaining momentum in terms of investigation and intervention due to its potential benefits for health and well-being. HAI appears to be effective at enabling and strengthening social interactions, functional skills and rehabilitation, physical and cognitive skills, and the emotional processes of older people (Gee, Mueller, & Curl 2017). Studies based on therapeutic interventions with animals for institutionalized older people indicate that contact with dogs has a positive influence on mobility and social interaction. The benefits include "sensory stimulation, emotional stimulation and opportunities for social interaction, reminiscence of childhood experiences and were supported by the development of some new social relationships" (Jain et al., 2021, p. 1456). A survey with non-institutionalized older people who received dog-assisted therapy at home showed that pet therapy significantly reduced individuals' blood pressure and heart rate (Krause-Parello & Kolassa, 2016). A study comprising treatment with animal-assisted therapies involving older schizophrenics showed stimulated mobility, interpersonal contact and communication, and enhanced activities of daily living (Rodrigo-Claverol et al., 2020). However, the impacts of interactions between older adults and companion dogs (that is, in non-therapeutic situations) have not been examined as extensively, although some assumptions can be made. For example, having a companion dog may induce a set of activities that involve daily mobility (such as exercising with the dog or going to the vet) and social interactions (such as talking to other dog owners and sharing the dog's achievements). The relevance of this scoping review is to map the existing evidence of the impact of having a companion dog on the daily mobility and

social interactions of older people living in urban areas and to identify potential gaps in the literature.

Condition being studied: The factors of interest in this research stem largely from the understanding that dogs, as companion animals, are active participants throughout their owners' lives. As people age, their mobility and opportunities to socially interact and form relationships begin to diminish (Lefrançois, Leclerc, & Poulin, 1998). Several factors contribute to the lower daily mobility and social interaction of older people: (i) the retirement process, which means that there is no need to go out every day and leads to the loss of daily contact with co-workers (Glass, Seeman, Herzog, Kahn, & Berkman, 1995; Handley, Lewin, Butterworth, & Kelly, 2021); (ii) difficulties with their own health (Shumway-Cook, Ciol, Yorkston, Hoffman, & Chan, 2005); (iii) the physical weaknesses that can affect mobility and contribute to the reduction of social interactions (Gardner, 2014; Metz, 2000); and (iv) mourning the loss of relatives, especially spouses and friends (Holt-Lunstad, Smith, Baker, Harris, & Stephenson, 2015). This review is interested in understanding the relationship between having a companion dog and the daily mobility and social interactions of older people living in urban communities so that these concepts can guide the mapping and observation of gaps in the existing literature. Daily mobility is a multidimensional concept that encompasses both an individual's abilities to move around within the home as well as the opportunities and possibilities to leave the house, use transportation, and access equipment and services (Webber et al., 2010). Social interaction encompasses the various contacts and relationships that older adults maintain in their daily lives in a diversity of environments, involving relatives, friends, service providers, and the neighborhood (Kim & Kaplan, 2004; Dall et al., 2017).

METHODS

Search strategy: This scoping review will employ a three-step search strategy to

identify published articles: 1) We will use selected English search terms after analyzing the most-used keywords in articles published in SCOPUS within our research theme, and we will test the terms indexed in PubMed, using keywords and terms from the Medical Subject Headings (MeSH) relevant to this review. 2) We will check the search strategies with the university library to adapt the keywords and index terms according to the needs of each database chosen for this review. These are: SCOPUS, Web of Science, PubMed, and Academic Search Complete. 3) Additional references and citation searches will also be conducted. Reference lists of articles identified during the search will be manually checked to identify potential articles for inclusion in the review.

Participant or population: The study population will include community-dwelling older adults (≥ 65 years old) living in urban areas who have at least one companion dog, with no exclusions based on ethnicity or gender.

Intervention: Not applicable.

Comparator: Not applicable.

Study designs to be included: All types of study designs will be included (qualitative and quantitative, randomized clinical trials, controlled trials, cohort studies, case series, cross-sectional studies, observational studies).

Eligibility criteria: Based on the Population, Context, and Concept (PCC) for scoping reviews, we will consider studies that include (i) Population: community-dwelling older adults, aged ≥ 65 years, who have at least one companion dog; (ii) Context: urban communities, regardless of country of origin; (iii) Concepts: daily mobility and social interaction. Therefore, studies that deviate from these criteria are not eligible, namely those in the context of animal-assisted interventions in aged care facilities or involving guide or therapeutic dogs. Studies other than peer-reviewed articles will be excluded (e.g., gray literature, letters to the editor, and

abstracts published in proceedings). Only studies published in English, Spanish, or Portuguese will be considered for inclusion.

Information sources: We will use electronic databases and will contact authors if necessary. From the search terms identified in item 11, specific search strategies will be developed with the help of a librarian to adapt to the chosen databases, namely SCOPUS, Web of Science, PubMed and Academic Search Complete. There will be no restriction on the publication date to avoid excluding articles not identified in the index.

Main outcome(s): This scoping review is expected to provide evidence about how having a companion dog impacts both the daily mobility and social interactions of community-dwelling older individuals. Main outcomes will comprise a paper and a conference presentation.

Additional outcome(s): Not applicable.

Data management: Following PRISMA (2020), we will take the following steps. 1) Titles and abstracts will be selected by two independent reviewers for evaluation according to the inclusion criteria. Data from each relevant publication will be imported into the reference software (Mendeley version 1.19.8). 2) Before the initial screening, the same program will be used to automatically delete any duplicate documents. 3) Then, the author (A) will export the titles and abstracts of the selected articles to a spreadsheet (Excel version 2016, Microsoft Corporation, Redmont, W). (A) and will be responsible for data extraction. It will exclude studies that clearly do not meet the inclusion criteria. The second reviewer will do the same; any disagreements that arise between the initial reviewers at each stage of the selection process will be resolved through discussion or with an additional reviewer. 4) The full text of the selected articles will be read by (A). The second author (B) will evaluate the extracted data and will also read the full text to verify the accuracy of the inclusion process. Any disagreement

will be addressed through discussion or consultation with the third author (C). 5) Reasons for excluding full-text evidence sources that do not meet the inclusion criteria will be recorded and reported in the final scoping review. Data from the studies that will be included in the review will be presented through numerical presentation (i.e., number and types of studies); through the scoping review flowchart (PRISMA-ScR); and by using narrative formats and tables in a summary report that will discuss the implications of the findings for future research and practice.

Quality assessment / Risk of bias analysis: We will use the Mixed Methods Assessment Tool (MMAT) to assess the risk of bias, inconsistencies, publication bias, and data inaccuracy. The MMAT has five criteria divided into two parts for analyzing the quality of five types of studies: qualitative research, randomized clinical trials, non-randomized trials, quantitative descriptive studies, and mixed-methods studies.

Strategy of data synthesis: Data synthesis will be performed through thematic analysis, conducted by three authors. We will follow these steps: 1) Extract a table of the following data: a) Author, year, country; b) Objective(s); c) Geographical context; d) Sample (age and sex); e) Design/methodology; d) Instruments/indicators; f) Results: mobility; g) Results: social interaction; h) Other variables. 2) Thematic analysis: coding, description, and elaboration of analytical themes for discussion of results. The results will be illustrated through tables or diagrams and described in a narrative way and through demonstrative tables by category in order to indicate the sources of evidence.

Subgroup analysis: Not applicable.

Sensitivity analysis: Not applicable.

Language: Studies published in English, Portuguese, or Spanish.

Country(ies) involved: Portugal.

Other relevant information: Second affiliation's - Department of Education and Psychology, University of Aveiro Campus Universitario de Santiago, 3810-193 AVEIRO, Portugal.

Keywords: Community Urban; Companion Dog; Senior; Walking; Social Interaction; Mobility; Urban Areas; Healthy Aging; Well-being.

Dissemination plans: The results will be presented at a conference, submitted to a peer-reviewed journal and presented in a master's thesis.

Contributions of each author:

Author 1 - Suellen Costa - The author prepares and develops the protocol, will be part of the selection and data extraction process, and will prepare the manuscript for this review.

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Author 2 - Liliana Sousa - The author helped develop the research idea, helped in the creation of this manuscript, provided research oversight, critically reviewed, and provided full feedback on this protocol. The author will be included in the selection and data extraction process as a secondary reviewer and will also collaborate with a critical review.

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Author 3 - Helena Luz - The author assisted in the creation of this manuscript, critically reviewed it, and provided feedback. The author will be included in the selection and data extraction process as a tertiary reviewer. Having provided research oversight, the author will also critically review the manuscript for this review.

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Author 4 - Miguel Padeiro - The author helped develop the research idea and provided oversight of the research as well as feedback on its development. The author assisted in the creation of this manuscript, reviewed it critically, and will provide full research feedback. The author will also critically review the manuscript for this review.

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