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Longevity and Development: New perspectives on Ageing Communities

Proceedings of the 2nd International Congress Age.Comm, November 11–12, 2021

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AGE.COMM

UNIDADE DE INVESTIGAÇÃO INTERDISCIPLINAR
COMUNIDADES ENVELHECIDAS FUNCIONAIS
INTERDISCIPLINARY RESEARCH UNIT
ON BUILDING FUNCTIONAL AGEING COMMUNITIES

Springer

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Preface

The way we investigate and analyse today the dynamic process of ageing is a key issue in our society, whose intervention must be multi-dimensional. It is under this premise that Age.Comm—Interdisciplinary Research Unit—On Building Functional Ageing Communities of the Polytechnic Institute of Castelo Branco conceives its intervention, bringing together in a common space a group of researchers from different scientific fields, from social and behavioural sciences, education, information and communication technologies, and different specialties of health sciences, to understand the phenomenon of the ageing population from a systemic, holistic, and sustainable perspective. From one of the most aged areas in Portugal and Europe, the history and impact of this ageing process will be studied from two perspectives that are interrelated and interdependent: longevity and development. Longevity is increasingly a question of contemporaneity, in which everyone advocates that increasingly old age is an asset of this society and that it must be respected as an added value. The way we approach this concept, understand it, explore it, and pass it on to the next generations will determine much of what we do in the coming decades. Ageing is more than ever a temporal phenomenon, in the sense that all future eras will be built upon it. However, it seems that we are increasingly applying double standards for this longevity. Popular Portuguese proverbs translate well the paradox in society regarding ageing and growing old: "Old age is an incurable disease". "Old age is a strange disease that is treated so that it lasts"; "Nobody wants to be old, but nobody wants to die young either"; "Old age is not made up of years"; "Old age is not good, but everyone wants it"; "Happy old age is the fruit of a regulated youth"; "The health of the elderly is highly recommended". These are just a few of many examples that are repeated throughout Europe and that reflect the contradictions that still exist in society regarding longevity and development, and this subject is analysed in several dimensions in this book. Recall that in the Green Paper on Ageing, published in 2022, the European Union states that "… ageing also provides new opportunities for creating new jobs, fostering social fairness, and boosting prosperity, for instance in the 'silver' and care economies." From responses to these challenges come opportunities for development—including individual and collective opportunities—for building societies in which longevity is not a threat but an opportunity desired by all. The increase

in longevity is an unavoidable reality in contemporary Portuguese society today. When the people who are now 70 or 80 years old were born, that is, in the 1940s and 1950s, life expectancy was between 51 and 62 years (between 1940 and 1959). The average life expectancy of those born in these decades increased beyond the years that would have been expected if the conditions that existed at their birth had been maintained. This is because life expectancy has increased, especially at older ages: since 1960, there has been an increase of six years (for both sexes combined), which has been slightly higher for women than for men. In 2020, a woman aged 65 will have a life expectancy of almost 21 years, compared with 17 years for men. This trend explains the progressive increase not only in the number of people aged 80 and over, but also in the number of people over 100: while in 2011 there were 1526, in 2020 it is 5025. This increase in life expectancy presents new challenges to individuals, forcing them to rethink their goals, desires, expectations, and needs. In addition to individual challenges, communities also face collective challenges: How to respond to the goals, desires, expectations, and needs of these very old people? What social and health interventions? What services and organizations? What policy guidelines are for the development of these ageing communities? With a common denominator for all of us, the idea that living longer is one of the greatest achievements of society in recent decades, there is still a clear difficulty in linking longevity with the need for intergenerational solidarity. It is time to address this reality and call for better coordination of resources, policies, and strategies focused on reducing the inequalities that impact ageing. Given the heterogeneity of the population, which is not reduced or constrained by ageing, there is a need to build bridges between research and intervention, develop a new perspective on social contexts, and create new opportunities for action. The implications of a long life are far reaching, affecting individuals, businesses, communities, and governments. As a society, we must prepare for longevity, which means engaging all sectors: the private and public sectors, academia, social, non-governmental organizations, and volunteerism. Science tells us that if we can reach old age physically fit, financially secure, and mentally healthy, many of the problems we associate with old age will disappear. There is a need to define who we are as adults and later in old age and what we want to be as a society. Ageing is a complex process, characterized by numerous peculiarities, contexts, and virtues because it is a human phenomenon of which there are no exact copies. After all, it is a phenomenon that simultaneously affects several levels and different dimensions of social reality. Therefore, we must try to find some common measures, but we must not forget that we must respect the legitimacy of the individual decision. Perhaps the first step is to focus on social issues, mobility, cognitive skills, and financial security. The path is unclear, but it has some stops where we can find support and bridging mechanisms for building functional communities for all ages. The diversity of articles presented in this book contributes to the development of research and intervention related to older areas and communities. We cannot fail to mention the necessary reflection on the pandemic reality in which we live, and this disease has opened new debates and revived old ones on how society should deal with the elderly population. Making knowledge intra- and interchangeable can facilitate the exchange

of knowledge and finding similar realities. This is the greatest asset of the Academy and certainly reflects the work and intervention of the Research Unit—Age.Comm.

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Contents

The Role of Music in Lifelong Learning

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Abstract. Understanding the motivations, objectives, advantages and constraints in participating in music activities is the topic for the present investigation, organized as an exploratory and descriptive study. In this communication we point out the results of our investigation, analysing what music means in the lives of individuals and identifying the advantages and constraints felt in participating in musical activities. A questionnaire survey "Music in lifelong learning (MALV)" and the scales "SWLS—Satisfaction with life scale" and "Subjective Happiness Scale (SHS)" were applied to our target audience, defined according to the following criteria: age over 65 years, involved in some activity with music. The results point to medium or high levels of satisfaction with life associated with pleasure and a sense of accomplishment in the performance of musical activities.

Keywords: Lifelong learning · Musical activities · Life satisfaction · Sense of accomplishment

1 Introduction

If the 20th century were the century of the elderly, in which the World Health Organization had its main objective to increase the average life expectancy, the challenge of the 21st century would be to give quality to time of life (Fontaine 2000).

Taking this assertion as a starting point, the present study is part of the field of research that is conceptually based on transversal concepts such as "lifelong learning" and "active ageing". We consider that these concepts can generate a change in perspective that will allow for a new perspective of the ageing process and, consequently, alternative ways of interacting and analysing this period of life.

One of the central challenges of the 21st century is to face longevity as an opportunity for development and well-being (Jacob 2007). It is consensual that the success of increasing longevity reflects significant advances in health practices and social and economic development that have allowed the extension of human life to ages not expected a few decades ago. We share, however, the idea of Fontaine (2000) questioning the overlap of concepts associated with quantity and quality of life.

2   The Ageing Process: Challenges and Learning

According to the World Health Organization (WHO) (2005), active ageing allows people to realise their potential for physical, social, and mental well-being throughout life and for these people to participate in society according to their needs, desires and skills.

It is undeniable that the ageing process has taken on new and multiple facets associated with the exercise of multiple activities and challenges. Through rediscoveries and different definitions of themselves, the elderly seek to build their life with new meanings.

From the perspective of psychological models of lifespan (Baltes and Carstensen 2008; Erikson 1994), human development is conceived as a longitudinally integrated process, allowing us to conceive of old age as a moment in the life cycle with its particularities that cannot be reduced to regressions, or involutions, with a wide range of potentialities that can be realised. According to Pinto (2008) mentioned by Maia (2010), regardless of age, we should all take advantage of our potential daily, making the most of them as we can to prepare for tomorrow.

At the beginning of the 21st century, it is considered that there is a new old age since the process itself is experienced in a globally more positive way. Individuals in this age group are, in general, healthier, with higher academic qualifications, having access to more social and cultural opportunities.

Active ageing is inextricably linked to involvement in social and productive activities, in a logic of social participation in which the individual maintains and (re)creates relational networks. Some studies report that the average life expectancy in sedentary and socially isolated individuals is lower than those harmonised by life strategies (Maia 2010).

According to Osório (2005), involvement in activities is essential to maintain seniors' balance and personal development. The development of an activity suited to their situation, not only related to what the person is, but to what they can be, is a fundamental principle to maintain this group's health status and involve them more in society as an active subject.

Based on this framework, we define the concept of lifelong learning, understood as a longitudinal process that allows the subject, at any time in his temporal dimension, to enjoy a more confident, autonomous, and self-directed life.

In Western culture, the ageing process occurs when the individual no longer assumes formal professional responsibilities, facing the possibility of managing their routines and activities with greater autonomy. This fact can generate anguish and conflict in the confrontation with feelings of existential emptiness, but, at the same time, it can allow the exploration of postponed projects and interests or the development of new skills.

According to the reports of the elderly themselves, at this stage of life, the individual (or most of them) is freer, with fewer responsibilities, fewer time constraints, and greater experience accumulated throughout life, which favours the creative process. In the research carried out by Rodrigues et al. (2015, p. 152), cited by Silva et al. (2020, p. 91): "Now that the children are raised, I am able to dedicate my time to activities that give me pleasure, I can study, go for walks, participate in courses and workshops that I consider interesting and important in my life".

In addition to redefining family and affective relationships and routines, cultural and leisure activities are opportunities that favour the socialisation and self-esteem of the elderly and can stimulate creativity, well-being, and a sense of self-fulfilment.

Throughout the different stages of human development, supportive social networks and the sharing of positive emotional experiences play a crucial role in well-being and a sense of satisfaction with life. The WHO (2005) considers that the subject's health status is not characterised solely and exclusively by the "absence of disease", requiring a self-assessment of well-being experiences related to the satisfaction of needs and aspirations in the different dimensions that make up human nature. In this sense, psychological well-being is crucial for successful adaptation.

We also emphasise that some limits or restrictions, whether of a cognitive or motor nature, associated with the ageing process, can be partially overcome through compensatory mechanisms, which can be that of discussing health and physical and mental well-being positively, even when objective health and life circumstances are increasingly adverse (Fonseca 2006). Corroborating the perspective of Maia (2010), the interest, discovery, and insertion in activities by personal initiative, the creation of interpersonal relationships, and the performance of new social roles help combat the feelings of discouragement and loneliness traditionally associated with elderly individuals.

3 The Role of Music in Human Development

Learning is a process inherent to human beings, from birth to death. Through this process, they develop skills, updating individual potentials and interests, changing their behaviour in the interaction with their life contexts. Ordonez and Cachione (2011) consider that learning is not an end in itself but a bond through which a person can find a variety of personal and growth goals.

Contextualising this perspective in the learning that occurs during the ageing period, there has been an increasingly active search by the elderly for formal or informal educational contexts to initiate or deepen specific skills, establish new networks of social interaction, and implement postponed projects. Responding to these new needs and assuming the underlying principles of active ageing and lifelong learning, the different territories and municipalities have been providing multiple occupational alternatives and support structures, so that elderly individuals can exercise their sense of initiative and autonomy, according to their interests and guaranteeing their citizen participation.

In the educational context, music becomes a vital instrument for promoting knowledge and self-knowledge (Kater 2004) and is an instrument that facilitates communication and human expression (Marques 2011).

In the context of Gerontology, music learning enhances the creative and expressive development of their individuality, being also essential in promoting the quality of life of this population. Even without any musical training or purpose in the training of professional musicians, musical activities allow to revive memories, often lost, stimulate motor and sensory dimensions, namely the coordination of movements, rhythm, and body expression, in a context of social interactions. According to Gomes and Amaral (2012), the use of music as a teaching-learning process promotes significant effects in these people's psycho-emotional, physical, and social spheres, resulting in improved self-esteem and socialisation.

There is a consensus among educators and other people indirectly involved with education about the teaching of Music as an enhancer of human development. In addition to providing students with activities that require group cooperation and coordination (Hummes 2004), music can promote the development of sensitivity, creativity, rhythmic sense, the pleasure of listening to music, imagination, memory, concentration, attention, self-discipline, respect for others, socialisation and affection, also contributing to an influential body and movement awareness (Chiarelli and Barreto 2005).

Shafer et al. (2014), considers music a vital experience for human beings and can positively change their lives.

> Musical experiences (IMEs) have proven to be of high significance for the people who have them. We investigated the long-term effects of such experiences on people's way of life and developed a process model: (1) IMEs are characterised by altered states of consciousness, which leads to the experience of harmony and self-realisation; (2) IMEs leave people with a strong motivation to attain the same harmony in their daily lives; (3) people develop manifold resources during an IME; (4) IMEs cause long-term changes to occur in people's values, their perception of the meaning of life, social relationships, engagement, activities, and personal development. Results are discussed as they relate to spirituality and altered states of consciousness and conclusions are drawn from the process model that forms a starting point for quantitative research. Results suggest that music can indeed change our lives – by making it more fulfilling, spiritual, and harmonious (p. 525).

Music is also closely related to social and emotional behaviours, given its direct link with human emotions, cognition and social interactions (Saarikallio 2019). The idea of music as a form of action (musicing), and not simply "something to be learned", was emphasised by Christopher Small (1999). Making music gives rise to relationships in which the interaction of those participating is essential, whether as listeners, performers, instrumentalists, singers, improvisers, composers, or dancers. Through music, individuals regulate their emotions, giving meaning to their ways of being in the world (DeNora 2000).

We thus have the combination of two functions: social and personal. Bearing these aspects in mind, Stefan Koelsch (2013) proposed seven social functions of music: (1) contact; (2) cognition; (3) empathy; (4) communication; (5) coordination (6) cooperation; and 7 (social cohesion). However, based on Alan Merriam's (1964) classification of the functions of music in society, Martin Clayton (2016) proposed four functions for music: (1) regulation of emotional, cognitive and physiological states; (2) mediation between self and others, (3) symbolic representation, and (4) coordination of action.

Bearing in mind these theories, Beatriz Ilari (2020) suggested that the music activity can reinforce the social flexibility of its participants and make the collective musical activity gain coherence, thus reinforcing interpersonal relationships positively and strengthening the identity of the participant groups. Estelle R. Jorgensen (2020) states that Iris Yob developed a conceptual model of the necessary provisions for social change favouring the common good in three domains: knowledge, skills and socio-affective experiences.

According to Jorgensen (2020), systematising music education offers a stimulating environment to enhance the collaborative skills essential for working together in a democracy, respectful relationships and valuing the differences between people and their music. The musical practice can cultivate respect for rules. It also offers space for developing a love for spiritual rather than material experiences and for an awareness of how the arts are precious manifestations of human creativity in the profusion of its diversity.

4   Methodological Design

Based on the concept of lifelong learning, the present study aims to understand the role of musical practice in the well-being of the elderly population and identify the motivations and cognitive and socio-emotional dimensions associated with this experience. In this sense, we organised the study based on the following questions:

- What motivations lead elderly individuals (over 65 years old) to participate in musical activities?
- What goals and expectations do these individuals have when participating in musical activities?
- What advantages and constraints do you relate to this activity?

     In turn, we set out the following objectives:

- Identify the motivations that led individuals to participate in musical activities.
- Understand the objectives and expectations underlying the participation in musical activities.
- Understand what music has changed in your life in general.
- Identify the advantages and constraints felt in participating in musical activities.

4.1   Methodology

According to the objectives and context of the study, we chose to carry out an exploratory investigation based on an essentially descriptive data analysis (Bogdan and Bibklen 1994). This is a methodology frequently used in the social sciences since it allows the collection of descriptive data and assigning meaning to them from the perspective of the research subjects, thus enhancing the identification of questions to be explored in further studies with more significant samples.

     This option is not unrelated to the fact that the study was carried out during the Covid-19 pandemic, with the data collection phase coinciding with the second period of confinement. This situation compromised the operationalisation of a study of a qualitative nature by making direct contact with the subjects of the sample and the contexts associated with their musical practice.

a. Data collection instruments

Based on the bibliographic review consulted, as well as the knowledge of the areas of Music and Psychology of the authors of the study, we created the questionnaire "A música na aprendizagem ao longo da vida—MALV (Music in lifelong learning)".

MALV integrates five thematic blocks:

(a) Sociodemographic characterisation of the respondents;
(b) Identification of descriptive aspects related to their musical practice (e.g., the institution where they perform this practice, a musical activity carried out…);
(c) Identification of motivations associated with musical practice;
(d) Levels of physical, psychological and socio-emotional well-being provided by the musical activity;
(e) Open-ended question about the meaning of music;
(f) Identification of conceptions about lifelong learning.

In addition to the MALV, two scales were used:

- SWLS—Life Satisfaction Scale (Pavot and Diener 1993)
  The variable satisfaction with life corresponds to each individual's judgment of their life in general and is a component/dimension of the happiness/subjective well-being construct (Diener 2000).
- SHS—Subjective Happiness/Well-being Scale (Lyubomirsky and Lepper 1999)

Happiness is a fundamental positive emotion that has mobilised the most diverse approaches and conceptualisation attempts. Being a subjective concept and marked by cultural and social representations, it is associated with different variables and mediators. Starting from a conception of happiness of intrinsic nature, Positive Psychology, although it does not deny the influence of external events, works with the concept of subjective well-being that corresponds to the cognitive and affective evaluation that each individual makes about his own life (Diener et al. 2002).

In summary, subjective well-being involves positive emotional experiences, rare negative emotional experiences such as depression or anxiety, and satisfaction with various aspects of life and life as a whole.

The instruments were made available through the Google Forms platform and sent by email to institutions linked to music activities, along with the request for collaboration to send them to the respective respondents.

b. Sample selection criteria

– People over 65 years old;
– Involved in musical activities;
– Live in the Castelo Branco area.

As it was not possible to know the population universe of our research study, a sample of 17 individuals was obtained, corresponding to the respondents to the survey. The survey includes multiple choice question allowing single or multiple answers.

5   Data Analysis

The collected data were subject to descriptive statistical treatment, namely through their organisation in frequency tables and graphic representation, using the EXCEL program for this purpose. The open-response questions were subjected to descriptive content analysis.

5.1   Sample Characterisation
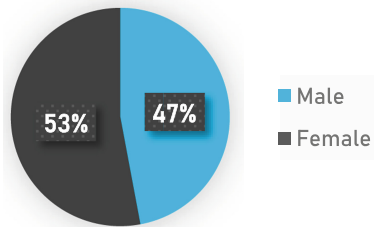
Fig. 1.   Gender
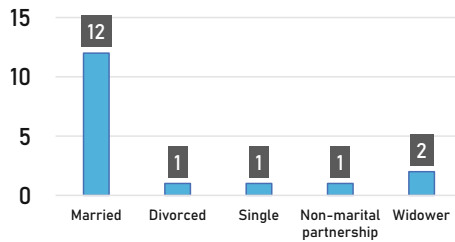
Fig. 2.   Marital status

The sample is composed of nine (53%) women and eight (47%) men (Fig. 1). The vast majority are married (12), but one is divorced, one is single, one in a de facto relationship and two widowers (Fig. 2).
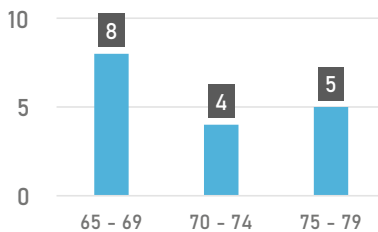
Fig. 3.   Age
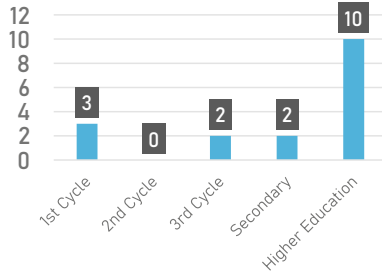
Fig. 4. Education

Approximately half are in their 60s and the other in their 70s (Fig. 3). Most have a higher education degree (10), but three have only the 1st cycle of schooling, two the 2nd cycle and two the secondary (Fig. 4).
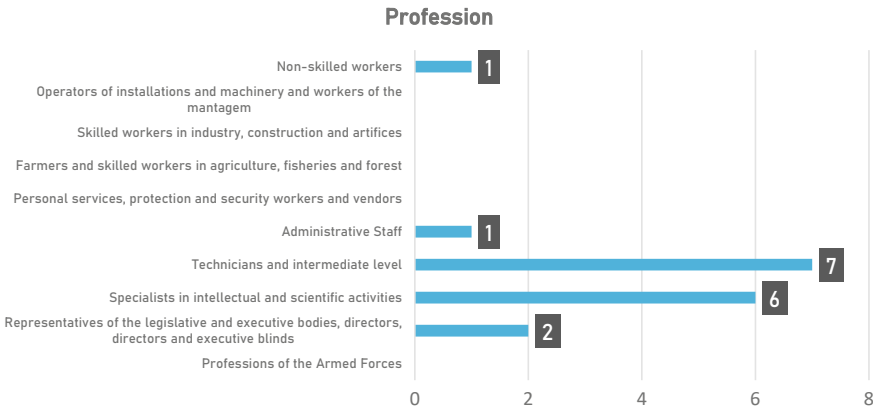
Fig. 5. Professions

Although the subjects are currently retired, their professions were mainly in technicians and intermediate-level professions (7), and specialists in intellectual activities (6), with representatives of the legislature and executive bodies (2), administrative staff (1) and unskilled workers (1) (Fig. 5).

5.2 Identification of Descriptive Aspects Related to Musical Practice

Almost half attend an activity in the field of music at the USALBI (Senior University) (8), followed by Orfeão (5), Orquestra Típica Albicastrense (2) and the Viola Beiroa group (2), with an informal group, Rancho Folclórico and Philharmonic Band (1) (Fig. 6). In the musical activity, the choir (6) stands out, followed by playing an instrument, with a predominance of the cavaquinho (5) (Fig. 7).

In the role within the activity, there is a preponderance of instrumentalist (10) in relation to singer/choir player (7) (Fig. 8). In the choir, the various voices of Soprano,
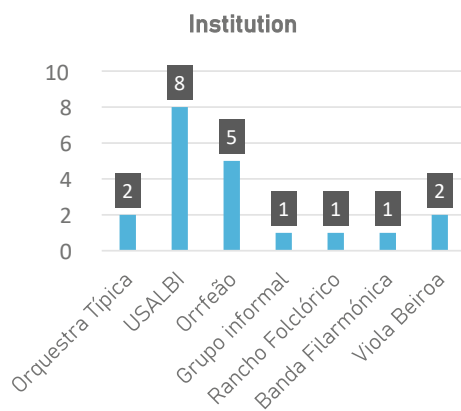
Institution

Fig. 6. Institution that attends
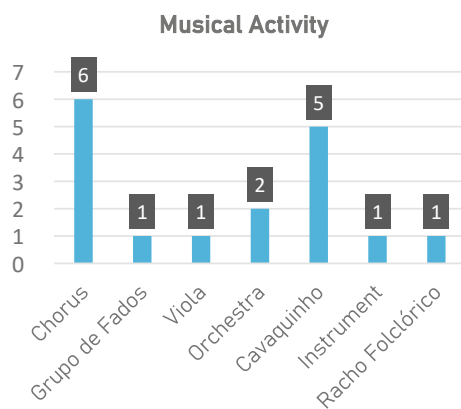
Musical Activity

Fig. 7. Musical activity

Function within the activity
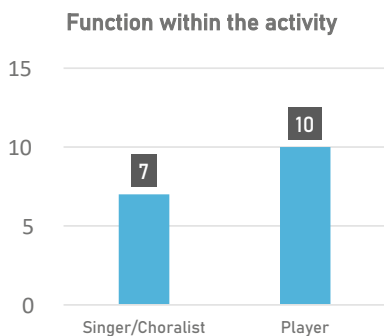
Fig. 8. Function within the activity
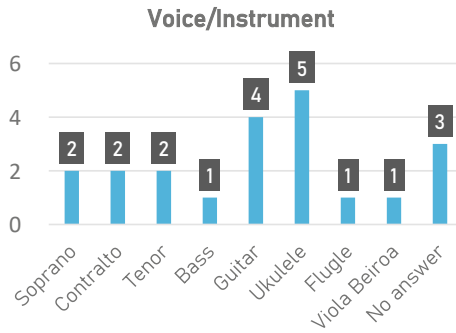
Voice/Instrument

Fig. 9. Voice/Instrument

Alto, Tenor and Bass find a certain numerical balance; as for the instruments, there is a predominance of the cavaquinho, perhaps because it is an accessible instrument and because there is a cavaquinho orchestra at USALBI. The guitar also still has some preponderance (Fig. 9).

5.3 Identification of Motivations Associated with Musical Practice

Motivation
What led to participate
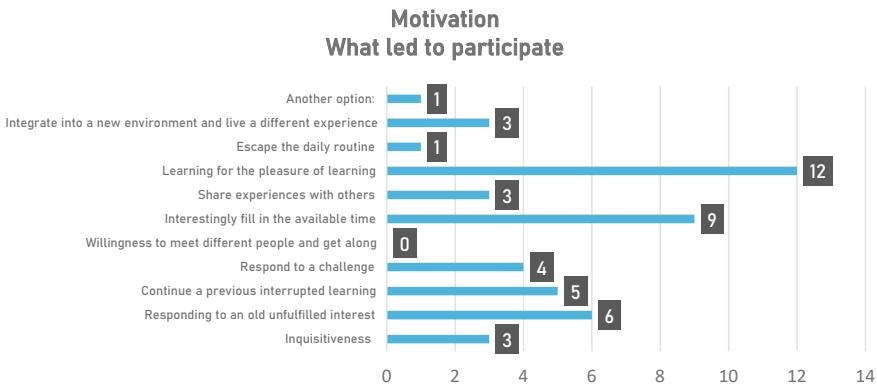
Fig. 10. Motivation to participate in musical activities

What led to participating in musical activities was mainly learning for the pleasure of learning (12), followed by interestingly filling the available time (9), responding to an old unfulfilled interest (6), continuing previous learning interrupted (5), responding to a challenge (4); still with three answers: integrate myself in a new environment and live a different experience, share experiences with other people and curiosity. There was still an answer in the option "escape the daily routine" (Fig. 10).

Learning is associated with the need for knowledge, influence on self-concept and wanting to learn. As it is voluntary, it is often associated with motivations of an affective nature and of an essentially intrinsic nature.
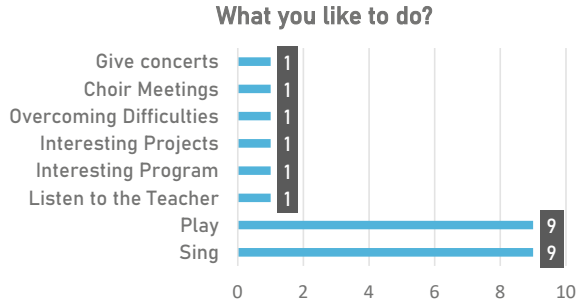
What you like to do?

Fig. 11. What you like to do in musical activity

The tasks they most enjoy are playing (9) and singing (9), giving concerts, participating in choir meetings, exciting projects, overcoming difficulties and listening to the teacher (Fig. 11). It is essential to mention that the respondents could indicate more than one answer option.

As less motivating, in the execution of the musical activity, the reasons indicate insecurities in musical learning or technical difficulties (5) ("thinking I can't do better", "not having more in-depth musical knowledge", "not evolving as much as I would like"); time spent and/or waiting whether in rehearsals when another voice is being prepared, or in shows to perform (5); improper behaviour ("conversations outside the learning process"); (5) having to repeat certain parts of the songs many times (2); no activities because of Covid (2). Two subjects did not respond.

The reasons for what they consider more difficult in musical activity point to technical issues of performance (7) or musical theory (8); or it still does not match, evolve or fail (5): "Some chords that I try to play them. I have tendinitis and arthrosis problems in some fingers, making it difficult for me to perform properly"; "The perception of timbre and melody".
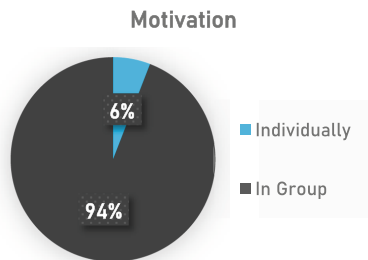
Motivation

Fig. 12. Motivation individual and in group

Group performance is overwhelmingly more motivating (94%) than individual performance (6%). The first is based on cooperative learning, as it is based on a form of organisation of a collaborative workgroup, according to which one must work so that

Participation in shows
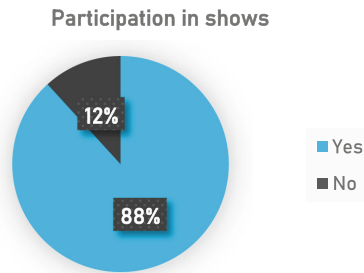
Fig. 13. Participation in shows

the final result is more favourable for everyone (Fontes and Freixo 2004). Group learning has a more positive interdependence than individual learning since all elements feel responsible for each other's learning; the goal is only achieved if all members achieve their goals (Johnson and Johnson 1999) (Fig. 12).

Participation in concerts or recitals is an asset for 88% of respondents, which shows the appreciation of social and interpersonal dimensions in musical activities. As an example, some of the answers are cited: "A moment of conviviality and presentation of the harmonious final product, the result of the interaction and effort of each one in their suit"; "It becomes more motivating"; "In the show there are many people participating, raising the energy level. The skin shivers with so many vibrations" (Fig. 13).

5.4 Levels of Physical, Psychological and Socio-emotional Well-Being Provided by Musical Activity
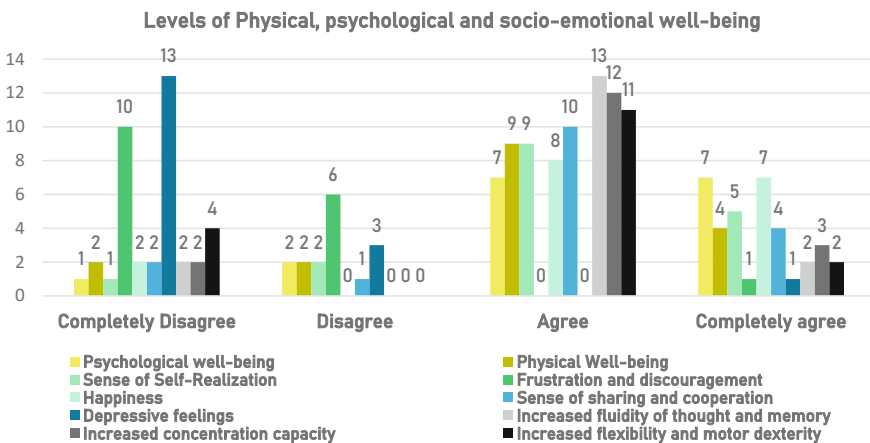
Fig. 14. Levels of Physical, psychological and socio-emotional well-being

For the levels of physical, psychological and socio-emotional well-being provided by musical activity, mostly the answers marked in the "agree" or "completely agree" option

point to greater fluidity of thought and memory (15), greater ability to concentrate (15) and happiness (15), followed by psychological well-being (14), a sense of self-fulfilment (14), a sense of sharing and cooperation (14) and also physical well-being (13) and greater flexibility and motor skills. To disagree or disagree entirely are, with the same number of choices, on equal terms, frustration and discouragement (16) and depressive feelings (16) (Fig. 14).

The answers show the importance of musical activities in the general well-being of the respondents, valuing their role in promoting different dimensions, namely their contribution to the dynamisation of cognitive processes. We emphasise that almost all subjects have evidenced the contribution of these activities to their happiness.

5.5   Meaning of Music

The words associated with music mainly indicate positive emotional experiences, such as joy, pleasure, dream, beauty, emotion, well-being, and even "very healthy drug", indicating agreement and reinforcing the results obtained in the previous question. Other answers refer to musical concepts, such as sheet music, composing, symphony and sonata.
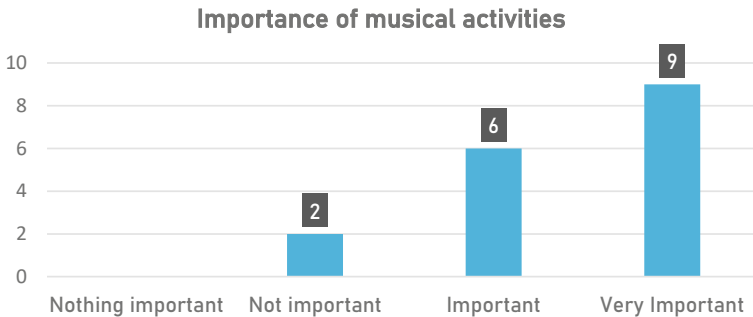
Fig. 15. Importance of musical activities

Most respondents consider musical activities in their lives as necessary (6) or very important (9). Only two individuals considered it unimportant (Fig. 15).

5.6   Identification of Conceptions About Lifelong Learning

In this section, we present three graphs that result from the combination of multiple questions made to all the participants, the goal was to present in a clear way the feelings, perceptions and a happiness scale.

In the conceptions of lifelong learning, all items have a high level of agreement: it allows the development of new skills (16), delays the effects of ageing (15), enriches the community (15), is a necessity in today's society (14) and provides meaningful social interactions and qualifies citizens (14). Only the statement "it is a reality in today's
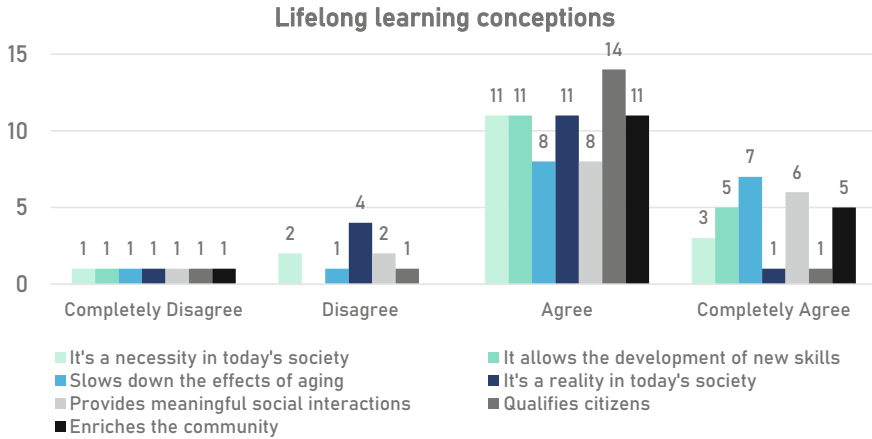
Fig. 16. Lifelong learning conceptions
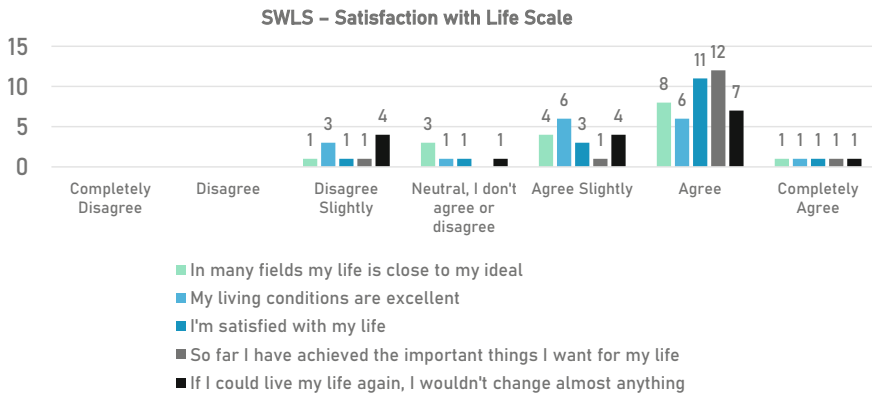
Fig. 17. SWLS—satisfaction with life scale

society" integrates a more significant number of negative responses, which indicates that they currently consider this reality still insufficient (Fig. 16).

The SWLS consists of 5 items: 1. In many fields, my life is close to my ideal 2. My living conditions are excellent 3. I am satisfied with my life 4. So far, I have achieved the important things I want for my life 5. If I could live my life over again, I would change almost nothing.

Most subjects are on the positive pole regarding the assessment of the variable satisfaction with life. We point to the fact that an individual marked "strongly agree" on all items, which means that he/she evaluates the dimensions positively included in the scale. On the other hand, there is no answer situated in the "disagree" and "strongly disagree" options (Fig. 17).

Finally, we present the results obtained on the Happiness/Well-being-subjective scale:
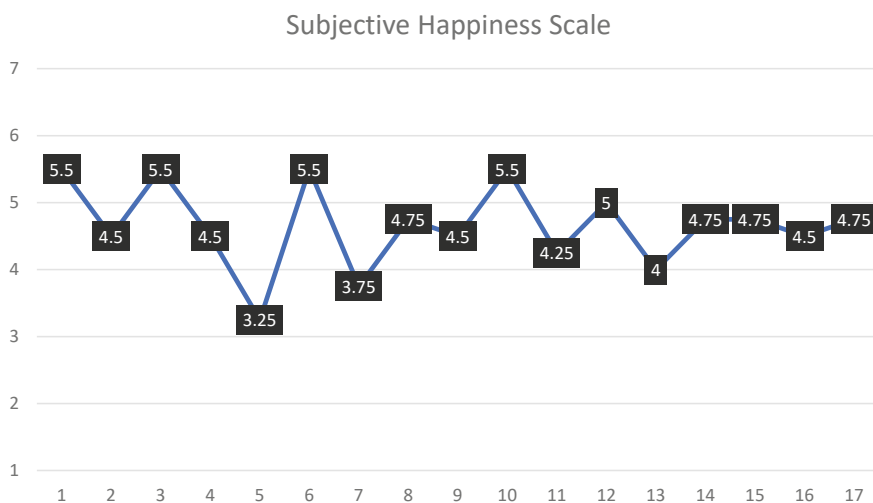
Fig. 18. Subjective Happiness Scale

The results indicate, in general, positive average levels in the happiness/subjective well-being variable, but slightly below those found in the quality of life (Fig. 18). This result coincides with those found in other studies that show the non-coincidence of the constructs evaluated in the two scales. Diener (2000) stated that the variable satisfaction with life corresponds to the judgment that each individual makes of their life in general and is just a component/dimension of the happiness/subjective well-being construct.

6   Conclusions

The results obtained show that involvement in musical activities plays a vital role in physical, cognitive and socio-emotional well-being. Respondents associated this experience with a sense of self-fulfilment, greater fluidity of thought and memory, better concentration capacity, greater flexibility and physical dexterity, and experiences of sharing and cooperation. Group activities and performances are highly valued aspects, identifying the importance of the socio-emotional dimension associated with musical practice. Only two individuals consider this experience to be unimportant. These data are in agreement with the studies by Gomes and Amaral (2012), Hummes (2004), Shafer et al. (2014) and Stefan Koelsch (2013), authors mentioned in point 2 of this article that highlight the importance of involvement in musical activities in the physical, socio-emotional and cognitive well-being of human beings, throughout their life cycle.

According to the expectations of the study authors, the motivations underlying the choice of musical activities are, in general, of an intrinsic nature, the most mentioned being "Learning for the pleasure of learning, "To fill the available time in an interesting way", and "To respond to an old unfulfilled interest". The musical learning of the subjects coincides with a period of their lives in which they no longer assume professional responsibilities, and may choose to engage in tasks that motivate them, essentially, for

the pleasure associated with performing this task. We reinforce the fact that intrinsically motivated activities promote a sense of self-fulfillment and involvement, promoting more meaningful learning (Deci and Ryan 2008), also identified in the subjects of the sample.

There is an appreciation of lifelong learning, with almost all individuals considering it an opportunity to develop new skills and a necessity in today's society. Active ageing is inextricably linked to involvement in social and productive activities, in a logic of social participation in which the individual maintains and (re)creates relational networks.

In general, the data obtained indicate that the subjects who participated in the study have the profile of a group of elderly people who emerged at the beginning of the 21st century: it is considered that there is a new old age since the process itself is experienced in a generally more positive way. Individuals in this age group are, in general, healthier, with higher academic qualifications, having access to more social and cultural opportunities.

Data analysis also allowed us to understand that the results obtained in the questionnaire agree with those obtained in the satisfaction with life and subjective well-being scales, having found values slightly above the average in these two scales.

As a limit, we highlight that the sample is small and very restricted, comprising mainly of individuals with higher education, which may "bias" the way they analyse their involvement in musical activities and the results obtained in the SWLS and SHS scales. In this sense, we consider it pertinent to extend the study to a larger and more heterogeneous sample in terms of academic qualifications. The continuity of the study will allow us to assess with greater accuracy the adequacy of the Questionnaire MALV, even if it has proved to be helpful to meet our objectives.

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Community Development—A Proposal for Action in a Village Context with Older People

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Abstract. This article arises from the analysis of the community project "Há Festa no Campo", a community intervention initiative supported by the PARTIS—Artistic Practices for Social Inclusion Programme of the Human Development Programme of the Calouste Gulbenkian Foundation in Portugal, which designed and implemented a proposal for community intervention in the context of 4 villages, where older people are the main protagonists. As project coordinator (2014–2016) and participant-observer, the author systematises the community approach undertaken, the learning acquired, successes and failures, and proposes an integrated community intervention model, which focuses on mobilisation and participation of ageing communities in the development of their communities. This analysis is based on the author's training in social work and on the concept of Holdcroft (1978), where community development appears as a process that involves the community in finding solutions to its problems, promotes learning, and participative democracy, and seeks to join forces for the development of the community in a democratic and scientifically based way.

Keywords: Community development · Community intervention · Social work

1 Introduction

This article results from the work developed by the researcher and, simultaneously, as project coordinator, with an ageing community in the central region of Portugal. It presents a practical and reflective approach to the project "Há Festa no Campo", a community intervention initiative, funded for three years (2014–2016) by the PARTIS Programme—Artistic Practices for Social Inclusion of the Human Development Programme of the Calouste Gulbenkian Foundation, having as promoter and coordinator the Associação EcoGerminar - Associação de Desenvolvimento do Interior de Promoção do Comércio Solidário e Sustentável, do Ecoturismo e de combate à Desertificação Rural and as partner entities the Associação Terceira Pessoa, ETEPA - Escola Tecnológica e Profissional Albicastrense and União das Freguesias do Freixial e Juncal do Campo.

This article is the result of multidisciplinary contributions and the sharing of moments of reflection between different agents and perspectives, also expressed in the artistic publication "A Inspiração do Há Festa no Campo - Guia de Intervenção Comunitária para o Desenvolvimento Local", as well as the experience of the author as a social worker, project coordinator and specialist in community intervention and local development.

2 The Space of Action of "Há Festa no Campo" (There Is a Party in the Countryside)

The scope of the project "Há Festa no Campo" was located in the Parish Union of Freixial and Juncal do Campo (parishes administratively united in 2003, in the administrative reorganisation of the territory of the parishes—Law No. 11-A/2013 of 28 January) in the district and county of Castelo Branco.

This small territory with little more than 40 km² had four villages participating in the project, Juncal do Campo, Freixial do Campo, Barbaído and Chão da Vã, this last one with a small, attached village with the designation of Camões. The whole territory had just over 800 inhabitants and is marked, like other rural territories, by a high rate of an ageing population and low density.

In the territory there were 7 associations; Associação de Apoio Social Freixial do Campo, Associação Cultural e Recreativa Juncalense, Rancho Folclórico de Juncal do Campo, Associação de Caça e Pesca do Ribeiro Vale Sando, Cooperativa Agrícola dos Olivicultores de Chão da Vã, Clube Recreativo e Cultural de Freixial do Campo and Clube Recreativo e Cultural de Barbaído, and with 7 commercial establishments (4 cafés and 3 grocery shops).

The villages are spaces of diversity and opportunity for social change in the socio-economic context. However, in recent decades the villages have seen a strong migration and emigration of their populations to large urban centres and other European countries, accompanied by a growing devaluation of rural territories and their rural cultural identity, associated, for example, with the harshness of life, which led to the decline of family farming by younger people.

This reality generated significant population ageing and a substantial population loss in these territories, now considered low density and depopulated. Successive governments saw the villages as spaces condemned to abandonment, with the continued loss of the "necessary" public and private services, namely schools, pharmacies, health extensions, post offices, and transport, accompanied by small local businesses (grocery stores, cafés). In recent decades, public investment has been confined to the creation of rarely used sports rings, retirement homes and day centres. On the other hand, the growing feeling of "urbanisation" went hand in hand with the absence of political proposals for the development of the villages, distancing the populations from participative citizenship and a feeling of belonging that strongly characterised them, thus reinforcing their incapacity to claim for their rights, and allowing, on the other hand, growing asymmetries in investment between the urban centres and the small rural parishes.

Given the complexity of the main problems, the causes and effects are identified in Table 1, thus allowing a better framing of the intervention strategies, with which an integrated proposal of local development was built, seeking a greater sensitivity of the local political power towards local problems, and the creation of a sense of belonging that projected the territory of action, as an excellent example of development (good practice).

Having the most traditional diagnoses with a strong focus on the problems and constraints, "Há Festa no Campo" intended to enhance the opportunities, identified through a diagnostic work initially carried out with interviews door to door with the

Table 1. Problems, causes and effects.

Problem(s)	Lack of investment and public policies	"Ageing population"	Lack of faith in the territory
Causes	Asymmetric urban-rural investments Closure of public services Closure of private services	Migration to urban centres Emigration	Devaluation of the rural heritage Lack of participation in the development process
Effects	Low-density abandonment of traditional agricultural production Loss of traditions Lack of employment opportunities	Social isolation Depopulation	Cultural loss Weak critical capacity Weak sense of belonging Low sense of self-esteem

population and later with meetings with local "leaders" and local power, but also in the research of new development trends[1], of which we will now identify:

- Attraction of young population associated with sustainable models of life (local production and consumption, new movements, e.g. "novos povoadores"[2]);
- Spaces for alternative education (education based on community values and sustainability);
- Spaces for artistic and cultural creation and innovation—Artists' Residencies;
- Mobilisation of civil society for more participative processes associated with local and community development;
- Valorisation of the Know-How of communities as processes of territorial revitalisation;
- Attraction of residents of Nordic and Central European countries and refugees;
- Increasing sovereignty and sustainability by reducing dependence on traditional market consumption (e.g. creation of local currencies, short production and marketing circuits);
- Public spaces available for social investment (e.g. schools, people's houses);
- Spaces promoting entrepreneurship and social innovation:

  - New trends in tourism (social and experience tourism);
  - In residencies and meetings of artists;
  - Sustainable agricultural production;
  - The creation of local private services to replace public ones
  - The presentation of new models of education

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[1] Visits to other territories, participation in forums and online surveys.

[2] Resettlement support initiative, to find out more, visit http://www.novospovoadores.pt/.

- The creation of local markets based on products, services and skills;
- In working at a distance from a "click" (e.g. web designer);
- In the management of a village as hotel space.

3 Concepts Framing the Intervention Model

The intervention model of "Há Festa no Campo" results from concepts that underpin its intervention practices, namely local and community development, education for development and the social and solidarity economy. Local development because it suggests a community-based intervention in the empowerment of populations, which should be closely linked to a participative and reflexive strategy where we can include the critical and pedagogical dimension, referring us to the concept of education for development. Finally, the social and solidarity-based economy emerges in the search for greater sustainability of the actions and the social intervention model since the economy, by privileging its social vocation, will promote the territories' development, reducing social inequalities and reinforcing social justice.

3.1 Local Development and Community Action

Local development is a transversal concept that arose from community development experiences in the 1960s in countries formerly known as the third world and had significant intervention from the UN—United Nations Organization. According to Holdcroft, "community development is a process, method, program, institution and movement which:

- involves the whole community base in the solution of its problems;
- promotes education and insists on the use of democratic processes for the (re)solution of common community problems;
- Stimulates and facilitates technology transfer so that the community can effectively solve their common problems. Joining efforts to solve, democratically and scientifically, the common problems of the community was seen as one of the essential elements of community development" [1].

For Melo [2], the promotion of participative citizenship, the empowerment and autonomation of local players to fight local inequalities and seek innovative solutions is a process of local development that implies a common and shared vision, promoting integrated initiatives based on the economic, social, cultural, political and environmental dimensions. Above all, local development (LD) is a common will to improve everyday life. This proposed concept which emerges within the work developed in the Animar Association—Portuguese Association for Local Development, is also shared by Amaro [3], understanding "local development as a process of community-based change, a territorially rooted group, which recognises itself in a common identity and can mobilise in dynamics of active solidarity to solve problems". Advocating a process triggered from the observation of local problems by the community itself, for which some of its members mobilise their "endogenous" capacities and resources to solve them, through an educational and participatory process. The author argues that recognising the insufficiency

of endogenous resources, they seek exogenous capacities (human/technical, financial, informative, material) that reinforce the multidimensional and integrated perspective, consolidated in a logic of partnership and sharing of perspectives and resources, based on a great diversity of protagonists, paths and processes and with a high social impact on the community.

In the context of EU support, the opinion of the European Economic and Social Committee on "Community-led local development as a tool of cohesion policy 2014–2020" proposes to seek community-led local development mechanisms as a specific tool that allows the mobilisation and involvement of local communities and organisations so that they contribute to innovative, sustainable and inclusive growth, strengthening territorial cohesion.

In the context of EU support, the opinion of the European Economic and Social Committee on "Community-led local development as a tool of cohesion policy 2014–2020."[3] proposes to seek community-led local development mechanisms as a specific tool that allows local communities and organisations to mobilise and be involved in contributing to innovative, sustainable and inclusive growth, strengthening territorial cohesion.

3.2 Education for Development

The concept of education for development emerged from the concern of NGDOs (Non-Governmental Development Organisations) with the countries of the southern hemisphere and their concern for social cohesion, the participation of communities in the mitigation and resolution of their problems and the search for dignity and justice among citizens. This concern can easily be related to the asymmetries built between hemispheres and between urban and rural areas, namely in the Portuguese case. According to the Amílcar Cabral Development Research Centre [4], the concept of Education for Development (ED) emerged in the mid-1970s and has taken on different interpretations as the definitions of "education" and "development" became more complex. A situation also highlighted in the national strategy document on education for development (2010–2015) of IPAD—Portuguese Institute for Development Support, which points out the different definitions presented, taking into account the different priorities, but which nevertheless present common concerns as a tool to fight against exclusion, injustice and global inequalities.

One of the definitions of education for development is suggested by the Portuguese NGDO Platform [5], (n.d.): where "Development Education (DE) is a dynamic, interactive and participatory process that aims at the integral training of people; the awareness and understanding of the causes of development problems and local and global inequalities in a context of interdependence; the experience of interculturality; the commitment to transformative action based on justice, equity and solidarity; the promotion of the right and the duty of all people, and of all peoples, to participate and contribute to an integral and sustainable development". In 2007, within the European community, it was

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[3] See Official Journal of the European Union—Communications and Information No 58, 14 July 2015.

also suggested by the European consensus statement.[4] on DE that "development education and awareness-raising contribute to the eradication of poverty and the promotion of sustainable development through educational and public awareness-raising approaches and activities based on the values of human rights, social responsibility of gender equality and a sense of belonging to one world, ideas and perceptions of disparities in the living conditions of human beings and of the efforts needed to overcome such disparities, and participation in democratic actions that influence social, economic, political or environmental situations affecting poverty and sustainable development (…) aim to enable all citizens of Europe to have continuing opportunities to raise awareness and understanding of global development issues and their local and personal relevance, and to exercise their rights and fulfil their responsibilities as citizens of an interdependent and changing world, influencing the evolution towards a just and sustainable world" (European Consensus on Development: Contribution of Development Education and Awareness Raising (2007, Op. Cit, section II.12 and 13)). Highlighting the national strategy of education for development proposed [5], the various proposals for the concept of education for development inspire the design suggesting in broad strokes the following dimensions:

- DE raises awareness: by sharing information and reflections with people, questioning the lived and known situations, and increasing the will to change what is unjust;
- DE raises awareness, trains and mobilises people to assume their situation, their limits and possibilities as well as those of other human beings, enabling them to assess these situations with criteria of justice and solidarity, develop visions, strategies and concrete proposals for change and put them into practice, fighting injustice.
- DE influences policies: namely, public policies, denouncing those that systematically cause or perpetuate poverty, exclusion and inequalities, and proposing concrete policies in the field of state action, private sector and civil society to promote the common good on a local-global scale.

3.3 Social and Solidarity Economy

It is through the identification of new problems and reinforced by the incapacity of the state and its disbelief in the resolution of local and global problems, such as the new poverty and social exclusion or the growing global inequality, that the designation of solidarity economy assumes greater relevance in recent years. It is closely linked to social innovation and to a new and necessary dialogue between the economy and the new civil and associative movements, from which we can quickly identify the bold proposals that emerge in a rural and urban context, where they multiply in collective actions of proximity and solidarity, of cooperation, of reciprocity with strong concerns for the local.

For Laville [6], the solidarity economy brings together three types of resources: those arising from the reciprocity between its elements, the capital gains (material and non-material) generated by solidarity and reciprocal actions; the public resources, based on

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[4] Joint statement by the Council and the representatives of the governments of the Member States meeting within the Council, the European Parliament and the Commission on European Union Development Policy: "The European Consensus" [Official Journal C 46 of 24.2.2006] [15].

the principle of redistribution, in which the state is responsible, through the capture of resources and their redistribution through subsidies, support and the market resources, obtained in commercial exchange relationships. France [7], reinforces the ideological dimension, placing "the solidarity economy" as a current of thought and action that aims to recover the social and ethical sense of the economy to face inequality, poverty, and exclusion. It is not an approach based on the supremacy of the individual and their capacity for achievement but rather on an individual capable of supporting and being supported by others and of recognising restrictions on his freedom in the face of the rights of others. In this sense, it intends to focus on social relations embodied in economic exchanges, ensuring that they are in accordance with the rights and obligations of all involved.

4 A Proposal for Community Intervention—Intervention Model

4.1 Gathering Information and Presenting It to the Community

This phase is technically known as social diagnosis, but it is also carried out here as an opportunity to present the project and its team (ideas, partners and potentialities) to the community. In this first phase, conversations were held with the population door to door, meetings with local leaders and entities, where bridges for participation were also established in addition to the collection of information and qualitative data.

4.2 Mobilisation of People

Once the local leaders had been identified, contacts were made with local associations and collectivities, and appeals for participation were made through the church (during mass), one of the privileged spaces for establishing a relationship of trust and security with the local population. The invitation to mobilise was made using invitations in letterboxes and placing information in cafés, grocery stores, and public spaces.

4.3 Community Assembly/Participation

Once the first moment of participation has begun, it is fundamental to organise the spaces, which should be organised in spaces that promote a feeling of equality, proximity and unity (organisation in U or O). The dynamics of the assemblies should be decentralised and seek the participants' enthusiasm through participatory dynamics and animation of the sessions so that the primary agents become an integral part of the process. These are spaces for discussion and decision, so the first level aims to seek consensus and not just vote as a decision-making mechanism. The assemblies assume a role in promoting the population's participation, but they can also be oriented towards thematic and selective meetings. These more sectoral assemblies serve as a preparation for the community assemblies, which were assumed as "community assemblies" addressed to the entire population and partnerships invited to participate and served to discuss strategies and processes associated with decision-making. It was in the assemblies that the opportunities and constraints of the development proposals were identified, and from

where the different types of local development agents emerge locally: Agents of relationship with the community: they serve to approach and mobilise the population (e.g., local priest, parish management); Agents of mobilisation of community resources: they provide resources and mobilise themselves for the organisation of initiatives and events (e.g. associations); Agents of community transformation: they are participatory assets and aim at a social transformation of their territories (people from the community who are an integral part of the development initiatives). The assemblies are also close to the proposal of "conviviality groups" as an instrument of collective organisation and incentive to social participation, contributing to the search for satisfaction of collective interests [8].

4.4   Capacity Building/Sharing/Organisation

This phase is a process of informal empowerment of the communities by sharing responsibilities and competencies in the preparation and planning processes of the initiatives, where those involved are supported in common and shared tasks, such as the organisation of initiatives based on the sharing of responsibilities and knowledge at different levels.

4.5   Party and Celebration

This moment strengthens the feeling of belonging and mutual help, projecting the territory towards potential new partnerships, attracting visitors and generating new development networks. Local markets, festivals, and public artistic and cultural initiatives emerge here. The festival allows the community to: generate a feeling of shared mission with practical results; preserve the intangible heritage and community affections; mobilise the community by making it part of the initiatives; and create opportunities to attract new transformation actors and development promoters.

4.6   Communication— "Jornal das Aldeias" and Attracting New Actors

Communication suggests three specific targets, communication to the [1] community, communication to the [2] outside and communication to the [3] partners. While community communication needs a robust approach to local communication channels and the mobilisation of local actors who decode the intended message, communication to the outside should strengthen the place and the sense of belonging of the community and those who "migrated" from the village. It should also present the place as a place to visit and welcome in its various dimensions. The "Village Newspaper" is a practical example of the importance of communication, being also a tool that promotes the sustainable vision of the place and integrative and convergent by allowing the convergence of the various dimensions of development.

Finally, communication with partners should allow for a sustainable relationship based on sharing common and strategic interests between the parties.

4.7 Sustainability and Partnerships

Sustainability is enhanced by the proximity and empathy relationship established with the partners, namely: The local power; the parish and the local Council, where sometimes the reality of the relationship differs from the different logics of intervention and community mobilisation; The associations and local businesses; the grocery stores, cafes, recreational and cultural collectivities, the IPSS (Private Institutions of Social Solidarity) and other collective entities for-profit or non-profit. Here we can understand all entities with a social intervention component that vastly surpasses the objective of profit. The academic entities and professional schools, Polytechnic and University—Higher Education Institutions, play an essential role in action research and academic work that contributes to education for development, evaluation processes, and strategic expansion. The church is the privileged channel of communication of initiatives and creates the feeling of belonging and spiritual proximity, which is so often necessary, the church also being a privileged space for the development of initiatives. The local development associations are the entities that strengthen the intervention techniques for local development themselves. The sponsors and financiers; these entities can assume a national level, being those who make significant investments in social projects. At the local level, we have small entities that contribute to the sustainability of one-off initiatives.

The media and virtual social networks, the press and local radio, the digital dailies, the national radios and the different television channels generate networks and opportunities that should be highlighted. A good relationship with these entities is the affirmation of the strategy and associated ideas, generating transformation of attitudes and mentalities. Here it is essential to take extra care with the impact of certain pieces of communication that can have perverse and counterproductive effects on the community, applying the same sensitivity to communication via social networks.

5 Social Work in "Há Festa no Campo"

In the project "Há Festa do Campo", the social worker took on the coordination of a multidisciplinary team and of a strategy that underlines its most radical vision, the need for "political" transformation through the organisation of a network model promoting social change in the search for processes promoting local development. As argued by McDonough[5] [9], social work has as its principles freedom and the defence of greater social justice, and the focus on intervention with communities is totally justified as "key in the mission of social justice in social work; [1] due to the growth of excluded people in a market logic, and of a [2] democratic deficit, the need for participatory democracy as a source of empowerment", proposing 12 critical ideas in the intervention with communities of which 4 stand out, those that are closest to the reality of the project documented here; the [1] "intimate knowledge of community life to select the appropriate interventions", and the observation that communities [2] "exhibit a high degree of interaction and reciprocity that allows increasing resources to solve some day-to-day problems", on the other hand the [3] "process of involvement of the population and the need for successful

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[5] Josefina McDonough—Ph.D. in Social Work, Professor at the University of Arizona—USA.

experiences for empowerment" and the importance that the social worker represents for the strategy, where [4] "the action and decision belong to the community" [5].

Social work has an underlying culture of democratizing and participatory intervention by seeking to involve the community in the whole intervention process and an implicit logic of seeking knowledge in the field of social sciences to define strategies for action, consolidated in a logic of seeking and reflecting on knowledge (research) and presenting and developing proposals for intervention (action). Social work professionals have assumed a role as agents of change and promote greater social justice through their work with the local community. The model of action of the social work professional, present in the "Há Festa no Campo" project, was an excellent example of the training and principles of social work and the need for its critical and constructive role in the current and social context, a context marked by increasing inequalities and social fragility of the most vulnerable public, where they are inserted, namely the village populations, marked by a robust ageing population.

In assuming the coordination and guidance of the multidisciplinary team, the social work professional proposes a model of community intervention, or as Faleiros [10] would say, collectivisation of practice, where the "clients" are placed in interaction with others and encouraged to establish alliances in the search for standard solutions. This proposal implies an increase in the "power" of individuals and the community as a whole vis-à-vis the decision-making process of the proposed social intervention strategy. The social worker is led to build a strategy from the perspective of the community's interest and not only from his/her viewpoint, enabling the social worker to consolidate a change in reality through the participation, transformation and empowerment of local actors.

It is based on an intervention/experimentation model with a substantial degree of social innovation and pedagogy, which "may be based on a small group or a community, where the purpose is to involve the whole community in a social development project with an educational, promotional character" [11]. It thus refers us to the importance of active and participatory citizenship and a pedagogical process (concept of education for development) that allows for the sustainability of social intervention and autonomy of its development.

Community intervention in social work is also referred to by Esgaio [12] according to three models of action, the [1] local development, which suggests a localised and process-oriented intervention toward social integration and the development of competencies, and the [2] social planning, oriented towards results in the sense of mitigating social problems based on a precise diagnosis and with concrete responses and finally the [3] social action, the integrated intervention oriented towards changing the systems of power, dimensions that are very present in the project's activities. In this sense, we can affirm that the concept of social work of the International Federation of Social Workers (IFSW) [13] fits the reality of the project by proposing a global concept, suggesting social work as "a profession of intervention and an academic discipline that promotes the development and social change, social cohesion, empowerment and promotion of the person. The principles of social justice, human rights, collective responsibility and respect for diversity are central to social work. Underpinned by social work theories, the social sciences, and the humanities, social work connects people with social structures to respond to life's challenges and improve social well-being."

The concept of social work, also associated with the social worker, is thus an excellent example of the community intervention of the "Há Festa no Campo" project. The project is an empowerment and involvement strategy for the village people (participation) who, through their resources (skills and structures), will enhance their opportunities and thus mitigate or resolve their problems and those of their community. It is a model of development and social intervention, also according to Robertis [14], which defends "development as a global process of transformation of a society (…) where the conditions of participation of the population in the search for development processes must be created".

This initiative (project) for social change in which it defended a community intervention is easily associated with the proposals for seeking sustainability in social work action as Esgaio [12]. Thus, economic sustainability was sought in the search for alternative sources of funding and in valuing the theory of reciprocity (see the concept of social and solidarity economy), social sustainability in the promotion of social cohesion and the capacity for social mobilisation and environmental and cultural sustainability, where the holistic vision of the intervention (environmental dimension) and the valuing of the natural and cultural heritage is present.

The "Há Festa no Campo" has an underlying proposal for a radical change in the reality of the villages, where the current and dominant model conditions and feeds the growing abandonment of the village and rural populations, through and as an example, the loss of public services (transport, health, education…), increasing the inequalities of power relations [10] resulting from the low electoral expression and this way of defending their interests. The development of villages thus required the renovation of social intervention through the creation of proximity services, seen in a more traditional logic of social work (through attendance, information, and referral) but also in the search for radical changes in the structure and advocacy of the community, through "political activism" achieved through the promotion of collective actions and community awareness. Thus, the social worker assumed himself as a political activist by wanting to defend a new development model consolidated in the participation and empowerment of the local population to defend their interests. On the other hand, intervention should also be analysed in a less radical and more planned and concerted dimension in what might be called a systemic model of intervention. Here, the social worker is an agent of change who, by understanding the social dynamics (the interaction of systems), defines a structured intervention project (objectives, actions and results) with the community and social institutions, duly framed by social policies.

The community intervention model of "Há Festa no Campo" results from a participative and continuous diagnosis and a (re)structured planning process resulting from social intervention methodologies and the experience acquired by the coordination as a social work professional, which enabled the promotion of a sustainable relationship between different social and "non-social."[6] actors and disciplines, search for the empowerment of local agents who promote change and social cohesion. In participation, older people, the main protagonists of the project, assume old age as a commitment to participation, reinforcing citizenship rights and their full exercise, generating a greater sense of belonging and broader participation in social life [8].

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[6] Other areas of activity, such as arts and communication.

The project "Há Festa no Campo" is affirmed as a social intervention project and fits into the Declaration of Principles of Ethics in Social work[7], where the promotion of human rights and human dignity is a fundamental objective, promoting respect for self-determination (freedom of choice), people's participation and the promotion of empowerment, which seeks greater social justice, rejecting negative discrimination, promotes the recognition of cultural diversity, the equitable distribution of resources and challenges the dominant and political structure (governmental and local) intervening in solidarity to promote a more inclusive community.

6 Conclusions

The participation of people, and specifically in this project, older people, is an active factor for development, and for valuing ageing as a space, where strengthening the full exercise of citizenship can contribute to community development. It is the elderly who, by actively participating in the project, assume the purpose of enjoying their time, contributing to a greater sense of belonging to their community, and assuming the revitalization of spaces in the village context.

The social worker in "Há Festa no Campo" proposes a community and multidisciplinary intervention model, a model to promote participation (community assemblies), to promote empowerment (capacity building workshops), and to promote celebration (community presentation of the initiatives). The project is an experimental intervention process based on a logic of action research, where research is a continuous process of experimentation based on knowledge and practices resulting from the different disciplines and dimensions of social intervention. Here, social work assumes a vision of community and local intervention, an integrated and concerted vision with local partnerships, seeking exogenous resources to promote a model of sustainable local development in its different dimensions of action. Thus, enabling people to mobilize and empower them to make the most of resources and economic opportunities, preserving the cultural and environmental ecosystem of the context in which it operates, and promoting greater social cohesion between urban and rural areas, reducing inequality and injustice in the communities involved.

This guide is a humble conceptual contribution to the experience and analysis of social work within the scope of the project under development. It also aspires to be a guide for the transformation and promotion of community intervention, which will be rebuilt with each action and with the participation and contributions of the community.

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[7] Available from the APSS at http://www.apross.pt/profissao/etica-e-deontologia/. This document takes as its starting point the definition of Social Work adopted separately by FIAS—International Federation of Social Workers and AIESS—International Association of Schools of Social Work at their respective General Assemblies in Montreal, Canada, in July 2000 and subsequently agreed upon as one in Copenhagen in May 2001.

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Determinants of Future Housing Preferences of Portuguese Ageing Adults

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Abstract. According to the WHO (World Health Organization), between 2000 and 2050, the world population aged over 60 years will increase from 605 million to 2 billion individuals. The elderly, when asked about where they want to age, express the desire to remain in their homes, so we must give individuals the opportunity and conditions so that they can age where they want and manage to prepare for their ageing. In this context, Ageing in Place emerges as the first option due to the advantages of social inclusion and emotional reward that, in most situations, it brings with it. The main objective of this study is to analyse which sociodemographic characteristics and factors justify the choice of older people and future older people from an inland region of Portugal to age at home. This is a quantitative, cross-sectional, descriptive and exploratory study aimed to analyse the data collected through two questionnaire surveys, which were applied in people living in the community (N = 484), in several municipalities of the districts of Castelo Branco, Guarda and Portalegre, under the PerSoParAge Project. In a sample with an average age of 71.28 years, ranging from 55 to 99 years old, it was found that age, education, the existence of someone who can help in case of illness/disability and the best state of health are related to the option of wanting to stay at home during aging.

Keywords: Ageing in place · Sociodemographic characteristics · Ageing

1 Introduction

According to the WHO (World Health Organization), between 2000 and 2050, the world population aged over 60 years will exponentially increase [1]. Also, in Portugal, there is a progressive increase in demographic ageing due to the decrease in the young population, the increase in the elderly population and the increase in the average life expectancy [2, 3, 11], leading to more individuals surviving to older ages [4, 5].

The increase in the elderly population has been the subject of reflection and discussion by several researchers, governments, and international organisations, being reflected in several social policies. As a result of this increase, conceptual proposals such as Active

Ageing have emerged; its rationale is optimising opportunities for health, participation and security, intending to improve quality of life as people age [6]. Research has shown that people express a desire to age in their own homes [7–9], thus emerging the concept of Ageing in Place (AIP) as part of the Active Ageing paradigm, in a positive view on ageing and seeking to provide guidelines aimed at improving the permanence of older people in their home during ageing [10]. On the other hand, both formal and informal support networks appear as an essential part of the process of ageing at home. These networks facilitate autonomy, being a critical support to care, assisting in household chores, or for the psychological benefit of feeling accompanied [10].

The main objective of this study is to find out which sociodemographic characteristics and which factors are related to the option of aging at home, as a way of contributing to the fulfillment of the will of the elderly.

2   Theoretical Framework

2.1   Ageing and Sociodemographic Characteristics of Portugal and a Region of the Interior

Ageing is one of the most evident phenomena in current societies, and the concern with the well-being and quality of life of the elderly population on the part of different entities is increasingly evident [4, 12].

In Portugal, between 2011 and 2021 (provisional values of Census 2021), it was found that the percentage of young and working-age people has decreased while the percentage of elderly people increased. As a result, the ageing index increased from 127.8 in 2011 to 182.1 elderly people per 100 young people in 2021 [13, 14].

In inland municipalities of Portugal where this research was developed, there is a growth in the ageing index in all municipalities studied, with values between 174.9 and 625.5 elderly per 100 young people [13, 14].

2.2   Ageing in Place

Due to the changes that occur at various levels (biological, psychological and social) during the ageing process, several problems arise, such as the decline in functional capacity, quality of life and independence, which may affect the performance of Activities of Daily Living (ADLs) [15]. Despite this situation of dependence that some older people experience, when asked where they would like to grow old, most of them expressed their desire to grow old at home, valuing their independence and comfort [7–9].

The fulfilment of this desire can be assumed from the perspective of the AIP concept, which considers the continuation of living in one's own home or community and adapting to their needs arising from the ageing process [16].

According to WHO, AIP represents having the health and social support needed to live safely and independently at home or in the community at one age. AIP means the ability to continue to live in one's own home and community over time safely. This concept requires an interdisciplinary approach, valuing interventions at different national, regional, community and individual scales. It implies the ability to adapt the

physical and social environment to the daily life of the elderly, maintaining their quality of life over time [7]. AIP presents as objectives, from the perspective of the elderly and their families, to remain in their homes and communities as long as possible, providing control over their lives and allowing them to maintain a sense of identity, promoting well-being. Any relocation entails the loss of social relationships, changes in daily routines and lifestyles, and often loss of independence [17].

This realisation has inspired political authorities to implement measures that prioritise ageing at home, and the supply of services in this field has begun to proliferate, providing new options for those who need assistance at home to continue to maintain as independent a life as possible [17].

Remaining in a familiar environment implies the desire to control most aspects of daily life (self-care, routines and other significant activities for each individual), i.e. it translates the desire to grow old in an environment that adapts to the ageing process brings about. Given that, as the individual gets older, he/she spends more time at home and in the close community, reinforcing this relationship with the surrounding environment [7, 8, 18].

Hence the need for a complex approach to the different levels of intervention that the AIP objectives entail [7]. In the report of the 2nd WHO Global Forum on Innovation for Ageing Populations, the five main areas of intervention in the AIP process are identified: The 5 P's—People, Place, Products, Person-centered services, Policy) [7]. It is a contemporary concept, motivated by a social responsibility to protect the elderly, especially the most vulnerable [19]. It reflects a paradigm shift in social policies to support the elderly by considering as a priority the desire of the elderly person to remain in their family and community environment for as long as possible and independently, in good health and benefiting from social support [19].

To assist ageing at home and in the community, it is necessary to consider housing options and transportation, health, recreational opportunities, and services that facilitate physical activity, social interaction, cultural involvement, and continuing education [17, 19].

3   Research Context and Methodological Framework

This study used the quantitative method and is cross-sectional, descriptive and exploratory. In order to answer the framing question and achieve the objective of this study, the database of the PerSoParAge Project (SAICT-POL/23678/2016) [20] was analysed.

The sample used in the Project above was of the non-probability by quotas type and had as inclusion criteria: 55 and older, residing in the community; and not presenting changes in cognitive function.

The choice of this database is justified based on the sample size (N = 484), which is representative of the region under study. In addition, the PerSoParAge Project developed and applied a data collection instrument relevant to obtaining answers for this study.

3.1 Data Collection Instruments and Procedures

The PerSoParAge Project database was built based on the answers to two questionnaire surveys (one addressed to people aged 55 to 64 years, and the other to people aged 65 and over, residents in the municipalities of Castelo Branco, Elvas, Guarda, Idanha-a-Nova, Portalegre e Sabugal) previously developed and validated through pre-testing.

The questionnaires included sociodemographic characterisation, social and economic resources, health, support networks, housing conditions, activities of daily living, transport, social and recreational services, use of information and communication technologies, and support needs and expectations.

The questionnaire for people aged 55 to 64 years was composed of 239 questions, and the questionnaire for people aged 65 and over contained 312 questions. The application had an average duration of 60 min. Ethical issues were met through oral consent of the participants after explaining the study, and anonymity and confidentiality of all collected data were maintained [21–23].

The study was developed taking into account the Code of Conduct for Researchers, Universities, Research Institutions, Financing Institutions of the Office of Ethics and Scientific Integrity, of the Foundation for Science and Technology, according to the document available at https://www.ua.pt/file/52253.

For this study, the sociodemographic variables were taken into account: "Sex"; "Age"; "Marital Status"; "Education"; and "Number of Children".

To ascertain where people would like to reside during the ageing process, the question "In the future where would you like to reside (1st Option)? " has the following response options: "1-In your home with the current conditions"; "2-In your home making some changes"; "3-In your home with home support"; "4-In your home with a relative"; "5-In your home with a friend"; "6-In your home with a neighbour"; "7-In his house with a friend"; "8-In his house with a neighbour"; "9-In his house with a relative"; "10-With other elderly people with Home Support Service (SAD)"; "11-With a family who would take him in"; "12-In an institution"; "13-Other".

For the assessment of Support Networks, the following questions were selected: "1—How many people, counting yourself, currently live in this home?" and "2—Is there someone who can help you if you become ill or disabled?" ("1-Yes" or "2-No").

To assess health status, the questions "3—In the last 12 months, how would you define your health status?" were selected. ("1-Very Good", "2-Good", "3-Normal", "4-Bad" and "5-Very Bad") and "4—In the last 6 months, how many days were you unable to perform household chores?".

3.2 Statistical Analysis

The statistical software SPSS (Statistical Package for the Social Sciences), version 20 for Windows, was used for statistical data analysis, and the results were considered significant when they had a significance value below 0.05.

Descriptive statistics (based on distribution frequencies and percentages) were used to explore the sample characterisation variables. The ANOVA analysis of variance was used to check the relationship between the choice of residence and the sociodemographic characteristics and between the choice of residence and the support networks, housing conditions, and health.

4   Presentation of Results

Table 1. Table of sociodemographic characterisation.

Variable	Category	Total (N = 484) Frequency (%)	55 to 64 anos (n = 161) Frequency (%)	≥65 anos (n = 323) Frequency (%)
Sex	Male	217 (44.8%)	72 (44.7%)	145 (44.9%)
	Female	267 (55.2%)	89 (55.3%)	178 (55.1%)
Age	55–59	85 (17.6%)	85 (52.8%)	–
	60–64	76 (15.7%)	76 (47.2%)	–
	65–69	61 (12.6%)	–	61 (18.9%)
	70–74	76 (15.7%)	–	76 (23.5%)
	75–79	68 (14%)	–	68 (21.1%)
	80–84	53 (11%)	–	53 (16.4%)
	85–89	37 (7.6%)	–	37 (11.5%)
	90–94	21 (4.3%)	–	21 (6.5%)
	95–99	7 (1.4%)	–	7 (2.2%)
Marital status	Single	26 (5.4%)	15 (9.3%)	11 (3.4%)
	Married/Living together	280 (57.9%)	116 (72%)	164 (50.8%)
	Widow/Widower	145 (30%)	12 (7.5%)	133 (41.2%)
	Divorced/Separated	31 (6.4%)	16 (9.9%)	15 (4.6%)
	DK/DA[*]	1 (0.2%)	1 (0.6%)	–
Education	Can neither read nor write	45 (9.3%)	2 (1,2%)	43 (13.3%)
	Can read and write without level of education	32 (6.6%)	2 (1.2%)	30 (9.3%)
	1st Cycle	208 (43%)	35 (21,7%)	173 (53.6%)
	2nd Cycle	44 (9.1%)	22 (13.7%)	22 (6.8%)
	3rd Cycle	39 (8.1%)	19 (11.8%)	20 (6.2%)
	Secondary Education	57 (11.8%)	41 (25.5%)	16 (5%)
	Medium education	10 (2.1%)	6 (3.7%)	4 (1.2%)
	Higher education	48 (9.9%)	33 (20.5%)	15 (4.6%)
	DK/DA[*]	1 (0.2%)	1 (0.6%)	–
N° children	0	45 (9.3%)	17 (10.6%)	28 (8.7%)
	1	107 (22.1%)	41 (25.5%)	66 (20.4%)
	2	223 (46.1%)	86 (53.4%)	137 (42.4%)
	3	60 (12.4%)	13 (8.1%)	47 (14.6%)
	4	15 (3.1%)	3 (1.9%)	12 (3.7%)
	≥5	33 (6.8%)	1 (0.6%)	32 (9.9%)
	DK/DA[*]	1 (0.2%)	–	1 (0.3%)

[*] Didn't Know/Didn't Answer

Starting the presentation of results with the analysis of Table 1, it can be seen that the total sample is composed of 484 subjects, of which 217 are male (44.8%), and 267 are female (55.2%). The age of the participants ranges from 55 to 99 years (mean = 71.28; SD = 10.79), with 161 subjects from 55 to 64 years (future elderly group) (mean = 59.41; SD = 3.16), and 323 subjects from 65 to 99 years (elderly group) (mean = 77.19; SD = 8.05). In the future elderly and the elderly group, the female gender is predominant, 55.3% and 55.1%, respectively.

As regards marital status, the vast majority are married or cohabiting (57.9%), followed by widowers (30%). The future elderly and the elderly are also in the majority married or cohabiting with 72% and 50.8% respectively. Next, in the future elderly group, the divorced/separated with 9.9%, and in the elderly group, the widowed with 41.2%.

As regards schooling, in the group of future elderly, the highest percentage of subjects has completed secondary education (25.5%), followed by the 1st cycle (21.7%) and, with higher education (20.5%). In the elderly group, the majority have completed the 1st cycle (53.6%), followed by those who can neither read nor write (13.3%) and those who can read and write but have no level of education (9.3%). Regarding the number of children, the average is 2.11 (SD = 1.59), with the future elderly having an average of 1.73 children (SD = 0.86) and the elderly having an average of 2.29 (SD = 1.8).

Table 2 focuses on issues related to **Support Networks and Health.** Regarding the first factor, to the question "How many people, counting yourself, currently live in this house?", in the total sample, the answer with the highest percentage, 45.7%, focuses on "2" people, both in the group of future elderly and in the group of ≥ 65 years old (47.8% and 44.6%, respectively), in the case of the elderly, 43.3% live alone.

Regarding the question whether "Is there someone who can help you if you become ill or disabled?", the majority, both in the total sample and in both groups, answered, "Yes" (Total = 87.2% / Future Elderly = 93.2% / Elderly = 84.2%).

Finally, regarding the **Health** factor, to the question "In the last 12 months, how would you define your state of health?", the majority of subjects, both in the total sample and in the elderly and future elderly groups, answered "Normal", with 48.5%, 50.5% and 44.7%, respectively. Then, in the total sample, 21.1% answered "Poor," and in the elderly group, 26%. Already 24.2% of the future elderly answered that their state of health was "Good".

In the last six months, the total sample was, on average, 10.5 days, unable to perform domestic chores. The elderly were unable to perform domestic chores for an average of 14 days and the future elderly for an average of 2.9 days.

Table 3 shows the correlation between age and where individuals would like to reside. As can be seen, a statistically significant correlation is obtained, as a $p = 0.008$ was obtained. Since the r is positive (in the question "In the future where would you like to reside?" the response hypotheses range from "1-in your home with the current conditions" to "13-other"), it can be seen that the subjects who want to remain in the home with the current conditions are younger (although it is a weak correlation).

In Table 4, we can see a statistically significant correlation between schooling and the question "In the future, where would you like to reside?" with $p < 0.05$. Since an r =

Table 2. Questions related to the two factors of the questionnaire.

	Questions	Total (N = 484) Frequency (%)	55 to 64 years (n = 161) Frequency (%)	≥65 years (n = 323) Frequency (%)
Support network	1—How many people, counting yourself, currently live in this house?			
	1	169 (34.9%)	29 (18%)	140 (43.3%)
	2	221 (45.7%)	77 (47.8%)	144 (44.6%)
	3	65 (13.4%)	35 (21.7%)	30 (9.3%)
	4≥	28 (5.7%)	19 (11.8%)	9 (2.8%)
	DK/DA[*]	1 (0.2%)	1 (0.6%)	–
	2—Is there someone who can help you if you become ill or incapacitated?			
	Yes	422 (87.2%)	150 (93.2%)	272 (84.2%)
	No	45 (9.3%)	10 (6.2%)	35 (10.8%)
	DK/DA[*]	17 (3.5%)	1 (0.6%)	16 (5%)
Health	3—In the last 12 months, how would you define your state of health?			
	Very good	48 (9.9%)	28 (17.4%)	20 (6.2%)
	Good	87 (18%)	39 (24.2%)	48 (14.9%)
	Normal	235 (48.6%)	72 (44.7%)	163 (50.5%)
	Bad	102 (21.1%)	18 (11.2%)	84 (26%)
	Very bad	11 (2.3%)	3 (1.9%)	8 (2.5%)
	4—In the last 6 months, how many days have you been: Unable to carry out household chores	Mean 10.5 / SD 38.1	Mean 2.9 / SD 17.3	Mean 14 / SD 44.2

[*] Didn't Know/Didn't Answer

--0.078 was obtained, we can conclude that people who want to remain in their homes with the current conditions have a higher level of schooling.

Table 5 shows the correlation between the place where they would like to live and the questions assessing the support networks and health.

Starting with the support networks, as can be seen, only question "2—Is there someone who can help you if you become ill or disabled?" obtained a $p < 0.05$ score. We found that the number of people living with the older person/future older person is not related to the choice of future residence.

Concerning the correlation between the place where they would like to live and the questions assessing health conditions, the perception of health status and the number of

Table 3. Correlation between where you would like to live and age.

In the future where would you like to live (1st Option)?	Age				
	Frequency	Mean	SD	p	r
In your house with the current conditions	338	71.04	10.57	0.008	0.088
In your home with some changes	61	68.3	9.65		
In your home with home support	39	75.26	12.29		
In your home with a relative	18	75.28	10.95		
In your home with a friend	3	70	17.06		
In a neighbour's house	1	87	–		
In a relative's home	6	80	9.94		
In an institution	12	70.92	10.9		
Other	1	86	–		

Table 4. Correlation between where you would like to live and schooling.

In the future where would you like to live (1st Option)?	Education (1-can neither read nor write to 8-higher education)				
	Frequency	Mean	SD	p	r
In your house with the current conditions	338	3.01	1.6	0.031	– 0.078
In your home with some changes	61	2.8	1.58		
In your home with home support	39	2.13	1.46		
In your home with a relative	18	2.67	1.85		
In your home with a friend	3	3.33	2.08		
In a neighbour's house	1	1	–		
In a relative's home	6	1.67	0.52		
In an institution	12	3.08	1.7		
Other	1	2	–		

days they were unable to perform household chores in the past 6 months obtained a $p < 0.05$ score. Those with a better perception of health status and those unable to perform household chores for fewer days preferred to stay at home under the current conditions (positive r).

Table 5. Correlation between where would you like to live and support networks and health.

	Questions	In the future where would you like to live (1st Option)?	Frequency	Mean	SD	*p*	*r*
Support networks	1-How many people, including yourself, currently live in this house? (no. of persons)	In your house with the current conditions	337	1.93	1.08	0.150	− 0.007
		In your home with some changes	61	2.15	0.99		
		In your home with home support	39	1.64	0.81		
		In your home with a relative	18	2	1.03		
		In your home with a friend	3	2,67	1.53		
		In a neighbour's house	1	4	–		
		In a relative's home	6	2	1.26		
		In an institution	12	1.83	0.83		
		Other	1	1	–		
	2-Is there someone who can help you if you become ill or incapacitated? (1-Yes or 2-No)	In your house with the current conditions	325	1.08	0.27	0.022	0.128
		In your home with some changes	60	1.13	0.34		

(*continued*)

Table 5. (*continued*)

	Questions	In the future where would you like to live (1st Option)?	Frequency	Mean	SD	*p*	*r*
		In your home with home support	38	1.11	0.31		
		In your home with a relative	18	1.06	0.24		
		In your home with a friend	3	1	0		
		In a neighbour's house	1	1	–		
		In a relative's home	5	1	0		
		In an institution	12	1.42	0.52		
		Other	1	1	–		
Health	3-How would you define your state of health in the last twelve months? (1-Very Good to 5-Bad)	In your house with the current conditions	338	2.75	0.94	0.002	0.134
		In your home with some changes	61	3.23	0.94		
		In your home with home support	39	3.05	0.72		
		In your home with a relative	18	3.28	0.58		
		In your home with a friend	3	3.33	0.58		
		In a neighbour's house	1	4	–		

Table 5. (*continued*)

Questions	In the future where would you like to live (1st Option)?	Frequency	Mean	SD	*p*	*r*
	In a relative's home	6	3	0.89		
	In an institution	12	3.25	0.87		
	Other	1	3	–		
4-How many days were you unable to perform household chores in the last six months?	In your house with the current conditions	309	5.73	26.78	0.001	0.069
	In your home with some changes	60	21.87	53.95		
	In your home with home support	33	32.90	70.42		
	In your home with a relative	18	10.78	42.28		
	In your home with a friend	3	11.33	16.29		
	In a neighbour's house	1	10	–		
	In a relative's home	6	30	73.48		
	In an institution	12	5.67	9.94		
	Other	0	–	–		

5   Discussion

Regarding the characteristics of the sample used in this study, we found that, as expected, there was a predominance of females since the sample selection was representative of the population and the sampling technique respected the population proportion [14].

Considering the marital status, the majority were married subjects in the total sample. However, noticeably with increasing age, the widowhood situation increases, since if only 7.5% of the individuals aged 55 to 64 years were widowed, in the elderly group, this corresponded to 41.2% of the subjects. Higher mortality rates are verified in the more advanced age groups, which explains the increase in widowers in the 65 and over age group [14].

With regard to education, it can be seen that the level of illiteracy is higher in the group of the elderly (future elderly: 2.4%; elderly: 22.6%). These data are in accordance with the data at the national level for the year 2020, with only 1.4% of the working-age population having no level of schooling, while people aged 65 and over account for 16.9% [14].

In the present sample, the future elderly group and the elderly group have, in the majority, the 1st cycle of studies (21.7% and 53.6%, respectively). According to national data for 2020, the same is true for individuals aged 65 and over (51.6%). If we aggregate the subjects who have completed Medium Education with those who have completed Secondary Education, we see that the great majority of the sample aged 55 to 64 have this level of education (29.2%), which is in accordance with the national data for subjects aged between 15 and 64. Regarding subjects with Higher Education, they are mainly in the younger age group, and the values of the present sample are also identical to what is found at the national level for the year 2020 [24].

Although the degree of illiteracy has decreased over the years, there is still a considerable percentage of people aged 65 and over in this situation (22.6% in the present sample and 16.9% at the national level in 2020) [24].

Also, according to PORDATA, the synthetic fertility index (indicating the average number of children per woman of childbearing age) has been decreasing over the years, being 1.40 in 2020 and 3.20 in 1960. Even though both the elderly and the future elderly have mainly two children (42.4% and 53.4%, respectively), it is in the group of the elderly where the existence of 3 or more children is higher. This finding is in accordance with the data from the country [25].

As for the indicative factors—**Support Networks**—that may contribute to the choice of living in one's own home, regarding the question "How many people, including yourself, currently live in this house?", in the total sample, the most frequent answer was "2" people, both in the group aged 55 to 64 years and in the group aged ≥ 65 years (47.8% and 44.6%, respectively). Then follows in the total sample and the elderly group the indication of "1" (34.9% and 43.3% respectively) (Table 2). These percentages differ somewhat from the data presented by Moreira [3], who tells us that between 2001 and 2011, according to the National Institute of Statistics, the number of older people living alone or exclusively with other people aged 65 or over increased from 942 594 to 1 199 324, which corresponds to an increase of about 27%. Thus, in 2011 almost 60% of the older population lived in these conditions (in the present study, about 88% live alone or with another person), with 40% living with other people of the same age group (44.6% live with another person in the present study), and 20% living alone (43.3% in the present study). One-person households with one elderly person accounted for almost half of the one-person households (47%) in 2011 and are mainly located in regions with high ageing rates in the interior [3]. As can be seen, the data from the present study reflects this reality very clearly compared with the national figures of 2011 [26].

It was verified that there is someone available for both the group aged 55 to 64 and those aged 65 and over when they need help in the event of illness or disability (93.2% and 84.2%, respectively). We can consider that this support is either informal, through relatives, neighbours or friends or formal, through formal caregivers from other structures [27]. Studies refer that an individual aged 75 years or more is more likely

to need informal support than younger people (65 to 74 years), whereas individuals over 85 years are more likely to need formal support when disability becomes more evident and specialised health care is required [28]. It is vital to bear in mind that this support often does not necessarily mean providing care but may take the form of support with paperwork or companionship [27]. The fact that older people stay at home allows them to develop remarkable adaptive skills. Neighbourly relationships are another favourable factor that strengthens autonomy even when older people start to have limitations, keeping them inserted in the community [29].

The study by Clemente [30] confirms the data obtained with question 4. With regard to the factor—**Health**—it was found that the total sample defined their health status in the past 12 months as "normal" (48.6%). However, the elderly reported not performing household chores for about 14 days in the past six months. The group of future elderly showed a lower value (average of 2.9 days). In the study developed by Clemente, in people aged 85 + years, there is, in fact, a scenario reversal, as people consider that age often prevents them from performing activities [30].

Moving to Table 3, where the intention is to ascertain whether there is a relationship between age and the option for future residence, a correlation is verified, which indicates that younger subjects intend to remain in their domicile with the current conditions. It was not possible to find studies that make the exact correlation. However, it can be seen that about 86% of the users hosted in ERPI (Residential Structure for Older People) in 2019 were aged 75 and over, evidencing a clear predominance of older users with higher dependency levels. In comparison with other social responses for the elderly population, in which the elderly remain in their respective homes, namely the Day Centre and the Home Support Service (SAD), its users have a smaller age range [31].

Concerning the relationship between schooling with future residence options (Table 4), since the p-value was less than 0.05 and the r-value was negative, it can be stated that individuals with a higher level of schooling intend to stay in their home with the current conditions. A study developed in 2017 turns out to meet our data [32]. The said study found that poverty is also considered another challenge of demographic ageing, as the vast majority of older people have very low levels of education, which can make them more financially vulnerable. Although people wish to remain in their homes and are aware of some strategies, there is an economic problem. As most of the sample in the study was composed of people with low educational levels, this condition may jeopardise people's quality of life. On the contrary, people with better economic conditions will have a better adaptation capacity, which will provide a better quality of life and the ability to remain in their homes [32].

As for the correlation between the support networks and the choice of future residence (Table 5), we found that, for the first question, there is no relationship with statistical evidence, i.e. the number of people living with the older person or the future older person is not related to the choice of future residence. However, there is someone to help the elderly person if they become ill or incapacitated, and those who have help prefer to remain in their own home with the current conditions.

The way older people evaluate their social support gives them more confidence and security, which results in a more positive attitude towards life. On the other hand, if older people feel that they have no one to turn to in times of need, they become more insecure.

Often, the social support network of the elderly is made up of family members since they live with them, whether they are spouses, children or siblings. Some authors warn that this may cause the elderly to need to move house because of the death of one of their relatives, who may or may not be their carers [33]. However, many older people want to stay in their own homes alone, which leads to a greater need for help and supervision by other family members. The need for the elderly to be closer to more direct relatives, such as their children, becomes greater and more significant as they get older, especially after the age of 80 [33].

The exchange of support between members of the family network and with friends or neighbours is a source of assistance that in many cases allows the elderly to remain at home. This help often involves care related to the person's health condition and can also mean assistance with household chores, bureaucratic matters, financial help to meet daily expenses, or simply the psychological benefit of "being there" [34].

The last correlation is between the health factor and the choice of future residence. Statistical values were obtained for both questions, confirming the existence of a relationship. Subjects with a better perception of their health condition and those who had fewer days unable to perform domestic chores preferred to stay at home with the current conditions.

Regarding health, when observing the sample, we found that the tendency is for there to be a worse perception of this factor with age. The biological ageing process entails decreased functional and cognitive capacities [30]. People who prefer to remain in their homes with the current conditions revealed better health conditions. On the contrary, people who prefer/need to go to an institution have worse health conditions. This is verified in the Social Charter 2019, which states that users of ERPI have older ages and higher levels of dependency and disability [31].

6 Conclusion

In response to the objective of this study, we may conclude that age and education are related to the choice of wanting to stay at home during ageing, with this situation being observed in younger age groups (lower levels of disability) and for higher levels of education (which imply better financial conditions). However, the fact that considerable levels of illiteracy are registered in the group of older people may contribute to the impossibility of remaining at home. As far as support networks are concerned, there is a relationship only in the case of someone who can help the older person/future older person if he/she becomes ill or incapacitated.

In relation to Support Networks, no relationship was found between the option of wanting to stay at home and the number of people living with the subject; however, the existence of someone to help them if they need it due to illness or disability is a factor that contributes to staying at home. The fact that there is no one to help the elderly if they become ill or incapacitated may lead to institutionalisation.

With regard to Health, this factor also proved to be essential when choosing a future residence, with individuals with a better perception of their health condition and with lower levels of disability preferring to stay at home.

Home is the space that holds memories, to which we feel an immense attachment both for its physical space and for the community and socio-cultural environment where

we are inserted. Despite the well-known desire of people to remain as long as possible in their homes, they end up realising that if a more serious health problem arises, or if their residence no longer meets the necessary safety conditions, they will have to find other solutions. We have to find solutions at an individual and collective level so that it is possible to remain always or for as long as possible in our home. As we have seen, these solutions may include the guarantee of higher levels of education, the existence of support in case of illness or disability, or measures that promote health and prevent disability. In this scenario, people put institutionalisation as a last resort, prioritising family members or a carer who helps them in their daily lives.

It is also essential that decisions by decision-makers, industry, health and gerontology professionals about future residential housing are informed by the voices of today's older adults [35].

Taking into account the results achieved, and as a way of finding solutions with a view to the possibility of aging at home, it is suggested that currently existing measures, such as Home Support Services, be rethought and adapted, extending their opening hours, and providing affordable healthcare.

One limitation pointed out is related to the type of investigation. As this investigation is cross-sectional, there is no follow-up of the sample subjects. A longitudinal study is suggested, so that there is a follow-up of the "today future elderly", until the "tomorrow elderly", as a way of verifying if their opinions are changing with the emergence of some adversities inherent to the aging process.

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Geriatric Attitudes Among Portuguese Medical Students: A UCLA Geriatric's Attitude Scale Study

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Abstract. Demographic changes around the world present an increasing number of elderly people and the health professionals are the ones who need to provide the best possible care for them. There is an urgent need to evaluate their attitudes toward the elderly and infer how these attitudes interfere with the provision of care. The main objective of this study was to evaluate the attitudes of medical students from the 3rd and 5th years, towards the geriatric population, using the adapted "UCLA Geriatric Attitudes Scale" (UCLA-GA – Portuguese version). The eligible population (n = 338) was composed of 172 students in the 3rd year, whose response rate was 39,53% (68 responses), and 166 students in the 5th year with a response rate of 36,14% (60 responses), totalizing 128 responses. After informed consent, participants responded to the research questionnaires and the data collected were processed, using a significance level of 0.05 - group validity was tested using the Mann-Whitney U test, construct validity was tested by calculating the Spearman correlation coefficient, and a Multivariate linear regression was also performed. The UCLA-GA scale total median score did not differ between academic years (p = 0.903), sexes (p = 0.124), or between students with and without close contact with the elderly (p = 0.070), but was higher in single students compared with married ones (p = 0.002). Only the students' current average grade was a significant predictor, with the UCLA-GA score increasing an average of 0.8 points per each value in the student's average grade (β = 0,847; 95% CI 0,201–1,492; p = 0.011). Our population shows favorable attitudes from the students towards the geriatric population. Considering the growing panorama of aging, these results suggest that future medical attitudes from these subjects will be positive toward geriatric populations. However, some issues need to be evaluated more in geriatric classes and more effort should be made to combat ageism and stereotyping of this population.

Keywords: Geriatric · Geriatric attitudes · UCLA · Aging · Medical students attitudes

1 Introduction

Aging of the population is the most important aspect of the demography of the XXI century. The use of health care services tends to increase with age, accompanying the deterioration in the health status of individuals [1]. Bearing in mind that the geriatric population is responsible for a high rate of consumption of health care and knowing that health professionals spend much of their time providing for them in the best way, there is an urgent need to assess their attitudes toward geriatric patients and infer how these same attitudes interfere with the provision of care. In this way, the University of California in Los Angeles (UCLA) developed a 14-item scale – the UCLA Geriatrics Attitude Scale (UCLA-GA) - that allows to evaluate the attitudes that health professionals demonstrate towards the elders they care for. So far, this scale has been mostly used to understand the importance of educational measures in health professionals [2, 3].

Studies carried out with medical students have concluded that they have minimal knowledge about aging, moderately positive attitudes towards older adults, and little interest in geriatrics. Caring for older people before college was associated with more positive attitudes towards geriatric subjects, which in turn were associated with intentions to pursue a career in geriatrics, but not preferentially caring for older patients [4].

At a global level, a recent systematic review pointed to the presence of negative attitudes towards the elderly by health professionals and students in the health area. Female professionals and students would have more positive attitudes toward the elderly than males [5]. In England, it was found that the attitudes of medical students and doctors towards older patients were multidimensional and related to: (a) characteristics of older patients, (b) the healthcare processes involved, and (c) the personal and organizational environment of the individual providing their care. Overall, emotional responses toward old people were negative, although this was mainly observed in more junior staff [6].

The Turkish validation of the UCLA scale, with 256 individuals from the health area (pre and postgraduates), reached several relevant conclusions. First, students obtained significantly inferior results to those of the postgraduates. Second, it was observed that the attitude towards the elderly was more positive for students with high social and economic status and/or with training in geriatrics. Third, having an elderly relative did not influence respondents' attitudes. The importance of education programs in geriatrics, that allow first contact with healthy elderly people in society, was emphasized as well as the need for organized educational processes in order to foster a positive attitude toward the elderly [7].

Population aging is observed in Portugal as well as in most regions of the world. This will provide a continuous of geriatric patients to medical doctors and probably to medical students and young doctors. Due to cultural reasons, ageism is a non-word in Portuguese culture, but it seems to be latent in our society. There is no published data available about geriatric attitudes from Portuguese medical students till this moment. A doctoral thesis addressing the attitudes of future health and social service professionals towards working with the elderly population, using the Kogan's Scale in medical students in Portugal (n = 193), and other health related professions, found that the majority of respondents preferred not to work with the elderly in the future [8]. A significant part of this group were medical students, especially in their first years of training. The introduction of Geriatrics as a subject in the medical curricula, which is performed at the end of the

third year, and is continued through the 4th year, could be an important factor to change attitudes and to improve care for the elderly.

The main objective of this study was to assess the attitudes of medical students from the 3rd and 5th years at our faculty, with the teaching of Geriatrics, through the application of the UCLA geriatric scale adapted to the Portuguese population [9].

2 Methods

Our target population was all the students enrolled in the 3rd and 5th years of the Integrated Master's in Medicine at the Faculty of Health Sciences of the Beira Interior University. No exclusion criteria were applied. The 3rd year was selected because they have their first contact with Geriatrics at the end of the year. The 5th year was selected because they would have already 2 years of geriatric teaching.

The eligible group of students was composed of 172 students in the 3rd year, whose response rate to the UCLA scale was 39,53% (68 responses), and 166 students in the 5th year with a response rate of 36,14% (60 responses). Therefore, a total of 128 responses were obtained, from a total of 338 students inquired. Apart from the UCLA's geriatric attitudes scale responses, students were asked about socio-demographic and academic data - gender, age, place of birth and nationality, marital status, socioeconomic status, and the current average value - and relationship data with the geriatric population - classification of contact, degree of proximity, context in which it happens, and time spent on each visit.

For the use of the UCLA's geriatric attitudes scale, authorization was requested by a registered letter to the authors of the scale - and received it on December 15, 2019 via email from Dr. David B. Reuben [3]. Its adaptation to the Portuguese language was performed previously to its application [9]. The Portuguese version of the UCLA-GA questionnaire showed sufficient overall Cronbach α and intraclass correlation coefficients, both of 0.604 [10].

We applied the Portuguese UCLA's geriatric attitudes scale as well as the sociodemographic questionnaire, to the described eligible population. This was carried out with the help of Google Forms platform (the anonymity and confidentiality of each participant was ensured), given the current pandemic context that thus required the minimum face-to-face contact with the student sample. This procedure aimed to obtain responses to the scale from the target population, as well as the understanding of the instructions, the different items and the receptivity and adherence of the contents.

Each of the 14 items that characterize the UCLA-GA scale defines the degree of agreement of individuals through a Likert scale that varies between Strongly Disagree, Somewhat Disagree, Neutral, Somewhat Agree, and Strongly Agree. Except for questions 1, 4, 7, 9, and 14, all the others must have their score reversed before adding to the total score value of the scale, that is, for values of 5, used the value 1, for 4 the value 2, and so on. The final score can vary between 14 and 70, with higher scores corresponding to better attitudes towards the elderly. Descriptive statistics included absolute and relative frequency, median and interquartile range.

The Ethics Committee of the University of Beira Interior approved the study with the number: CE-UBI-PJ-2020-087: ID 2225.

Participation in this study implied the authorization from each of the participants, through free and informed consent, and the confidentiality of the data collected and anonymity inherent to an investigation process was maintained.

After the application phase of the research questionnaires, data collected were processed using the software Statistical Package for the Social Science (SPSS) version 26, with a significance level of 0.05. In the use of instruments of this kind, it is essential that measuring of a certain aspect is carried out precisely, that is to say, when it is intended to evaluate an aspect, it is necessary to have a guarantee that the test measures what it proposes to measure - validity. For group validity, we compared the UCLA-GA scale median total score between students with and without close contact with the elderly using the Mann-Whitney U test. Construct validity was tested by calculating the Spearman correlation coefficient for selected demographic variables. Multivariate linear regression was performed in order to identify potential predictors of the students' attitudes towards the elderly [11].

3 Results

3.1 Main Results

Table 1 shows the demographic and curricular characteristics of the 128 students. Female students (74.2%) and those in pre-clinical years were in larger numbers than students undergoing clinical clerkships (53.1% vs. 46.9%). Students were more frequently from a small town (42.2%) and their household was composed of a median of 4 elements while making more often between 1500 and 2999€ per month. Almost every student was single (96.1%; n = 123), with exception of 5 married students. The majority had contact with elderly people (77.3%; n = 99), with a median frequency of 2 times per week and a median duration of 65 min. A familiar type of contact was found in 97.0% (n = 96) of the latter, while 2 students had a professional and other 2 had a social type of contact with the elderly.

The distribution of partial and total scale scores between selected demographic variables is shown in Table 2. The UCLA-GA scale total median score did not differ between academic years (p = 0.903), sexes (p = 0.124) or between students with and without close contact with elderly (p = 0.070). When evaluating the influence of marital status, the UCLA_GA scale scores were higher in single students comparing with married ones (p = 0.002).

Table 3 shows the Spearman's Correlation coefficient between the UCLA-GA scale total score and collected continuous variables. Age ($\rho = 0.177$; p = 0.045) and student's average grade ($\rho = 0.219$; p = 0.014) were positively correlated with UCLA-GA scale total score, meaning that older students and students with better marks had a more positive attitude towards elderly people. There was no significant correlation regarding the number of children, household members, and the frequency and duration of contact with the elderly.

3.2 Item Evaluation

In question 1 "It is pleasant to be with the majority of the elderly." Female respondents have higher scores than male elements, with a p-value of 0.022 (which reveals moderate

Table 1. Sample's demographic and curricular features

Characteristics and demographics	(n = 128)
Academic year, % (n)	
3rd year	53.1 (68)
5th year	46.9 (60)
Age (years), median (IQR)	22.0 (3.0)
Sex, % (n)	
Male	25.8 (33)
Female	74.2 (95)
Habitational area, % (n)	
Small village	19.5 (25)
Small town	42.2 (54)
Big town	28.1 (36)
Big village	10.2 (13)
Number of children, median (IQR)	0.0 (1.0)
Household members, median (IQR)	4.0 (1.0)
Wage category (monthly), % (n)	
<650€	3.9 (5)
650–999€	10.9 (14)
1000–1499€	25.0 (32)
1500–2999€	43.8 (56)
>3000€	15.6 (20)
Current average grade, median (IQR)	15.0 (2.0)
Previous course, % (n)	39.8 (51)
Reasons for choosing medicine, % (n)	
Personal preference	72.7 (93)
Vocation	18.0 (23)
Family	1.6 (2)
Money	1.6 (2)
Other	5.5 (7)
Contact with elderly, % (n)	77.3 (99)
Frequency (days/week), median (IQR)	2.0 (2.0)
Duration (minutes), median (IQR)	65.0 (90.0)
Family influence on view over the elderly, % (n)	82.0 (105)

Table 2. Comparison of UCLA Geriatric Attitudes Scale median scores between academic years, sexes and proximity with elderly

Item	Overall	Academic year			Sex			Close contact with elderly		
		3rd year	5th year	P-value	Male	Female	P-value	Yes	No	P-value
Question 1	4.0 (1.0)	4.0 (1.0)	4.0 (1.0)	0.113	4.0 (1.0)	5.0 (1.0)	**0.022**	5.0 (1.0)	4.0 (1.0)	**0.038**
Question 2	5.0 (1.0)	4.5 (2.0)	5.0 (1.0)	**0.033**	5.0 (1.0)	5.0 (1.0)	0.137	5.0 (1.0)	4.0 (2.0)	0.362
Question 3	3.0 (1.0)	2.0 (3.0)	3.0 (1.0)	0.606	3.0 (1.0)	3.0 (1.0)	0.416	3.0 (2.0)	2.0 (1.0)	0.060
Question 4	5.0 (0.0)	5.0 (4.0)	5.0 (0.0)	0.291	5.0 (0.0)	5.0 (1.0)	0.376	5.0 (0.0)	5.0 (1.0)	0.146
Question 5	4.0 (2.0)	3.0 (5.0)	4.0 (1.0)	0.721	4.0 (1.0)	4.0 (1.0)	0.094	4.0 (2.0)	4.0 (0.0)	0.921
Question 6	2.0 (2.0)	2.0 (6.0)	2.0 (2.0)	0.656	2.0 (2.0)	2.0 (2.0)	0.400	2.0 (2.0)	2.0 (1.0)	0.612
Question 7	4.0 (1.0)	3.0 (7.0)	4.0 (1.0)	0.476	4.0 (1.0)	4.0 (2.0)	0.892	4.0 (2.0)	4.0 (1.0)	0.159
Question 8	4.0 (2.0)	2.0 (8.0)	3.5 (2.0)	0.225	3.0 (2.0)	4.0 (2.0)	0.058	4.0 (2.0)	3.0 (2.0)	0.159
Question 9	3.0 (2.0)	2.0 (9.0)	3.0 (2.0)	0.982	3.0 (2.0)	3.0 (1.0)	0.105	3.0 (2.0)	3.0 (1.0)	0.799
Question 10	5.0 (1.0)	4.0 (10.0)	5.0 (1.0)	0.888	4.0 (1.0)	5.0 (1.0)	0.096	5.0 (1.0)	4.0 (1.0)	0.214
Question 11	5.0 (0.0)	5.0 (11.0)	5.0 (0.0)	**0.046**	5.0 (1.0)	5.0 (0.0)	0.080	5.0 (0.0)	5.0 (1.0)	0.095
Question 12	5.0 (1.0)	4.0 (12.0)	5.0 (0.0)	0.208	5.0 (1.0)	5.0 (1.0)	0.847	5.0 (1.0)	5.0 (1.0)	0.694
Question 13	4.0 (1.0)	3.0 (13.0)	4.0 (1.0)	0.697	4.0 (1.0)	4.0 (1.0)	0.808	4.0 (1.0)	4.0 (1.0)	0.698
Question 14	5.0 (0.0)	4.0 (14.0)	5.0 (1.0)	0.584	5.0 (1.0)	5.0 (0.0)	0.157	5.0 (0.0)	5.0 (1.0)	**0.002**
Total score	56.0 (7.0)	52.0 (7.0)	56.0 (8.0)	0.903	54.0 (5.0)	56.0 (8.0)	0.124	56.0 (8.0)	54.0 (6.0)	0.070

Values are Median (Interquartile Range)

evidence against the null hypothesis). A close contact with the geriatric population leads to obtaining higher scores for a p-value of 0.038.

Table 3. Spearman correlation coefficients between the total UCLA Geriatric Attitudes Scale total score and continuous variables

Variable	ρ	P-value
Age	0.177	**0.045**
Children	0.124	0.163
Household members	−0.064	0.471
Contact frequency	−0.078	0.432
Contact duration	0.025	0.807
Current average grade	0.219	**0.014**

ρ, Spearman's Rho

Regarding question 2 "The government should redistribute the National Health Service money for the elderly to investigate AIDS or pediatric diseases." There was a difference between academic years with a p-value of 0.033. Thus, 5th grade students showed a higher percentage of students who consider the idea of the redistribution of money from the National Health Service destined to the elderly for pediatric investigation purposes to be unreasonable, while 3th grade students were less adamant about this.

With regard to questions 3 and 4, which are mainly related to the responsibility for providing care to elderly citizens, both 3rd and 5th year students consider that there is a social responsibility for this but that, as future doctors, they have some doubts about preference for treatments for younger patients.

When asked about the consumption of resources that the geriatric population requires (questions 5 and 12) both years and even genders consider that there is a large allocation of resources that is balanced with a fair contribution from the population in relation to the expenditure they present.

Questions more directed to the aging process itself, which make reference to more confusing states (question 6), the difficulty in obtaining a clinical history (question 8) and the supposed senile slowing (question 13), the students of both years consider having, effectively, a generalized process of confusion in the elderly that can sometimes make the collection of a medical history more complex. However, when considering that the elderly act very slowly for modern society, 3rd year students have a neutral opinion on the subject, while the 5th year students somewhat agree.

Results obtained with respect to question nº 7 - Older patients value the care they receive more than younger patients. "- show that 3rd graders have no opinion on this, but 5th graders seem to slightly believe that this population places greater value on medical care than the rest. In relation to question no 9 - "I tend to have more compassion for older patients than for younger ones." 3rd year students do not consider feeling more compassion based on age difference, and those in the 5th year have a null opinion. When asked about the useless contribution of the elderly to society (No. 10), both groups surveyed disagreed significantly with the statement.

Regarding item 11 "The treatment of chronic elderly patients is in vain." There is a p-value of 0.046, which indicates moderate evidence against the null hypothesis. Thus, there is a slight difference in the answers given between the academic years, with lower scores in the 3rd year, which can be justified, again, by the absence of a close contact with the hospital reality that may cause hopelessness regarding the results of the treatment of the elderly chronically ill.

Finally, with regard to question nº14 "It is interesting to hear the reports of the elderly about their past experiences." A p-value of 0.002 was obtained. This indicates that students who do not have close contact with the elderly, are not used to maintain a relationship based on communication and do not give due importance to this component, which causes consequences not only communicational, but also, long term, relational.

Table 4. Multivariate linear regression model for predictors of the UCLA Geriatric Attitudes Scale total score

Variable	β (95% CI)	P-value
Age	0,186 (−0,154–0,527)	0.281
Current average grade	0,847 (0,201–1,492)	**0.011**
Marital status	−5,115 (−11,583–1,353)	0.120

95% CI, 95% Confidence Interval

A multiple linear regression model including age, current average score and marital status was run to predict the UCLA-GA scale total score and is shown on Table 4 (F = 5,453; p = 0.001). Only students' current average grade was a significant predictor, with the UCLA-GA score increasing an average of 0.8 points per each value in the student average grade (β = 0,847; 95% CI 0,201–1,492; p = 0.011).

4 Discussion

This research, which involved the participation of 128 students of the Integrated Master's in Medicine showed that the total median score of the UCLA scale did not differ significantly between academic years (p = 0.903), sexes (p = 0.124), or between students with and without close contact with the elderly (p = 0.070) but was higher in single students comparing with married ones (p = 0.002). Only the students' current average grade was a significant predictor, with the UCLA-GA score increasing an average of 0.8 points per each value in the student average grade (β = 0,847; 95% CI 0,201–1,492; p = 0.011).

Results of previous studies on the effect of medical training on attitudes of health professionals towards the elderly have been inconsistent, perhaps due to the limitations of the existing attitude scales used by researchers. The UCLA scale of geriatric attitudes has in its base solid psychometric properties, which can help to overcome some of these limitations [3]. In addition to providing psychometric support for this instrument, our study also adds information to the current knowledge regarding the attitudes of students in the 3rd and 5th years of the Integrated Master's in Medicine at the Faculty of Health

Sciences of the Beira Interior University. Positive attitudes were found towards the elders in the studied population for some items, with no differences between sexes, academic year, or close contact, but there was a slight difference between married and single students.

Regarding the results of the UCLA-GA scores, some specific issues can be addressed:

(a) The highest scores for female respondents noted in question 1 "It is pleasant to be with the majority of the elderly." Is something observed in several other publications involving ageism and health workers. Still, in this same question, it is concluded that a close contact with the geriatric population leads to higher scores ($p = 0.038$), because, as expected, the empathy and relationships that are established when having close contact with the geriatric population leads to the emergence of interrelation skills that promote better attitudes towards the elderly. Other authors also found more positive attitudes from female nurses than male nurses toward geriatric patients [12], which can be explained either by cultural factors or by a tendency towards a more ageistic attitude from men [13]. The study by Camara et al., whose partial results also focused on medical students, found that the typical student from the group of students who would not like to come to work with the elderly is a young male student from medical, physiotherapy or social policy courses, and who rarely contacts with their grandparents or other non-family elderly [8]. Although these results cannot be directly compared with ours since the authors used different assessment tools, they also seem to highlight the importance of the previous existence of close contact with older people and the willingness to work with them. Despite the apparently worse results found by Camara et al., another association that may be established relates to finding better attitudes in students in later years compared to the first years of the courses suggesting a more mature relationship with aging and aged patients.

(b) Regarding question 2 "The government should redistribute the National Health Service money for the elderly to investigate AIDS or pediatric diseases." There was a difference between academic years with a p-value of 0.033. Thus, 5th-grade students obtained higher scores, that is, there is a higher percentage of students who consider the idea of the redistribution of money from the National Health Service destined to the elderly for pediatric investigation purposes to be unreasonable. This may be due to the greater clinical contact they acquire over the course years, which does not occur yet in the 3rd year, and to the conclusion of curricular units such as Geriatrics, which prepare students for clinical contact, not only of the associated pathologies to the elderly patient, as well as how to approach, communicate and treat them [14, 15].

(c) With regard to questions 3 and 4, which are mainly related to the responsibility for providing care to elderly citizens, both 3rd and 5th year students consider that there is a social responsibility but that, as future doctors, they have some doubts about preference for treatments for younger patients. The implicit ageism in today society is very much present in health care and health attitudes - the attribution of treatments according to the age of the patient is a current procedure in most health centers: it appears again in this report and it implies the need to change these paradigms in medical schools and medical institutions [6, 14–16].

(d) When asked about the consumption of resources that the geriatric population requires (questions 5 and 12) both years and genders consider that there is a large allocation of resources that is balanced with a fair contribution from the population in relation to the expenditure they present.

(e) Questions more directly related to the aging process itself, which make reference to more confusing states (n.º6), the difficulty in obtaining a clinical history (n.º8) and the supposed senile slowness (n.º13), the students of both years consider that exists a generalized process of confusion in elderly patients that can sometimes makes collecting a medical history more complex. The problem of stereotypes is constant in the elderly representation in the society and the answers of the students suggest a need to change and to improve this [17].

(f) Results obtained with respect to the premise "7 - Older patients value the care they receive more than younger patients." Also show that 3rd graders have no opinion on this, but 5th graders seem to slightly believe that this population places greater value on medical care than the rest. Again, this relationship may be due to the greater contact with the clinical reality that older students present [14, 15, 17].

(g) In relation to question nº9 "I tend to have more compassion for older patients than for younger ones." 3rd year students do not consider feeling more compassion based on age difference, and those in the 5th year have a null opinion. When asked about the useless contribution of the elderly to society (No. 10), both groups surveyed disagreed significantly with the statement.

(h) Regarding item 11 "The treatment of chronic elderly patients is in vain." There is a p-value of 0.046, indicating there is a slight difference in the answers given between the academic years, with lower scores in the 3rd year, which can be justified, again, by the absence of such close contact with the hospital reality that may cause hopelessness regarding the results of the treatment of the elderly chronically ill.

(i) Finally, with regard to question nº14 "It is interesting to hear the reports of the elderly about their past experiences." A p-value of 0.002 was obtained for the variable regarding close contact with the geriatric population. This indicates that students who do not have close contact with the elderly, are not used to maintaining a relationship based on communication and do not give due importance to this component, which causes consequences not only communicational but also, long term relational.

As for the total score of the UCLA-GA scale and the continuous variables collected, it is concluded that only the age of the respondents and the course average grades are correlated with the final score obtained. It seems that with the progress of the course and age, respondents acquire communicative and empathetic skills that lead to a better approach to the level of attitudes with regard to the elderly. On the other hand, students with higher academic grade averages have higher scores, which leads us to conclude that more dedicated students, who achieve better results and who take greater advantage of the subjects taught, may have more favorable attitudes towards the geriatric population. This difference in the UCLA-GA scores can increase an average of 0.8 points for each point in the student's average grade, being the only positive predictor. Combining these two parameters (year of the course and grades) and considering the teaching of Geriatrics in the Integrated Master's Degree in Medicine in the final months of the 3rd year and the

4th year, it is concluded that older students (5th year) who have already had and taken advantage of the classes taught, obtain higher scores in the present scale, so it is possible that the teaching of Geriatrics could also be central to the development of interrelational skills of future doctors. Some of the answers present in this study point to the need of changing stereotypes about the elderly and to the need of increasing contact of medical students with elderly patients, possibly from the first year of medical school onwards in order to change mentalities and to form doctors with a real image of what is a geriatric patient.

Finally, the limitations of the present study should also be mentioned. To begin with, and perhaps most importantly, the small sample collected. Among the 8 medical schools in Portugal, only 1 of the institutions was selected. On the other hand, it was concluded that attitudes change with training and with the advancement of teaching, but it was not evaluated in what ways this change occurs. It can also be inferred that students who did not participate in the present study (a total of 220, corresponding to 63.2%) may also be quite representative of the most negative aspects of the scale being validated, such as indifference towards the geriatric population.

In the future, we believe that the expansion of this same scale to other levels will bring an added value with regard to the geriatric population. It would be interesting to do the same study in all Portuguese medical schools, to evaluate how well-prepared students from different institutions are for the contact with the elderly population: the different demographic distribution of the country would probably present different results. On the other hand, we believe that it would be pertinent to evaluate students, previously and subsequently to disciplines, such as Geriatrics, which focuses only on this population and on how to learn to deal and take care of it, in order to increase the accuracy of the Geriatric teaching and the better care of the elderly patient.

5 Conclusion

It is concluded that older students (5th grade), who obtain better curricular classifications and who have direct contact with the elderly, have scores significantly higher than the others, which leads us to infer about the importance of the clinical path in the process of maturing these attitudes and the importance of certain teaching subjects, such as Geriatrics, which prepare students for a population that requires specific care.

Considering the growing panorama of an aging population and the impact of this population in the health system, we believe that all type of measures that could be beneficial should be implemented to study and improve attitudes towards older people.

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Health Perceptions and Health Care Accessibility Perception of Portuguese Ageing Adults

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Abstract. Although population ageing is a success story, it is often seen as a threat to the future of society, with an impact at various levels, such as, for example, on the dynamics of the response of health care services. Regardless of the heterogeneity that characterises the ageing process, real and perceived health is, for most older people, a fundamental aspect when assessing their quality of life. Perceived health depends on several factors that should be identified and analysed to intervene better and avoid negative results of perceived health, which may lead to several consequences. Studies carried out in several countries show that several socio-demographic characteristics and accessibility to healthcare are related to the perception of the health of the elderly population. Is the same true in Portugal, namely in inland regions of the country? The main objective of this study was to determine whether the perceived accessibility to health care and the socio-demographic characteristics are related to the perceived health of the elderly and future elderly population in an inland region of Portugal. To this end, we used a quantitative methodology and a cross-sectional, descriptive and exploratory design. We analysed the data collected through two questionnaire surveys applied to people living in the community (N = 484) in several municipalities of the Portuguese interior. In a sample with a mean age of 71.28 years, ranging from 55 to 99 years, we found a relationship between the characterisation variables and perceived health and between perceived health and the perception of accessibility to health care.

Keywords: Ageing · Accessibility to health care · Perceived health

1 Introduction

Population ageing has been a reality of recent decades, mainly due to the combination of birth rate reduction and increased longevity [1], which can be justified by the growth of technical and scientific knowledge and the improvement in the populations' living conditions [2].

Regardless of the heterogeneity that characterises the ageing process, real and perceived health is, for most older people, a fundamental aspect when assessing their quality of life [3, 4].

Briefly, perceived health is considered the subjective assessment by each person of the quality of their physical and mental health, from a temporal and comparative perspective. It stands out as a predictor of physical disability, hospitalisation and death since older people who categorise their health as poor are more likely to die early [5–8].

Perceived health is related to several factors, one of which is access to health services, which is essential in ageing, where there is a higher prevalence and mortality from diseases [9].

Several studies have addressed access to health care. However, no research was found to analyse the perception of accessibility to health care, which is pertinent to investigate in the older age group population and verify if there is a relationship between it and the perception of health status.

The main objective of this study is to determine whether the perceived accessibility to health care and the socio-demographic characteristics are related to the perceived health of older people (65 years and over) and future older people (55–64 years) in an inland region of Portugal.

2 Theoretical Background

2.1 Ageing, Socio-demographic Characteristics of Portugal and an Inland Region

Ageing is a multidimensional, multidirectional, gradual, irreversible and universal process that simultaneously encompasses physiological, psychological and social aspects [3, 10].

Ageing occurs throughout the life cycle, and old age corresponds to its final stage, and the individuals at this stage are not a homogeneous group. Given the life experiences that arise over time, the differences between people become more accentuated, making this the most heterogeneous group in society [3].

In the set of European Union countries, Portugal, since 2013, is among the five countries with the highest value of the ageing index, and in 2019, it was positioned just below Italy [11]. According to the INE (National Statistics Institute), the trend of demographic ageing remains due to the reduction of the young population, associated with the increase in the number of elderly people, which can be seen with the evolution of the figures between 2011 and 2021. The aging index rose from 127.8 to 182.1 elderly people per 100 young people and, according to INE projections for 2080, compared to the year 2021, it could almost double to 300.3 [12, 13].

The Portuguese inland municipalities where this study is focused follow the same reality of the country: the percentage of young people decreased between 2011 and 2021 (provisional data) in most municipalities; the percentage of the active population, in the same interval of years, also decreased in all municipalities, except for Idanha-a-Nova, whose percentage increased by 0.1%; and, the percentage of elderly increased, except for the municipality of Idanha-a-Nova, which is the only one that shows a decrease of 0.1% between 2011 and 2021. As for the aging index, it shows an increase in all the

municipalities studied here, varying between 174.9 and 625.5 elderly per 100 young people [14].

2.2   Perceived Health in the Elderly Population

The heterogeneity observed in the ageing process is reflected in several dimensions, one of which is health. While some older people show minor variations in health, others, from early on, manifest quite significant health changes, with implications at various levels [15]. The literature points to several reasons for these variations, such as biological effects, personality and lifestyle and life events [16].

Concerning actual health, this consists of the objective and concrete health of an individual at a given moment, considering the number of existing diseases and disabilities. Perceived health, on the other hand, can be understood as the subjective assessment of health status, performed by the individual him/herself, from a temporal and comparative perspective, and is influenced by factors such as functional and cognitive capacity, quality of life, social support, social stereotypes, beliefs, among others [17, 18].

Perceived health consists of a broad health measure, reflecting both the spontaneous assessment and its trajectory. It is an important indicator and of growing interest because it is easy to apply (it is based on the following example question: "How do you consider your health?") and because it predicts several factors such as physical disability, hospitalisation and death [5–8]. Furthermore, this assessment presents reliability and validity equivalent to other more complex measures of health status [19].

Perceived health is one of the most commonly used types of self-perception to determine the health status of the elderly from a subjective perspective since it reflects several aspects of the individuals' health status, which may be difficult to obtain through objective measures usually assess only one aspect. Therefore, the combination of both types of assessment will always be the best option to assess the individual's health status, which can only be seen as a bio-psycho-social being [18].

Several studies reveal that perceived health is influenced by several types of variables, such as: gender; age; social networks; family functioning; the presence of diseases; consumption of medication; the existence of pain; depression; impairment in the performance of activities of daily living; access to health services; medical consultations; and, hospitalisations [18–21].

2.3   Accessibility to Health Care

As the elderly population has a higher prevalence and mortality rate due to diseases, the issue of access to health services is becoming increasingly important for the definition of health policies with a view to equity [9].

The concept of access consists of a more complex process than the simple ability to reach a place. Access corresponds to the use of the service and not only the presence of the equipment; however, the measurement of access does not depend only on its use but also on several factors. There are several types of approaches, one of them reveals that the measurement of access depends on the assessment of five dimensions: availability, accessibility, cost, convenience/appropriateness and acceptance. More recently, a sixth

dimension has been proposed: knowledge. These dimensions make it possible to explain the ability of providers to provide health services and the ability of users to use services [9].

Several studies refer that accessibility to health services by the elderly population depends on factors such as: gender; age; income; place of residence; household composition; living close to the family; accessibility and cost of transportation; mobility; cost of the consultation [9, 22, 23].

In the last 30 years, there has been a reduction of inequalities in the Portuguese population's geographical access to health care and an improvement in the quality of the services provided. Although the most significant percentage of the Portuguese population is concentrated in the coastal area, where differentiated health care services have been growing, primary care has also spread throughout the country [24, 25]. Compared to other countries, this primary health care policy was a potential advantage. However, there is still a gap in access to specialised care, in the existence of home care and inpatient units, especially in rural areas where the percentage of elderly people is high [26].

The Centre and Alentejo region, despite presenting the highest aging rates in the country, are consequently the regions where incapacity and dependence, caused by chronic or acute diseases, are more evident. Paradoxically, these regions have a low frequency of health services due to the cost of travel and the lack of mobility. Also, the unequal location of hospitals means that they are used mainly by urban residents [26].

In this sense, it becomes pertinent to understand the perception of accessibility to healthcare, namely by the elderly population living in the country's interior, to adopt measures that bridge the existing gaps, promote equity and obtain better-perceived health outcomes.

3   Research Context and Methodological Framework

This study used the quantitative method, being cross-sectional, descriptive and exploratory. We chose to analyse the database of the PerSoParAge Project - Personal and Social Resources for Autonomy and Social Participation in an Aging Society (SAICT-POL/23678/2016), which was developed between 2017 and 2019 and had as its primary objective "to develop proposals and tools for analysis and intervention that would respond to the challenges of the ageing regions of the interior of Portugal, starting from a territory assessment, which was conducted in rural and urban municipalities of the districts of Castelo Branco, Guarda and Portalegre" [27].

The sample used in the PerSoParAge Project was of the non-probabilistic type by quotas and had as inclusion criteria: being 55 years old or older; living in the community, in several municipalities of the districts of Castelo Branco, Guarda and Portalegre; and not presenting changes in cognitive function.

The choice of this database is justified by the sample size (N = 484), which is representative of the region under study. In addition, the PerSoParAge Project developed and applied a data collection instrument relevant to obtaining answers for this study.

3.1 Data Collection Instruments and Procedures

The database of the PerSoParAge Project was built based on the answers to two questionnaire surveys (one addressed to people aged 55–64 years, and the other to people aged 65 and over), developed and previously validated through a pre-test.

The questionnaires included socio-demographic characterisation, social and economic resources, health, activities of daily living, transport, social and recreational services, use of information and communication technologies, support needs and expectations, among others.

The questionnaire for people aged 55–64 years comprised 239 questions, and the questionnaire for people aged 65 and over contained 312 questions. Its application lasted an average of 60 min. After explaining the study, ethical issues were met through the participants' oral consent, and anonymity and confidentiality of all collected data were maintained [28–30].

For the present study, the questions related to socio-demographic characterisation were considered, namely: "Sex"; "Age"; "Economic Resources"; and place of residence, "Rural/Urban".

For the assessment of perceived health, the question "In the last twelve months, how would you define your state of health?" was selected, which had as response options: "1-Very Good", "2-Good", "3-Normal", "4-Bad" and "5-Very Bad".

For the assessment of the perception of accessibility to health care, the following questions were considered: "To go to the GP/Hospital is:" ("1-Autonomous" or "2-Requires Help"); "Do you think you need medical care or treatment beyond what you are currently receiving?" ("1-Yes" or "2-No"); "Do you think you need transportation more often than you currently have for visits, outings, etc.?" ("1-Yes" or "2-No").

3.2 Statistical Data Analysis

The statistical software SPSS (Statistical Package for the Social Sciences), version 20 for Windows, was used for statistical data analysis, and the results were considered significant when they had a significance value below 0.05.

Descriptive statistics (based on distribution frequencies and percentages) were used to explore the sample characterisation variables and the answers to the selected questions. To assess normality, the *Kolmogorov*-Smirnov test was previously applied. To verify the existence of a relationship between perceived health, age and area of residence, the t-test was used. ANOVA analysis of variance was used to compare perceived health with income and perceived accessibility to health care.

4 Results

On analysing Table 1, it can be seen that the sample is made up of 484 subjects, of whom 217 are male (44.8%), and 267 are female (55.2%). The age of the participants ranges from 55 to 99 years (average = 71.28; SD (Standard Deviation) = 10.79), with the average age from 55 to 64 years (n = 161) being 59.41 years (SD = 3.16), and from 65 to 99 years (n = 323) 77.19 years (SD = 8.05).

In the total sample, 21.3% of the subjects earned less than EUR 439 per month, 19.8% EUR 581 to 1160, 14.5% EUR 440 to 580 and 11.4% a value equal to or greater than EUR 1161. It should be noted that 33% of the sample, equivalent to 160 participants, did not know or did not answer (DK/DA). In relation to the future elderly, 29.8% have monthly economic resources between 581 and 1160€ and 8.1% less than 439€. In the group of the elderly, the vast majority did not answer/did not know (38.7%), followed by 27.9% of individuals with less than 439€. A smaller percentage, 4.6%, are those with an income of EUR 1161 or more.

Both groups live primarily in urban areas.

Analysing the question assessing perceived health (Table 2), "In the last 12 months, how would you define your state of health?", most subjects, both in the total sample and in the group of the elderly and the future elderly, answered "Normal", with 48.6%, 50.5% and 44.7%, respectively. Then, the total sample answered "Poor" with 21.1% and the elderly group with 26%. The group of the future elderly, on the other hand, had "Good" as the second answer, with 24.2%.

When it comes to using health services, the majority say they are autonomous in going to the family doctor (total: 83.5%; future elderly: 95.7%; elderly: 77.4%) or the hospital (total: 73.8%; future elderly: 90.7%; elderly: 65.3%).

To both the question "Do you think you need medical care or treatment in addition to what you receive now?" and the question "Do you think you need transport more often than you currently have for visits, outings, etc.?", both groups answered no need (total: 80.2%; future elderly: 86.3%; elderly: 77.1% and, total: 84.1%; future elderly: 85.1%; elderly: 83.6%, respectively).

Table 3 shows the correlation between age and perceived health, taking into account that the answers range from "1-Very Good" to "5-Very Bad", and shows that older people had a higher mean response than future older people (3.04 and 2.56, respectively).

Concerning the correlation between the area of residence and the perception of health status, no statistically significant value was found ($p > 0.05$).

The correlation between the perception of health status and the sample's income obtained a value of $p = 0.000$. Since the r-value is negative, higher incomes imply a better perception of health status.

With regard to the correlation between the perception of health status and the perception of accessibility to health care, statistically, significant values were found for the questions addressing the autonomy to use the health care services, as well as for those assessing the need for additional health care or transportation (Table 4).

5   Discussion

Regarding the characteristics of the sample used in this work, it can be seen that, like the PORDATA data (around 58% of people aged 65 and over are female in the six municipalities), there is a predominance of females (55.2% in the total sample). The greater weight of the female gender can be justified by the fact that life expectancy at birth and 65 years of age is also higher for the female gender [13].

Concerning economic resources, although a large percentage of the sample did not answer (33%), it can be seen that the group of the future elderly is in a better position in

Table 1. Characterisation of the sample.

Variable	Category	Total (N = 484) Frequency (%)	55–64 years (n = 161) Frequency (%)	≥65 years (n = 323) Frequency (%)
Sex	Male	217 (44.8%)	72 (44.7%)	145 (44.9%)
	Female	267 (55.2%)	89 (55.3%)	178 (55.1%)
Age	55–59	85 (17.6%)	85 (52.8%)	–
	60–64	76 (15.7%)	76 (47.2%)	–
	65–69	61 (12.6%)	–	61 (18.9%)
	70–74	76 (15.7%)	–	76 (23.5%)
	75–79	68 (14%)	–	68 (21.1%)
	80–84	53 (11%)	–	53 (16.4%)
	85–89	37 (7.6%)	–	37 (11.5%)
	90–94	21 (4.3%)	–	21 (6.5%)
	95–99	7 (1.4%)	–	7 (2.2%)
	Mean/SD	71.28/10.79	59.41/3.16	77.19/8.05
Economic resources	<439€	103 (21.3%)	13 (8.1%)	90 (27.9%)
	440€ to 580€	70 (14.5%)	25 (15.5%)	45 (13.9%)
	581€ to 1160€	96 (19.8%)	48 (29.8%)	48 (14.9%)
	≥1161€	55 (11.4%)	40 (24.8%)	15 (4.6%)
	DK/DA*	160 (33%)	35 (21.7%)	125 (38.7%)
Rural/Urban	Rural	159 (32.9%)	39 (24.2%)	120 (37.2%)
	Urban	324 (66.9%)	122 (75.8%)	202 (62.5%)
	DK/DA*	1 (0.2%)	–	1 (0.3%)

* Did not know or did not answer

relation to the elderly, with 29.8% earning between EUR 581 and EUR 1160, while in the group of the elderly, 27.9% reported receiving a monthly amount of less than EUR 439. It should also be noted that, in the group of the future elderly, 24.8% receive an amount equal to or greater than 1161 Euros, a figure that only 4.6% of the elderly refer to receiving.

When comparing data from the present study with those from a study carried out in 2014 in the municipality of Coimbra, it can be seen that, in general, the data obtained are identical for the population aged 65 and over (≤500€: 36.9%; 501–750€: 20.3%; 751–1000€: 11.6%; ≥ 1001€: 18.2%) [31].

Concerning the area of residence, it was found that the great majority resides in urban areas (66.9%), with the group of elderly being the one with more subjects in rural areas (elderly: 37.2%; future elderly: 24.2%). The fact that the majority of the sample belongs to an urban area, where the rates of ageing are lower, and access to other health services

Table 2. Questions about perceived health and perceived accessibility of health care.

Variable	Total (N = 484) Frequency (%)	55–64 years (n = 161) Frequency (%)	≥65 years (n = 323) Frequency (%)
1 - In the last twelve months, how would you define your state of health?			
Very good	48 (9.9%)	28 (17.4%)	20 (6.2%)
Good	87 (18%)	39 (24.2%)	48 (14.9%)
Normal	235 (48.6%)	72 (44.7%)	163 (50.5%)
Bad	102 (21.1%)	18 (11.2%)	84 (26%)
Very bad	11 (2.3%)	3 (1.9%)	8 (2.5%)
2 - To go to the GP:			
Autonomous	404 (83.5%)	154 (95.7%)	250 (77.4%)
Need Help	74 (15.3%)	5 (3.1%)	69 (21.4%)
DK/DA[*]	6 (1.2%)	2 (1.2%)	4 (1.2%)
3 - To go to the Hospital:			
Autonomous	357 (73.8%)	146 (90.7%)	211 (65.3%)
Need help	123 (25.4%)	12 (7.5%)	111 (34.4%)
DK/DA[*]	4 (0.8%)	3 (1.9%)	1 (0.3%)
4 - Do you think you need medical care or treatment in addition to what you receive now?			
Yes	85 (17.6%)	21 (13%)	64 (19.8%)
No	388 (80.2%)	139 (86.3%)	249(77.1%)
DK/DA[*]	11 (2.3%)	1 (0.6%)	10 (3.1%)
5 - Do you think you need transport more often than you currently have for visits, outings, etc.?			
Yes	66 (13.6%)	18 (11.2%)	48 (14.9%)
No	407 (84.1%)	137 (85.1%)	270 (83.6%)
DK/DA[*]	10 (2.1%)	6 (3.7%)	4 (1.2%)

[*] Did not know or did not answer

(in addition to the family doctor) is more accessible may influence the correlations. In fact, there was no significant correlation between the area of residence and the critical question that allows assessing the perception of health status. Despite obtaining a p = 0,071, we verified that residents in rural areas had a worse perception of health status. This finding is in line with a study developed in 2011 in the northern region of the country (with an identical sample size, N = 432), where it was found that individuals aged 60 years and over living in rural areas had a poorer perception of health status than subjects living in urban areas. However, they did not obtain a statistically significant value (p = 0.121) [32].

In the comparison between age and perceived health status, it can be seen that younger subjects had better-perceived health (p = 0.000, but weak correlation). This correlation

Table 3. Correlation of perceived health status with age, area of residence and income.

Question	Age	Freq	Mean	SD	p	r
1 - In the last twelve months, how would you define your state of health? (1-Very Good to 5-Very Bad)	55–64	160	2.56	0.97	0.000	0.22
	65≥	323	3.04	0.87		
	Rural/Urban	**Freq**	**Mean**	**SD**	**p**	**r**
	Rural	158	2.99	0.85	0.071	−0.08
	Urban	324	2.82	0.97		
	Earnings	**Freq**	**Mean**	**SD**	**p**	**r**
	<439€	103	3.15	0.88	0.000	-0.25
	440€–580€	70	2.86	0.89		
	581€–1160€	97	2.57	0.98		
	≥1160€	55	2.69	0.79		
	DK/DA[*]	65	3.17	0.70		

[*] Did not know or did not answer

was also verified in a study developed in 2004, which found that over time, the perception of the state of health tends to be normal or bad [33]. However, it also found, as did other studies, that people aged over 90 years can paradoxically manifest a good or excellent perception of health status [33, 34], which can be explained by several factors the heterogeneity of the ageing process (although there is a greater risk of disease and deterioration of functionality with the passing of the years, the elderly do not necessarily manifest poor perceived health) [35]; the elderly having as a reference other elderly people in whom diseases and disabilities are the norms, leads them to evaluate their health more positively; the development of adaptation mechanisms to accept the ageing process itself [36]; the "survival effect", i.e. those who reach 85 years old constitute the most optimistic group, as opposed to those who are more pessimistic about their health who may have already perished [18]; and the "natural selection" effect, as the survivors tend to be stronger and healthier [37]. It was also found in this study that subjects aged over 90 years tended to have a better perception of their health status (r = −0.056) (see that the subject aged 99 years had a "Good" perception of their health status in the last 12 months). The opposite occurred between those aged 65 and 90, i.e. perception worsens with age (r = 0.059).

Moving on to the correlation between perceived health and income, it was found that the higher the income, the better the perception of health status. The same was verified in a study developed in Spain in 1999, which found a strong association between perceived health status and the socio-economic level of the populations (evaluation according to occupation) [34]. Also, in Portugal, an association between poverty among older people living in rural inland areas and poor health can be found [26].

Finally, statistically significant values were found regarding the correlation between perceived health and the perceived accessibility of health care. People who need help to go to the health services and those who feel they need more medical care or treatment

Table 4. Correlation of the perception of health status with the perception of accessibility to health care.

Questions	Perceived health (1-Very good to 5-Very bad)	Freq	Mean	SD	p	r
2 - To go to the GP is: (1-Autonomous/2-Requires Help)	Very good	48	1.02	0.14	0.000	0.28
	Good	84	1.05	0.21		
	Normal	234	1.14	0.34		
	Bad	101	1.32	0.47		
	Very bad	11	1.45	0.5		
3- To go to the Hospital is: (1-Autonomous/2-Requires Help)	Very good	48	1.02	0.14	0.000	0.33
	Good	84	1.13	0.34		
	Normal	235	1.23	0.42		
	Bad	102	1.49	0.50		
	Very bad	11	1.55	0.5		
4 - Do you think you need medical care or treatment beyond what you currently receive? (1-Yes or 2-No)	Very good	46	1.93	0.25	0.000	−0.22
	Good	87	1.90	0.31		
	Normal	231	1.84	0.37		
	Bad	99	1.67	0.50		
	Very bad	11	1.55	0.5		
5 - Do you think you need transportation more often than you currently have for visits, outings, etc.? (1-Yes or 2-No)	Very good	46	2	0.00	0.001	−0.13
	Good	85	1.86	0.35		
	Normal	232	1.88	0.3		
	Bad	100	1.76	0.45		
	Very bad	11	2	0.0		

and more frequent transportation report a worse perception of their health condition. These data agree with a study from 2000, which states that mobility dysfunction is an essential determinant for the poor health of a population [26].

Also, a 2002 study on primary care, self-perception of health and the reduction of social inequalities in health reported that a good experience of primary care, in particular better accessibility and continuity of care, was associated with a better perception of health status, both overall and mental [20].

6 Conclusion

Taking into account what has been explained above and considering the framing question "Does perceived accessibility to health care, and socio-demographic characteristics affect the perceived health of the elderly and future elderly of an inland region of Portugal?", it can be concluded that perceived access to health care and socio-demographic

characteristics are indeed related to the perceived health of the elderly and future elderly of an inland region of Portugal.

The data obtained show that socio-demographic characteristics, such as age or income, are related to the perception of health, with people in a lower age group, combined with higher income, having better physical conditions, a lower degree of disability and better financial conditions, presenting a better perception of their health status. Another correlation verified was that individuals with a better perception of their health status have a better perception of access to health care.

Still, regarding the correlation between age and health perception, it is interesting to verify that subjects aged over 90 tend to reverse their health perception, i.e. they show better-perceived health compared to individuals aged between 65 and 90, which is due, as described, to the heterogeneity of the ageing process, the development of adaptation mechanisms, the "survival effect" and the "natural selection effect".

Another socio-demographic characteristic analysed was the area of residence, in which no relationship was observed with the perception of health status. However, it was found that people living in rural areas, where the availability and access to healthcare are lower, have worse perceived health.

It would be interesting in future studies to investigate the perception of people living only in rural areas. Another limitation that can be pointed out in this study is the question commonly used to assess perceived health, which is usually applied in qualitative data acquisition. It will be interesting to assess perceived health using qualitative methodologies.

Considering the results achieved, in an attempt to achieve the benefits that an optimal perception of health status brings, there is a need to adopt measures and develop individual and collective efforts to improve the economic conditions of the elderly. This may be done working on adaptive strategies in the 65–90 years old group (equaling or adapting the mechanisms that the subjects aged over 90 years have developed), as well as to improve the accessibility to health care (namely specialised care), mainly by the older population in rural areas in the interior of Portugal.

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Sociodemographic Characteristics of Elderly People Using the Emergency Department. Initial Data

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Abstract. Adequate care planning for a heterogeneously aging population is a challenge, because there is notable variation in the way older people react to illness and trauma. We also know that elderly patients have higher rates of visits to urgent/emergency departments (ED) worldwide, due to the complexity and severity of underlying diseases and comorbidities. In this article will be described the results regarding the socio-demographic variables of 1373 emergency episodes, by elderly people. The study reveals that most users are women, and the average age is around 82 years, 40.93% used the emergency department two or more times in the last year; and already reveals some worrying data with most of the elderly having low levels of education, living alone or with insufficient social support, polymedication, and with high levels of frailty. In addition, the prevalence of frailty is expected to increase along with the rapid growth of the elderly population. Understanding and managing frailty will likely form a major component of future care strategies around the world.

Keywords: Aging · Frailty · Emergency department

1 Introduction

We are witnessing an unprecedented demographic transformation in the human history. Over the next three decades, the global number of older persons in the world will reach 1.5 billion persons in 2050, more than double of 2019 [1]. The World Population Prospects 2019 [2] reports that 1 in 6 people in the world will be over the age of 65, by 2050, an obvious increase from 2019 of 1 in 11 and from 2015 to 2050, the number of people aged 80 and over in the world will increase from 125 million to 434 million [3].

Although there is a decline in physiological functions in this continuous process, which is senescence, aging can occur in an unsuccessful way, with an increase in the prevalence of chronic situations and comorbidities, which progressively conditions the

increase in dependence and institutionalization and consequently an increase in considerable consumption of socio-sanitary resources, with a frequent tendency for complex situations to arise [4]. We also noticed that the complexity will increases as the elderly present different patterns and disease trajectories.

This decline of the various systems, with energy and functional deregulation, which evolves for a pathological aging, it cannot be associated only with the process of passing time. In this sense, a set of pathological alterations, named "frailty", began to be studied, with the purpose of diagnosing and better understanding the approach in debilitated elderly.

Frailty represents a state of increased physiological vulnerability, which is heterogeneous, associated with chronological age and reflects multisystem physiological changes, with repercussions on the homeostatic adaptation capacity and associated with a greater risk of adverse situations such as delirium, functional decline, disability, impaired mobility, falls, social isolation, increased morbidity, recurrent hospitalizations, institutionalization, and death [5–8].

In Portugal, life expectancy in 2019 was slightly higher than the EU average, with an increase of more than five years between 2000 and 2019 [9]. However, around 13 out of the 20 years, over 65, are likely to be lived with disability [10]. About half of people aged 65 and over in Portugal (53%) report having at least one chronic disease, with many of them reporting two or more chronic diseases, and about 17% of the population with over 65 years old report some limitations in basic activities of daily living (ADL) [9].

The burden of non-communicable diseases is high, with cardiovascular diseases and cancer being the main causes of death and although the Portuguese health system provides universal access to high quality health care, there are some structural weaknesses [11].

Elderly patients have higher rates of visits to urgent/emergency departments worldwide, due to the complexity and severity of underlying diseases and comorbidities. Erazo, in 2018 [12], stated that elderly people are four to six times more likely to go to an emergency department than a non-elderly person. In addition, several studies have verified over the years, that the number of elderly patients admitted in hospital emergencies is quite significant and, in some cases, abusive.

Portugal, almost unchanged since 2001, is the country with the most admissions to emergency services per capita, among the 21 countries of the Organization for Economic Cooperation and Development [9].

Consequently, this abusive use presents constraints not only in terms of the organization of human resources but also in terms of financial resources and their correct allocation.

Considering the existence of this inappropriate use, the care provided will also be inadequate, that is, an adequate approach to the patient will not be carried out, which will result in an insufficient health professional - patient relationship.

This relationship will prove to be an added difficulty for professionals regarding the correct monitoring of the practices and procedures applied.

2 Materials and Methods

This article represents the first results of a larger, unicentric, retrospective, observational, descriptive study, entitled "Fragility and end-of-life care - Prevalence of Fragility and Aggressiveness in End-of-Life Care in the elderly admitted to an emergency department".

The study started in March 2021 and predicted in December 2022 and will comprise 3 successive phases. In the 1st phase of the study - (current phase) - we selected all episodes, in 2019, of admission on the Emergency Department of Hospital Amato Lusitano - Local Health Unit of Castelo Branco, by individuals aged 65 and over (about 21,721 episodes). By applying random sampling technique, we selected 6 days of each month. In each episode, we extract the socio-demographic variables; clinical data related to the emergency episode; application of the Rockwood Clinical Frailty Scale (2004) and Charlson Comorbidity Index (CCI); destination after the emergency episode and mortality (at 30 days, 60 days, 120 days, 240 days, 1 year) after the episode.

In this paper we will present the socio-demographic variables of 1373 emergency episodes (6-day emergency episodes of the months of January, February, March, April 2019).

The Amato Lusitano Hospital of the Castelo Branco Local Health Unit, where the study is being developed, is a public hospital that provides differentiated health care to the populations of the municipalities of Castelo Branco, Idanha-a-Nova, Oleiros, Penamacor, Proença-a-Nova, Sertã, Vila de Rei and Vila Velha de Ródão, in Portugal, with a population of around 98,785 thousand people and a capacity in 2019, of 225 beds distributed by the main specialties.

In general terms, the population residing in this area is extremely aged. In 2018, individuals over 65 years old represented 30% of the total number of residents.

3 Presentation and Discussion of Results

In our study, in 2019 there were 65,894 episodes of urgency, of which 21,721 (32.96%) corresponded to users aged 65 or over. Among these, the highest percentage is found in the group [75–84] (Fig. 1).

In Portugal, as in many other countries, the accelerated increase in the older population raises important socio-sanitary issues, since, in addition to morbidity being higher in these age groups, there is an increase in the prevalence of chronic-degenerative diseases, with a consequent increase in dependence and disability. This increase in disability and morbidity is underpinned by a pathological aging that, together with other socio-sanitary factors, instigate a significant influx of elderly people to emergency services [13].

Recent studies show a progressive increase in emergency care, more evident in the elderly population. In fact, previous studies reported that the percentage of visits to emergency departments by older people was 11,5 to 50% [14]. In general, they represent more than 15% of all consultations and almost 50% of all admissions to intensive care units. Therefore, some authors mention that "emergency services are aging" [15].

In our study, 44,5% of the elderly are male and 55,5% are female and the age average is 81,43 (Male: age average – 80,47; Female: age average – 82,20) (Fig. 2).

We noticed that more women use the emergency service and that their age average is higher than that of men. This distribution of admissions by gender is in line with the
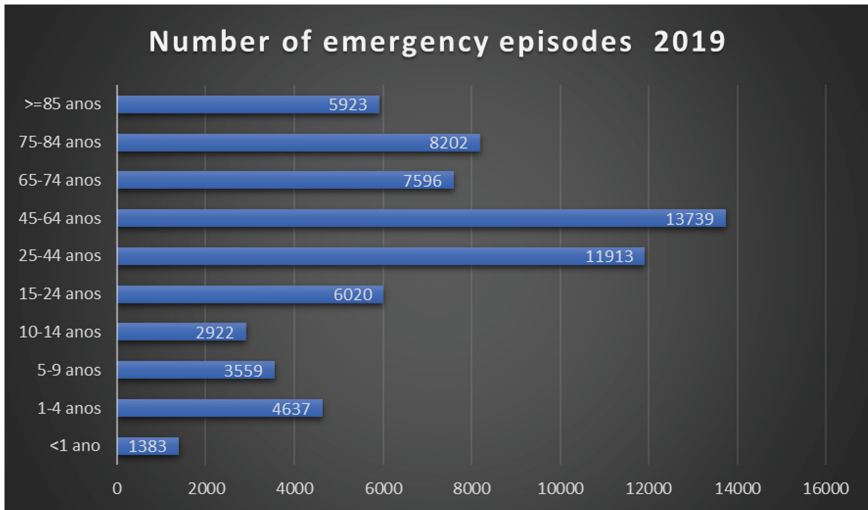
Fig. 1. Number of emergency episodes of Hospital Amato Lusitano - Local Health Unit of Castelo Branco, in 2019
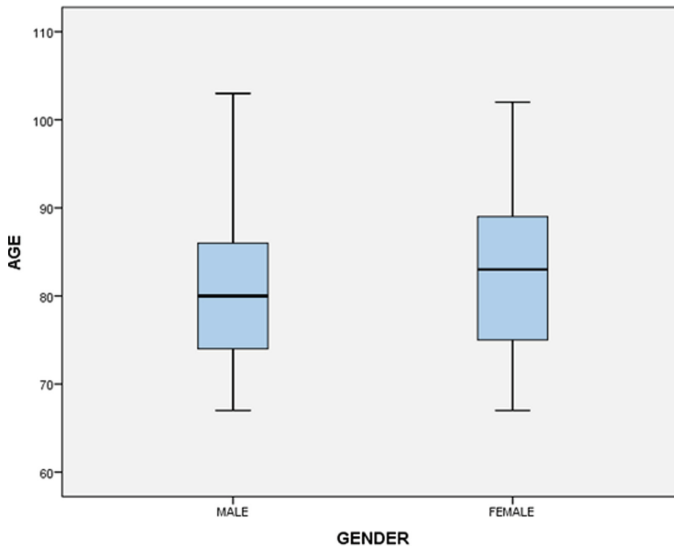
Fig. 2. Box-plot gender/age

conclusions drawn by most studies [16–18]. Although the gender gap in life expectancy at age 65 is nearly four years in favor of women, men have more years of healthy life and women tend to live a greater proportion of their lives after age 65 with health problems [9].

In our data 66,57% of the elderly who use the Emergency Department are married, 24,11% widow, 6,773% single and 2,549% are divorced (Fig. 3).
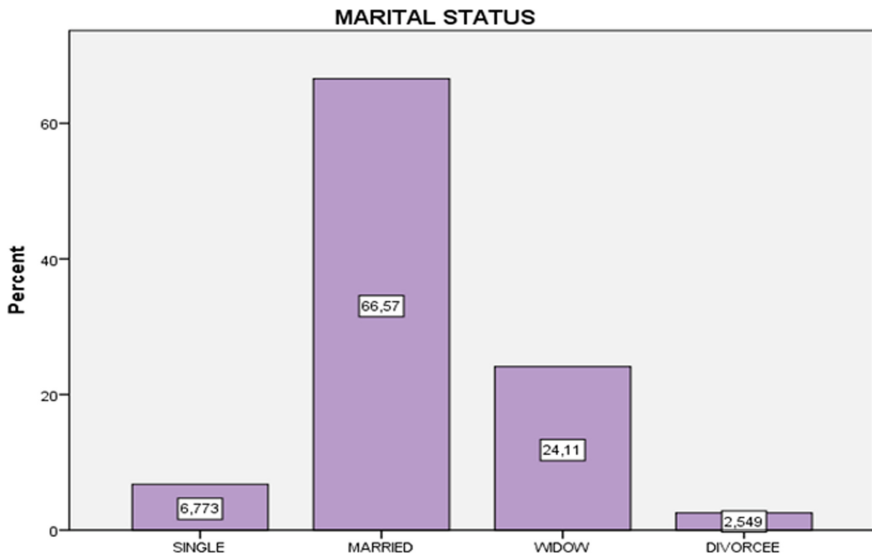
Fig. 3. Marital status

Regarding cohabitation, 49,60% of the elderly live exclusively with their spouse; 16,97% live in residential institutions for the elderly; 15,29% live alone; 9,541% live with other adult family members and 8,594% live with other elderly relatives (Fig. 4).

The structural change not only in the number of elements per household, but also in the type of family, associated with the urbanization of rural spaces (which often determines the spatial separation of generations) as well as the increase in longevity are important factors that contribute to the elderly see yourself, in a medical emergency/urgency. While the need for care increases, there is a decrease in the number of elements per household and therefore of potential informal caregivers, making it difficult for the family to take care of their elderly [13]. Indeed, there are many elderly people (especially the so-called very old people) who no longer have a family. This factor and the awareness that finitude is approaching, leads the elderly or their family (when there is one) to interpret symptoms/signs that are considered by clinicians as not urgent as very urgent.

When the family is only made up of two people and the one in need of care is elderly, the other member is often elderly and has also health problems. In these cases, the use of home visits and the emergency service becomes much more frequent, with the patient often being transported by ambulance to the latter service, not only because they do not have their own transport, but also because of this so there is greater speed in service [13].

15,29% of the elderly have support from day center; 7,138% from homes services; 16,82% from nursing homes and 69,74% have no formal social support (Fig. 5).

The isolation to which elderly people are often subject, and the failure of effective and efficient social support are also factors that influence the demand for health services [13].
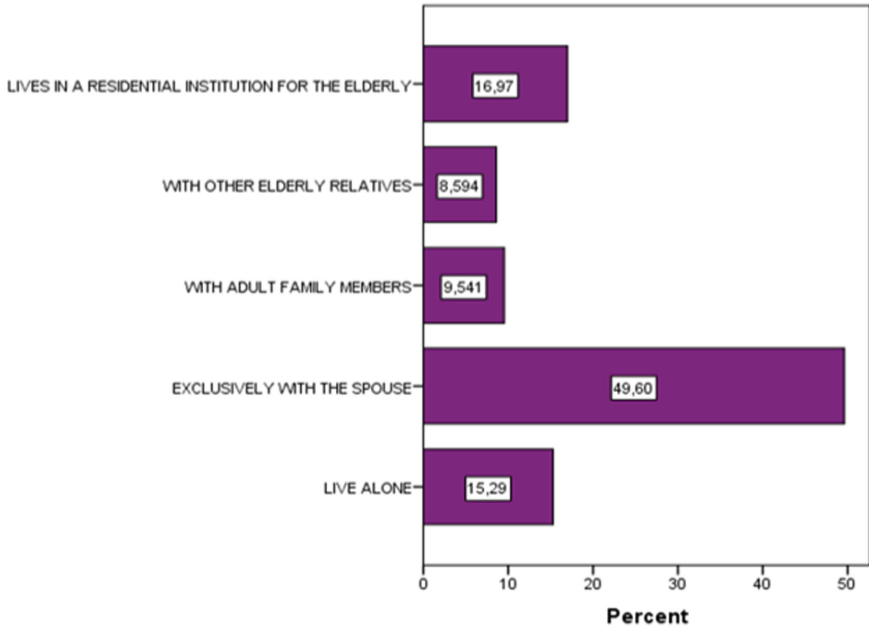
Fig. 4. Cohabitation
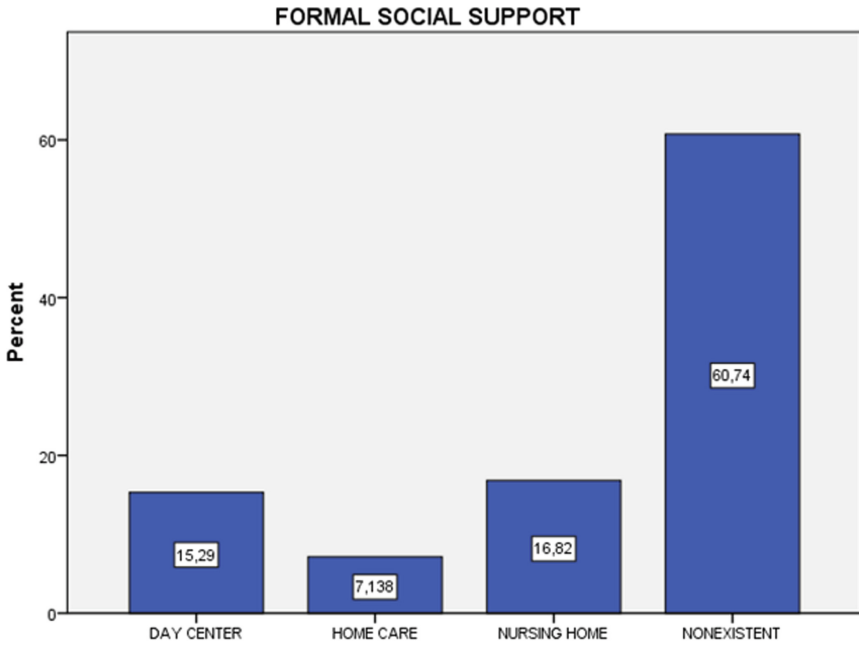
Fig. 5. Formal social support

Some authors have investigated the association between frailty and individual's economic and social situation. Social vulnerability (encompassing social support, social connection, sense of control over life circumstances and socioeconomic status) appears to be moderately correlated with frailty, and that greater social vulnerability is strongly associated with significantly higher mortality [19].

Other studies have shown that social isolation and loneliness are antecedents for morbidity and premature mortality [20] an important issue if we consider that 20–34% of older people in Europe are lonely [4].

In our study 41,51% of the elderly have no schooling; 32,19% completed the 1st cycle (4 years of schooling); 11,22% the 2nd cycle (5th and 6th); 5,025% the 3rd cycle (7th to 9th); 7,575% secondary education (10th to 12th years) and 2,476% higher education (Fig. 6).
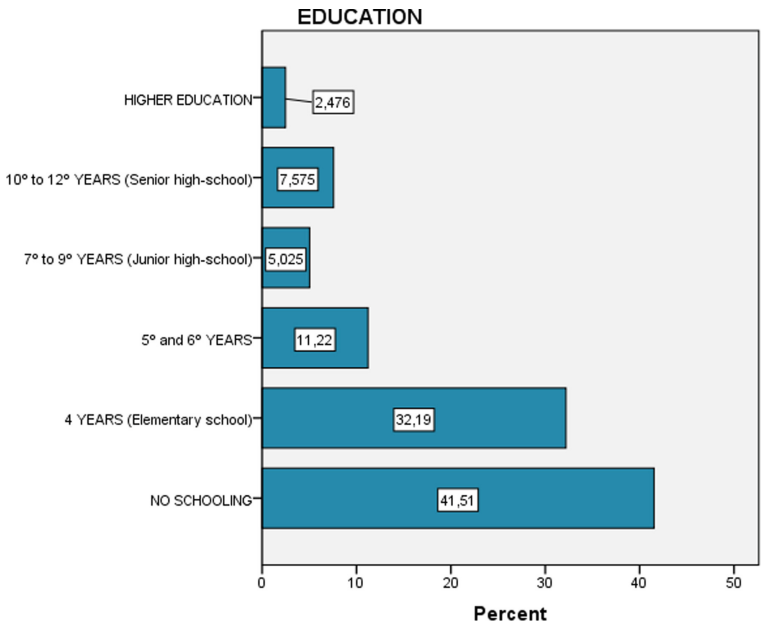
Fig. 6. Level of education

In Portugal, studies revealed that there is a high number of people with low levels of literacy, particularly the elderly, with chronic diseases, with low levels of education and low incomes [21]. Low levels of Health Literacy are related with a greater number of hospitalizations and with a more frequent use of emergency services.

Regarding the application of the clinical frailty scale, 26% of the elderly are vulnerable, and all the levels of frailty combined represents 48,293% of the total of elderly (Fig. 7).

The Technical Group for the Development of Primary Health Care [22] identified that about 35–40% of people who use the ED do so due to non-urgent acute illness. The Urgency Services Working Group reports that 43% of admissions to the emergency
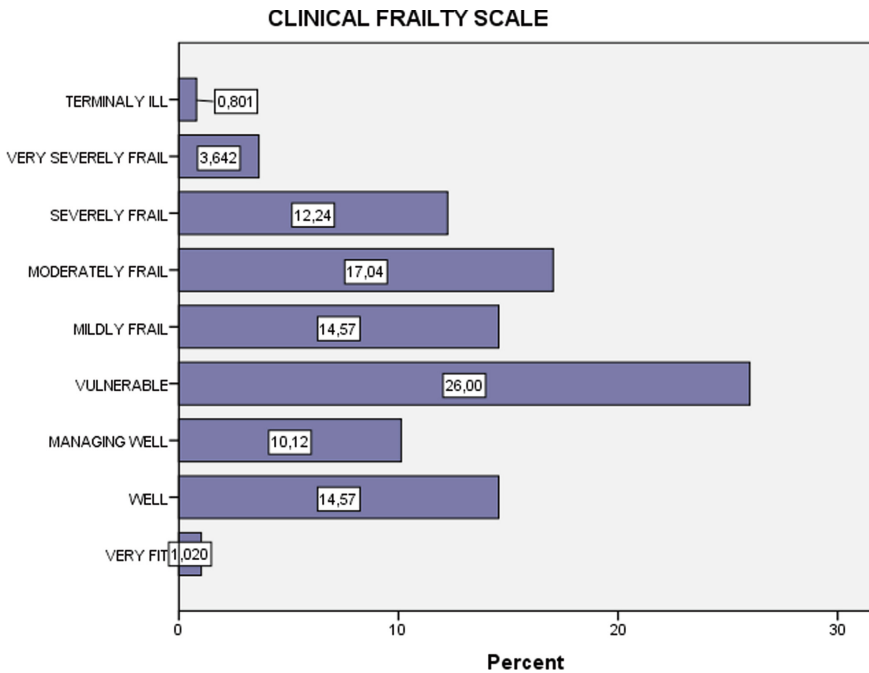
Fig. 7. Frailty by the clinical frailty scale

department, for the years 2017 and 2018, are considered non-urgent [23]. In our study 40.93% of the elderly had two or more visits to the ED in the last year and 66.72% take 5 or more drugs per day.

Polypharmacy is related to the severity of comorbidity and, therefore, can be considered a variable associated with the frequent use of emergency services by the elderly [24]. In fact, multimorbidity is associated with medication intake and the number of medications tends to be proportional to health status [25]. On the other hand, having comorbidities and being a heavy user of health services exposes the elderly to polymedication [24]. In the study by Franchi, Cartabia, Santalucia et al. [26] found that male individuals over 85 years of age, polymedicated, with admissions and admissions to the ED during the previous year and who live within 10 km of an ED had a higher risk of accessing the ED.

19,30% of the elderly died within 1 year after the emergency episode (12 people died in the emergency room, in the observed episode).

Despite of the gravity of some clinical data presented, none of the elderly of the sample are accompanied by palliative care teams.

4   Conclusions

The study of the sociodemographic characteristics of the 1373 episodes of admission to the Emergency Service of Hospital Amato Lusitano - Local Health Unit of Castelo

Branco, in the first 4 months of 2019 reveals that most users are women; the average age is around 82 years, but there is a high incidence of elderly people over 80 years old; most of the elderly are married (25% are widow); most elderly live exclusively with their spouse (16,97% live in a nursing home and 15,29% live alone); 41,51% have no schooling; 40,93% used the emergency room two or more times in the last year; 66,72% take 5 or more medications a day; 26% of the elderly are vulnerable, and all the levels of frailty combined represents 48,293% of the total of elderly and 19,30% of the elderly died within 1 year after the emergency episode (12 people died in the emergency room, in the observed episode).

In the absence of an effective social organization and/or exhaustion of caregivers, the use of health professionals increases, increasing latent needs [13]. Hospital emergency services are the easiest gateway to the public health system.

Due to the low physical capacity caused by aging, atypical symptoms and multiple comorbidities, emergency care for elderly patients is complex and multifaceted. Therefore, the progressive aging of the population can seriously affect the dynamics and functioning of hospital emergency services.

While a steady transition to large, multidisciplinary emergency departments can improve care for critically ill patients, it may not adequately respond to the growing needs of older people [27].

This study already reveals some worrying data with most of the elderly having low levels of education, living alone or with insufficient social support and with high levels of frailty. In addition, the prevalence of frailty is expected to increase along with the rapid growth of the elderly population, so realizing that frailty is a concept that continues to be used incorrectly or too generally is worrying.

Adequate care planning for a heterogeneously aging population is a challenge, because in addition to age not being a sensitive predictor of mortality, there is notable variation in the way older people react to illness and trauma. Understanding and managing frailty will likely form a major component of future care strategies around the world.

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Relationship Between O$_2$ Saturation Values, Functional Mobility, Physical Activity Levels and Quality of Life in Older People

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Abstract. Introduction: Aging is an inevitable, complex and multifactorial process that leads to a set of physiological, biochemical and biomechanical changes. The present study aims to evaluate the relationship between peripheral oxygen saturation values, functional mobility, physical activity levels and quality of life in elderly people. Materials and methods: Cross-sectional study, with a sample (n = 48) of elderly people. Characterisation data, oxygen saturation values, functional mobility, physical activity levels, and quality of life were collected. Results: There were statistically significant differences ($p \leq 0.05$) between the SpO$_2$ values of subjects aged 65–79 years ($96.3 \pm 1.8\%$) versus those aged ≥ 80 years ($94.6 \pm 2.7\%$); and between those who reported mobility problems (94.6 ± 2.6) and those who did not (96.5 ± 1.6). We also observed a moderate positive correlation (r = 0.437) between SpO$_2$ values and the mean number of steps recorded during 4 days and a moderate negative correlation (r = −487) with the times recorded in TUG. No statistically significant correlations were found between QoL and SpO$_2$ levels. Conclusions: A decrease in SpO$_2$ values was observed with age progression, and subjects with lower values had worse functional mobility and lowered physical activity levels. QoL is influenced by a wide range of internal and external conditions may explain the lack of significant correlations with SpO$_2$. Even so, of the four QoL domains analysed, the physical domain showed the highest correlation coefficient.

Keywords: Oxygen saturation · Quality of life · Older people

1 Introduction

1.1 Ageing

Ageing is an inevitable, complex and multifactorial process that leads to a set of physiological, biochemical and biomechanical changes, both at macroscopic and microscopic levels, affecting not only tissues and organs but also cells and subcellular organelles [1, 2]. These progressive changes promote the appearance of several pathologies and deficits associated with ageing, including cardiovascular, musculoskeletal and neurodegenerative diseases [1].

In adjuvant, there are also repercussions at a psychological level, namely a decrease in cognitive function, learning capacity, reasoning and memory losses. On the social side, changes occur in family, work and occupational roles, resulting in a decrease in social participation, which is reflected in the physical and mental health status of the elderly [3, 4].

Although the ageing process is inevitable and primarily determined by genetics, it is also influenced by several environmental and behavioural factors, including diet, physical activity, smoking habits, alcohol intake and exposure to microorganisms, pollutants and ionising radiation throughout life [4, 5]. The respiratory system ages the fastest due to increased exposure to environmental pollutants over the years [6].

1.2 Oxygen Saturation

The values of oxygen saturation in arterial blood (SaO_2) and the partial pressure of oxygen in arterial blood (PaO_2) are clinically and physiologically relevant as they are dependent on the effectiveness of lung function and are directly related to the supply of oxygen to the organs [7]. Thus, assessing the amount of oxygen available in peripheral tissues is fundamental in assessing and managing all users at risk of respiratory dysfunction [8].

The normal values for peripheral oxygen saturation [SpO_2] are not yet objectively defined in the literature due to several factors, namely variations in the measurement technique, sensor location, type of device, age of the individual and altitude [8]. Concerning the older population, several "normal" limits of vital signs and physiological parameters have not yet been established, and the limits defined for young adults are not always applicable to this age group, either due to the physiological changes associated with ageing or to the increase in inter-individual differences that arise with age. There are few data on the regular respiratory rate at rest and on pulse oximetry values, which are essential parameters in clinical practice, relatively easy to measure and change rapidly in respiratory and cardiac diseases [8, 9].

1.3 Functional Mobility

Functional mobility provides a global and functional perspective of the health status of individuals. It represents the physiological ability of people to move independently and safely in a variety of environments to perform functional activities or tasks and participate in activities of daily living (ADLs), whether at home, at work or in the community. It includes basic but essential movements for ADLs [10].

Limitations in functional mobility represent one of the leading causes of functional decline in the older population. The decrease of functional capacity results, in part, from neuromuscular alterations, reducing muscle mass and decreasing strength and muscle power [11]. These changes have a negative impact on the functional mobility of elderly subjects due to the reduced effectiveness of postural adjustment and motor control mechanisms [11].

However, functional mobility is a modifiable factor through therapeutic interventions, and the benefits of physical exercise and Physiotherapy in improving health status, functional capacity and mobility in healthy and frail elderly subjects are reported [12].

1.4 Physical Activity

The World Health Organization (WHO) defines physical activity (PA) as anybody movement produced by muscles and requiring energy expenditure. Although there is an association between this concept and physical exercise, they differ. Physical exercise is understood as all planned or structured physical activity, emphasising repeated movements to maintain or improve one or several components of physical function. Therefore, PA refers to all movements, including walking, cycling, sports, recreational activities and household activities [13]. It is recommended that people aged $\geq$ 65 years perform at least 150 min of moderate-intensity aerobic PA or 75 min of vigorous-intensity aerobic activity per week. Elderly people with mobility limitations should also perform physical activities focused on improving balance and preventing falls 3 or more days per week.

Regular PA can bring significant health benefits across all age groups, with increasing evidence indicating that PA can extend years of active and independent life, reduce disability and improve quality of life (QoL) in older people. Thus, a more active lifestyle may minimise the health and social care burden by enabling and promoting healthy ageing [14].

Among the benefits reported in the literature are improved quantity and quality of sleep, a healthier pattern of a set of physiological indicators (e.g., maximal oxygen consumption, blood pressure, body weight and bone density), and a lower risk of falls. Furthermore, the positive effect of exercise on mental health is also described, reducing anxiety, depression, social isolation, and improving self-esteem and cognitive function, consequently leading to higher levels of life satisfaction [15–17].

Thus, the main objective of this study is to assess the relationship of O$_2$ saturation values with functional mobility, levels of physical activity and quality of life of elderly people. Additionally, we intend to analyse the SpO$_2$ values according to different descriptive variables, such as age, gender, obesity, smoking habits and medication.

2 Materials and Methods

2.1 Procedures

The Ethics Committee approved the study of the Escola Superior de Saúde Dr Lopes Dias (Opinion 180 CE-ESALD/2020). This is an observational, correlational study with a sample of 48 subjects residing in Nursing Homes or the community (including some Day Care Centre users). The Mini-Mental State Examination Questionnaire (MMSE) was applied to assess the participants' response skills [18].

A questionnaire was applied for clinical and socio-demographic characterisation; SpO$_2$ values at rest were measured through a pulse oximeter; functional mobility was assessed through the Time up and Go Test (TUG) and quality of life through the WHOQOL-Bref assessment instrument (Appendix C). A pedometer was also distributed to each subject to quantify the number of daily steps for four days.

2.2 Sample

The sample of the study is non-probabilistic by convenience. Exclusion criteria were defined as the presence of severe uncontrolled cardiorespiratory pathologies; diagnosed

progressive neurological alterations; history of fracture, surgery or prosthesis in the lower limb in the last six months; moderate or severe cognitive impairment (assessed by the MMSE).

2.3 Evaluation Instruments

Questionnaire of clinical and socio-demographic characterisation

The characterisation questionnaire allowed the collection of socio-demographic information of the study participants (age, gender, height, weight, body mass index (BMI), marital status and academic qualifications), as well as questions regarding the presence of clinical conditions, smoking habits, mobility problems and practice of physical activity both current and pre-pandemic.

Peripheral O_2 Saturation

The amount of oxygen in arterial blood can be measured by gasometry, but this is an invasive method and does not allow permanent monitoring, providing only an intermittent assessment [8, 19]. Thus, pulse oximetry is a Yesple and non-invasive alternative that indirectly measures SaO_2 and represents peripheral oxygen saturation (SpO_2) [8]. The accuracy of pulse oximetry readings worsens when SaO_2 is less than 90% [20].

The participants remained at rest for at least 15 min before measurement for data collection, and we used MD300M model pulse oximeters. This device has a SpO_2 measurement range between 0 and 100%, resolution of 1% and accuracy of $\pm$ 3% for values between 70 and 100% [21].

Time up and go (Functional Mobility)

The TUG test has been widely used in clinical practice and research as a Yesple and easily applied method to assess mobility and functional balance [22, 23]. The result obtained through the TUG translates the time used by the participants to complete a sequence of movements [22, 23]. Shorter times are representative of better functional mobility.

The reference values recommended for elderly people are 8.1s, 9.2s and 11.3s for ages ranging from 60 to 69; 70 to 79; and 80–99 years, respectively [24]; with recorded times higher than 14 s being associated with a higher risk of falling in frail elderly of the community and values higher than 30 s being predictive of the need of walking aids and dependence in DLAs [25].

Regarding psychometric properties, the TUG presents high inter-observer (ICC = 0.98) and intra-observer reliability demonstrating the excellent reproducibility of the test [26, 27]. The sensitivity and specificity of the TUG is around 87%, indicating that it has predictive validity and may be used to assess functional mobility in the elderly [26].

Pedometer (Physical Activity Level)

Pedometers are motion sensors that respond to oscillations during gait cycles. With walking being one of the most common forms of physical activity, pedometers readily measure an important aspect of that activity by providing the number of steps recorded over a given period [28]. A record below 5,000 steps/day is representative of a "sedentary

lifestyle"; 5,000 to 7,499 steps/day is considered "not very active"; 7,500 to 9,999 is considered "moderately active"; 10,000 to 12,499 steps/day determines classification as "active"; and finally ≥12,500 steps/day as "highly active" [28].

To assess PA level, each subject was instructed to wear a pedometer (Model ONwalk 900) for four full days, placed on the hip region (could remove for bathing and during sleep). The counting of steps by the pedometer starts from the first 7 [29].

WHOQOL-Bref (Quality of Life)

The short version of the World Health Organization's Quality of Life Evaluation Instrument (WHOQOL-Bref) is a generic, multidimensional and multicultural measure. It consists of 26 items developed for a subjective assessment of QoL. It integrates four domains of QoL - Physical, Psychological, Social Relationships and Environment; and also enables the calculation of a global indicator, the overall QoL facet. The final result is on a scale from 0 to 100, with a higher final score corresponding to a better perception of quality of life [14].

As far as psychometric properties are concerned, the WHOQOL-Brief presents a Cronbach's alpha between 0.64 (Social Relationships domain) and 0.87 (Physical domain). With regard to reproducibility, there are no statistically significant differences between the mean scores of the domains, and the correlation coefficient ranges between 0.65 (Social Relationships) and 0.85 (Psychological). Regarding discriminant validity, the domains and general facet of the WHOQOL-Brief allow discriminating between individuals with and without associated medical pathology. Regarding construct validity, the WHOQOL-Brief shows statistically significant correlations between domains and high correlations with the general facet of QoL [14].

2.4   Statistical Analysis

Statistical analysis was carried out using the Statistical Package for the Social Sciences (SPSS 25.0) software, Windows version, and central and dispersion tendency measures and statistical inference tests adequate to the collected data were used.

The Kolmogorov-Smirnov test (n > 30) was performed to check data normality [30]. Then, non-parametric tests were performed for two independent samples to check the SpO$_2$ distribution by category. Statistically significant differences were defined as $p \leq 0.05$.

Finally, Spearman's correlation coefficient was calculated between the variable of SpO$_2$, functional mobility, levels of PA and quality of life. For the purpose of analysis it was considered "very low" correlation if $r < 0.2$; "low" if $0.2 < r < 0.39$; "moderate" if $0.4 < r < 0.69$; "high" if $0.7 < r < 0.89$; and "very high" if > 0.9 [31].

3   Results

The study sample comprised 48 subjects, aged between 65 and 95 years (81.3 ± 8.5 years), primarily female (68.8%). 62.5% of the participants lived in Residential Structures for Older People, 20.8% in the community and the remaining 16.7% received

Day Centre services. Most were widowed (60.4%), overweight (47.9%) and reported taking medication (85.4%), with an average of 7.5 (±3.6) tablets daily. Regarding mobility, 64.6% stated having mobility problems, 37.5% used a walking aid, and 22.9% reported having fallen at least once in the last three months.

Regarding smoking habits, 87.5% were non-smokers, 8.5% were ex-smokers, and 4.2% were smokers. Still, 52.1% reported practising PA regularly, an average of 2.8 (±3) days per week. However, half of the participants reported that before the pandemic period, they were more active - 4.1 (±3.3) days per week (Table 1).

According to Table 2, values between 89 and 99% (95.27 ± 2.50%) of SpO_2 were recorded. In the results concerning the WHOQOL-Bref questionnaire, on a scale from 0 to 100, participants obtained a mean of 57.29 ± 20.92 points in the General Facet (General perception of Quality of Life and Satisfaction with Health); 59.23 (±17.48) in the Physical domain; 63.45 (±17.43) in the Psychological domain; 65.1(±14.14) in the Social Relationships domain; and 64.58(±15.22) in the Environmental domain. Finally, and considering the day on which each subject was most active, an average of 3246.75 (±4473.61) daily steps was obtained.

There were statistically significant differences ($p \leq 0.05$) between the SpO_2 values of subjects aged 65–79 years, (96.3 ± 1.8%) versus subjects aged ≥ 80years (94.6 ± 2.7%); likewise, between those who reported mobility problems (94.6 ± 2.6) and those who did not (96.5 ± 1.6) (Table 3).

There was a moderate positive correlation (r = 0.437) between SpO_2 values and the average number of steps recorded during the 4 days, and a moderate negative correlation (r = −487) with the times recorded in the TUG with statistical significance. On the other hand, only weak correlations were found with the general facet and domains of the WHOQOL-Bref (Table 4).

4 Discussion

Oxygen Saturation

Literature has shown that average SaO_2 values in adults range from 97.1% at 18 years of age to 95.4% at 70 years of age, with normal lower limits of 96 and 94%, respectively [32]. In healthy elderly people aged over 70 years, non-smokers and without associated cardiovascular or respiratory diseases, SaO_2 is around 95% [33]. Vold and colleagues also found that individuals aged 65 years or older were associated with SpO_2 values ≤95%, and individuals aged 80 or older with SpO_2 values ≤92% [34]. The results obtained in the present study corroborate what was described in the mentioned studies, with a decrease in SpO_2 values with age progression, with higher values recorded in subjects aged between 65 and 79 years (96.3 ± 1.8%) compared to subjects aged ≥80 years (94.6 ± 2.7%). Physiological changes, such as increased alveolar and arterial O_2 difference and decreased PaO_2 due to ventilation-perfusion (V/Q) imbalance, associated with increased comorbidities and risk factors, may contribute to this decrease in SpO_2 [34, 35].

Regarding risk factors, previous studies report an association between obesity (BMI ≥ 30 kg/m^2) and reduced SaO_2 [34, 36, 37]. Although no statistically significant differences were found in the present study, a trend towards decreased SpO_2 was observed with increasing BMI. Similarly, smoking and former smoking are associated with lower

Table 1. Sample characterisation.

Characterisation		Total (N = 48)
Age (years)		81,3 ± 8,5
Gender	*Female*	N = 33 (68,8%)
Residence	*Nursing home*	N = 30 (62,5%)
	Day centre	N = 8 (16,7%)
	Community	N = 10 (20,8%)
BMI categories	*Low weight (BMI: < 18,5)*	N = 1 (2,1%)
	Normal weight (BMI: 18,5–24,9)	N = 12 (25%)
	Overweight (BMI: 25–29,9)	N = 23 (47,9%)
	Obesity Class I (BMI: 30–34,9)	N = 9 (18,8%)
	Obesity Class II (BMI: 35–39,9)	N = 3 (6,3%)
Do you take medication?	*Yes*	N = 41 (85,4%)
Average number of daily medications		7,5 ± 3,6
Mobility Problems	*Yes*	N = 31 (64,6%)
Use of Walking Aids	*Yes*	N = 18 (37,5%)
Place of Use of Walking Aids	*Both (Exterior & Indoor)*	N = 18 (37,5%)
Occurrence of falls in the last three months	*Yes*	N = 11 (22,9%)
Average number of falls in the last three months		1,3 ± 0,6
Smoking habits	*Yes*	N = 2 (4,2%)
	No	N = 42 (87,5%)
	Ex-smoker	N = 4 (8,3%)
If yes, how long have you smoked? (years)		54 ± 5,7
Smokers' smoking load (ONE)		6,5 ± 5
If ex-smoker, how long have you quit smoking? (years)		21,5 ± 13,1
Smoking load of former smokers (ONE)		15,6 ± 18,8
Do you practice regular physical activity?	*Yes*	N = 25 (52,1%)
If yes, how many times a week?		2,8 ± 3
Before the pandemic, did you perform more physical activity?	*Yes*	N = 24 (50%)
	No	N = 24 (50%)
If yes, how many times a week? (Pre-Covid19)		4,1 ± 3,3

SpO$_2$ values, related to the development of emphysema, COPD and chronic bronchitis [34, 37]. However, corroborating the results obtained by Witting et al. [38] in the present study, no differences were found between former smokers and non-smokers. However,

Table 2. Saturation values, TUG, WHOQOL-Bref and number of steps.

	Minimum	Maximum	Average	Standard deviation
Sp0$_2$ (%)	89	99	95,27	2,50
Time up and go (TUG)	7,54	59,89	19,19	13,76
WHOQOL-Bref				
General Facet	0	100	57,29	20,92
Physical	21,43	96,43	59,23	17,48
Psychological domain	20,83	100	63,45	17,43
Social Relations domain	25,00	100	65,10	14,14
Environmental domain	25,00	93,75	64,58	15,22
Number of Steps				
1st day	17	20656	2440,13	4141,86
2nd day	15	19651	2216,81	4154,61
3rd day	10	19064	2229,06	3731,81
Day 4	41	21097	2598,48	3875,50
Highest daily no. of steps	113	21097	3246,75	4473,61
Total no. of steps	245	80468	9484,48	15333,62

considering that, in general, there are more male smokers and with higher smoking loads, the fact that the sample was relatively small and mainly female may have contributed to the fact that no associations between these variables were observed. Also, the small number of smokers (n = 2) did not allow us to analyse possible differences.

There is no consensus in the literature regarding gender differences. A 2012 study found an association between male gender and decreased O_2 saturation [34], but another study from 2004 reported higher values in elderly men than in elderly women [33]. As for the present study results, these support the data obtained by Crapo and collaborators in that there were no statistically significant differences in the values of SpO$_2$ between men and women [32].

Relation between SpO$_2$ and Level of Physical Activity

In assessing physical activity levels (mean number of daily steps), we observed a record below 5,000 steps/day, showing that the elderly population of this study has a sedentary lifestyle. These values may be related to the collections having been carried out during the period of confinement, which in addition to having contributed to the reduction of PA levels of the general population residing in the community, it introduced numerous restrictions on the participation of the elderly in Day Centres and recreational activities in the Homes. When asked about PA practice, half of the subjects reported being more active in the pre-pandemic period compared to nowadays. Goethals and colleagues reported that the worldwide pandemic of COVID-19 led to a decrease in the number of older people attending group physical activity programmes [39]. Other researchers have concluded

Table 3. Saturation values by descriptive variables.

		n	Sp0$_2$ (%)		
			Average	St.Dev	*P-value*
Age	Between 65 and 79 years	19	96.3	1.8	*,019*
	≥80 Years	29	94.6	2.7	
Gender	Female	33	95	2,7	,235
	Male	15	95,9	1,9	
Rresidence	Nursing home	30	94,6	2,6	*,004*
	Day Centre	8	95,1	2,2	
	Community	10	97,4	0,8	
BMI categories	Low weight (BMI: < 18,5)	1	96.0		,555
	Normal weight (BMI: 18,5–24,9)	12	95.4	3.3	
	Overweight (BMI: 25–29,9)	23	95.7	2.1	
	Obesity Class I (BMI: 30–34,9)	9	94.3	2.5	
	Obesity Class II (BMI: 35–39,9)	3	94.3	2.5	
Obesity (BMI ≥ 30)	Yes	12	94,3	2,4	,090
	No	36	95,6	2,5	
Smoking	Yes	2	95.5	2.1	,978
	No	42	95.2	2.6	
	Ex-smoker	4	95.5	2.4	
Mobility problems	Yes	31	94.6	2.6	*,010*
	No	17	96.5	1.6	
Do you take medication?	Yes	41	95.0	2.6	,052
	No	7	96.9	1.3	
Do you practice physical activity regularly?	Yes	25	95.7	2.5	,131
	No	23	94.8	2.5	

that physical activity levels decreased significantly during confinement in the general population, especially concerning vigorous activities and walking time [39, 40].

Regarding the relationship of this variable with O$_2$ saturation, in this study, a moderate positive correlation was observed between SpO$_2$ values and the number of daily steps, demonstrating that more physically active subjects present a greater amount of

Table 4. Correlation between SpO_2 with PA levels, functional mobility, and QoL.

	r	p
Highest daily no. of steps	,418[**]	,003
Average number of steps taken	,437[**]	,002
Time Up and Go	-,487[**]	,000
General Facet - WHOQOL_Bref	-,068	,648
Physical domain- WHOQOL_Bref	,242	,098
Psychological domain - WHOQOL_Bref	,168	,255
Social domain - WHOQOL_Bref	-,118	,426
Environmental domain - WHOQOL_Bref	,207	,158

[**] Correlation is significant at the 0.01 level (bilateral).

oxygen available in peripheral tissues. The study by Bichay and co-workers, carried out to assess the therapeutic effect of a treadmill exercise programme on SaO_2, VO_2max and maximum walking distance in healthy elderly subjects, revealed a significant increase in the three variables studied in the intervention group when compared to baseline values and the control group [41]. Although the decline in lung function inherent to age is not recovered with training [42], these results reinforce the importance of older adults' participation in aerobic exercise programmes for improving cardiorespiratory response [41]. In contrast, a study by Huang and colleagues showed no significant changes in SaO_2 values in a sample of 16 women, aged 80 to 93 years, after a 4-month exercise training programme [43].

Relation between SpO_2 and Functional Mobility

Regarding functional mobility, the results obtained showed TUG values well above the reference values for this population [24], above the cut-off point of 14s, and, in some cases, values higher than 30 s related to dependence in DLAs [25].

Kovác and colleagues, in a study in which the TUG was also used, obtained a mean of 10.8 ($\pm$3.3) seconds in community-dwelling elderly who were participating in a regular exercise programme; 15.1 ($\pm$1.9) seconds in community-dwelling elderly who were physically inactive; and 15.2 ($\pm$1.9) seconds in institutionalised elderly [39]. The functional mobility of the elderly who lived in the community and were physically inactive and institutionalised were significantly worse compared to the cut-off value of 14s [44], as in the results obtained in this study.

Both functional mobility and SpO_2 values are parameters that tend to decrease throughout the ageing process. The 25–35% decrease in the size of large muscles in advanced age, a more significant percentage of fat and connective tissue, accompanied by a 30–40% reduction in the number of muscle fibres between the second and the eighth decade [42]; associated with the reduction in the efficiency of mitochondrial energy production, may be associated with such results [42, 45]. In this study, a statistically significant difference was found between the SpO_2 values of the subjects who reported having mobility problems in relation to those who did not; and a moderate

negative correlation between the SpO$_2$ values and the values recorded in the TUG. No studies were found to address the relationship between both variables. However, such results may be related to subjects with higher functional mobility who are possibly more active.

Relationship between SpO$_2$ and Quality of Life

Contrary to expectations, no relationships were found between QoL domains and SpO$_2$ values. Such results may be explained by the fact that lower values of oxygen saturations are observed in elderly subjects with associated comorbidities. In this sense, given that subjects with severe cardiorespiratory and neuromuscular diseases were excluded from the study, added to the fact that A wide range of conditions influences QoL, both internal and external, the SpO$_2$ values found, not being abnormally low, did not influence the subjects' QoL. Even so, of the four QoL domains analysed, the highest correlation coefficient was found in the physical domain.

5 Limitations of the Study and Future Investigations

The limitations of the present study include the small sample size, thus not being representative of the population under study. Additionally, the significant variance in the results obtained through the selected measuring instruments, namely the pedometer and the TUG, contributed to a sample without normal distribution, implying the use of non-parametric tests in the statistical analysis.

In addition, the fact that the collections were performed during the Covid-19 pandemic period may have influenced the measurement of physical activity levels by the pedometer. Also related, and despite the initial explanation, the non-supervision of the daily use of pedometers may have compromised the participants' correct use of the pedometers, which could partly justify specific values obtained.

Finally, the limited and not always existing consensual literature precluded a comparative discussion between the results. Therefore, to compare the results and establish more solid conclusions, further studies should be carried out to overcome the limitations presented, with identical outcome measures and similar methodology.

6 Conclusions

As expected, lower SpO$_2$ values were observed in subjects aged 80 years or older than those younger. It was also found that subjects with lower saturation values had worse functional mobility and lowered physical activity levels. On the contrary, no relationship was found between SpO$_2$ and the different quality of life domains.

Finally, and taking into account the results substantially below those recommended by health professionals and entities, as in the case of the number of daily steps; or quite different from the normative values for the elderly population, as observed in the TUG, it is essential to remember and reinforce the role of the Physiotherapist, as a movement professional, in the promotion of active and healthy lifestyles in this population, either in the community or in institutions and residences for the elderly.

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The Relationship Between Physical Activity and Gait in People Aged Over 60—A Systematic Review

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Abstract. Introduction: Physical activity significantly impacts healthy ageing, reducing the changes caused by it and is indicated to improve functional capacity that enables independence in activities of daily living. Exercise is a type of physical activity that has been shown to reduce or delay these alterations. Typically, individuals in an older age range are less physically active than younger individuals and perform less demanding physical activities. Walking is considered a complex motor task and one of the capacities that may be altered due to ageing, and the decrease in physical activity may be related to these changes in gait. Objective: To evaluate the relationship between physical activity and gait in people over 60. Materials and Methods: Use of the PubMed, B-on and PEDro databases, using the descriptors aged, elderly, physical activity, exercise, activities of daily living and gait between June and July 2021. RCT's on the relationship of physical activity with gait in people over 60, with less than or equal to 10 years of publication. The analysis of the validity of the studies was made through the PEDro—Physiotherapy Evidence Database Scale. Results: A total of 9 articles, which met the inclusion criteria, were selected for the systematic review. Conclusion: As the elderly population is more prone to sedentary lifestyles, the gait will be one of the factors to develop limitations, and we can verify through this review that different types of interventions, which promote physical activity, help improve the gait.

Keywords: Physical activity · Gait · Ageing

1   Introduction

Ageing is defined as a continuous and irreversible process typically characterised by both anatomical and physiological decline of organ systems, resulting in reduced functional capacity and physical activity levels with increasing age [1–3].

The progressive ageing of the population and increase in health and social costs due to the trend towards dependency has caused the need to decrease age-associated morbidity and mortality to increase the quality of life of the elderly [3].

In terms of ageing, there are age-related physiological factors, the accumulation of adipose tissue, loss of muscle mass, reduced bone density and decreased basal metabolic

rate [4, 5]. Functional dependence is one of the factors which most affects the quality of life of elderly people. The decrease in joint range of motion and the increase in joint stiffness are other consequences of ageing and the impairment of gait and balance; the last one can reduce the individual's ability to cope with environmental factors, leading to falls. All these factors will influence the performance in the activities of daily living so that physical mobility is an essential objective in the elderly population. Age is not the only factor in the ageing process; sedentary life style also influences the decay of the different systems in the ageing process. The disuse of different systems, mainly the musculoskeletal and cardiac systems, will significantly impact changes in strength and decreased activity in older people [5–8].

Physical activity (PA) can be defined as "any movement of the body produced by contraction of the skeletal muscles resulting in a higher energy expenditure than at rest", such as walking, dancing, gardening or physical exercise. Exercise is a type of physical activity that consists of "planned, structured, repetitive body movements done to improve and maintain one or more components of physical fitness". These two terms are often used together but are not synonymous [5]. Notably, while physical activity does not always contribute to an increase in performance and fitness in older adults, it improves health and functional capacity [9].

Participation in a regular exercise program is effective in reducing/preventing a range of functional declines associated with ageing. The benefit of training older individuals is evident in increased adaptive capacity to both resistance and strength training. Resistance training can help maintain and improve various aspects of cardiovascular function. Strength training helps to compensate for the loss of muscle mass and strength typically associated with normal ageing. Thus, the benefits of regular exercise and physical activity contribute to a healthier and more independent lifestyle, improving functional capacity and quality of life in older people [8, 9]. Regular physical activity is the only intervention that has consistently been shown to improve overall health and physical fitness, more significant opportunities for social contact, gains in brain function, lower mortality rates and fewer years of disability during adulthood [4, 11, 12]. PA may be a way to reduce the changes caused by ageing and is indicated to improve functional capacity that enables independence in daily life activities [10]. It is recommended that the older population perform a moderate-intensity aerobic activity of at least 30 min for 5 days per week or vigorous aerobic activity of at least 20 min for 3 days [13] to promote cardiovascular function and health.

Scientific evidence demonstrates that high levels of spontaneous physical activity and a variety of forms of exercise can slow the decline in muscle, tendon, skeletal, nerve and cognitive functions, or those of other organs, which in turn will slow the deterioration of gait speed [14]. When a 65-year-old person walks at a speed equal to a 25-year-old (1.2 m/s), they show multisystemic well-being. A speed below 1.0 m/s in people over 65 years of age suggests potential clinical or subclinical dysfunction or disability. Walking can be defined as "a method of locomotion involving using both legs, alternately, to provide support and propulsion". To be able to exclude running, we must add that "at least one of the feet has to be in contact with the ground at all times" [15]. Thus, gait is the movement pattern used during locomotion [16]. A normal gait is a

complex activity involving a series of rhythmic and alternating movements of the trunk and limbs, seeking minimal energy expenditure [17].

Healthy ageing is associated with the onset of muscular, neuronal and cognitive dysfunctions, resulting in functional disability, one of the characteristics being a decrease in gait speed of 16% per decade starting at the age of 60 years [14]. Older people tend to develop a more cautious gait, which is commonly characterised by a reduction in speed, cadence, stride and step length and an increase in step width, step time, stride and cycle phases [18].

Several systematic reviews evaluate specific exercise interventions and gait in elderly with frailty [19] or some health conditions such as cerebrovascular accident (CVA) or Parkinson's disease [20], with not many evaluating or relating them in healthy elderly. Other reviews evaluate the effect of interventions on the general physical condition of the elderly and not only on the gait and its components [21], or even use the gait speed as a parameter to evaluate the frailty of the elderly [22]. Thus, it will be relevant to understand the relationship between physical activity and gait in healthy elderly.

1.1 Objective

The main objective of this systematic review is to answer a research question: "What is the relationship between physical activity and gait in people older than 60 years?".

2 Materials and Methods

For the development of this study, the following steps were followed: formulation of the research question, the establishment of the keywords, of the inclusion and exclusion criteria and the search strategy, selection of the studies, evaluation of the quality of the studies, synthesis of the information of the studies and interpretation of the results. The search and selection of articles were performed according to the Preferred Reporting Items for Systematic Review (PRISMA) [23] (Fig. 1).

2.1 Selection of Research Question

The research question of this study is "What is the relationship between physical activity and gait in people over 60 years of age?".

2.2 Inclusion and Exclusion Criteria

The following were considered regarding the inclusion criteria: randomised controlled studies on the relationship between physical activity and gait in people over 60 years old, with the period less than or equal to 10 years of publication, in English and only applied to humans over 60 years old.

They were considered as exclusion criteria: master's dissertations and doctoral theses, monographs and papers describing academic activities, samples consisting of people with advanced neurological, cardiac or severe respiratory conditions and the use of prostheses.
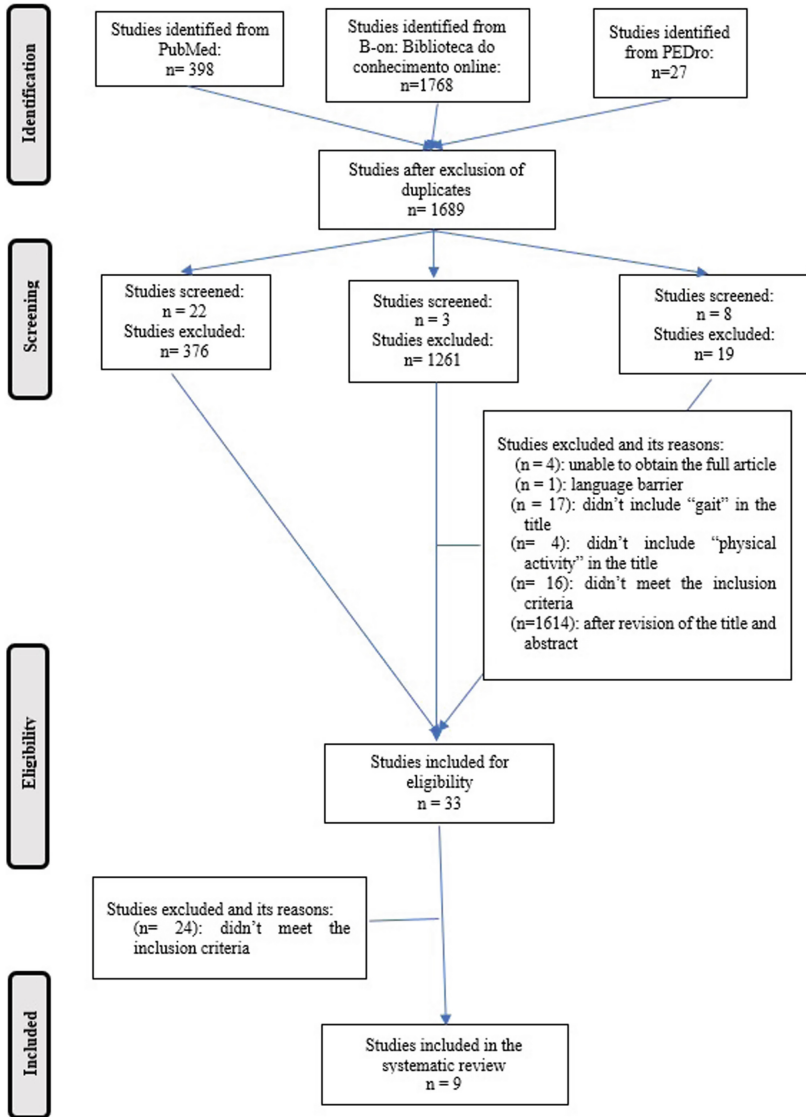
Fig. 1. Identification of studies through databases according to PRISMA

2.3 Literature Search

The search was done through the PubMed databases, where the following search terms were used: ((("Aged"[Mesh]) AND "Exercise" [Mesh]) OR "Activities of Daily Living" [Mesh]) AND "Gait" [Mesh]). Through B-on—Biblioteca do Conhecimento Online, the search terms "aged" AND "physical activity" OR "activities of daily living" AND "gait" were used, not having used the word exercise, since a substantial number of articles appeared to be reviewed by only one person. The PEDro—Physiotherapy Evidence

Database was also used, where a simple search was done with the search terms "elderly", "physical activity", "gait" without Boolean operators, since the database format does not accept them. It was also impossible to use an advanced search as the search terms were unsuitable for this format.

2.4   Evaluation of the Studies

The analysis of the validity of the studies was performed using the PEDro—Physiotherapy Evidence Database Scale adapted for Portuguese, which assesses the internal validity of randomised controlled trials and the presence of replicable statistical information in a score from 0 to 10 since the first criterion does not receive a score as it is a criterion that assesses the external validity of the study [14, 24]. Studies are considered high-quality for those with a score ≥6 points [25, 26].

3   Results

3.1   Extraction of Studies

A total of 2193 articles were found from the databases mentioned above during the search conducted on 14 and 15 June 2021 (Fig. 1). The selection was made by excluding duplicates (504 articles) and applying the inclusion and exclusion criteria, leaving 33 articles to be included in the review potentially. After the full reading of the articles, 24 studies were eliminated for not meeting the inclusion criteria and not answering the research question, making a total of 9 articles that met the inclusion criteria and were selected for the systematic review.

3.2   Quality of the Studies

Concerning the quality of the studies, it was found that one article scored 3 out of 10 points, another scored 5 points, four articles scored 6 points, and three scored 7.

3.3   Characteristics of the Studies

Table 1 shows the main characteristics of the selected articles, such as their objectives, conclusions and the score obtained in the PEDro Scale. 1794 subjects were obtained in the nine articles, aged over 60 years.

Table 2 shows the parameters and measures used in each article. Only two articles assessed physical activity, of which one used a questionnaire (Freiburg questionnaire) [29], and the other used an accelerometer [33]. To assess gait, two studies assessed only speed, of which one used the Timed Up-and-Go (TUG) test [27] and the other only performed gait for 4 m at normal speed [33]. The remaining seven assessed the spatial and temporal parameters of gait (speed, cadence, stride length and width and times in the support phases), using different means of assessment, such as the GAITRite Platinum Software [28], OptoGait System [29], TUG, 6 min Walking Test (6MWT) [31], 30-s gait test with constant speed on an electric treadmill [32], dynamic gait index (DGI)

[34] and Physilog [35]. Other parameters were also assessed in these studies, such as body mass index (BMI) [27], grip strength [27, 31, 33], health-related quality of life [27, 30], fear of falling [29, 35], balance [29, 30, 34], functional and spinal mobility [29, 34], muscle strength [29, 33], cognitive function [29, 30, 34, 35], depression [35] and neuropsychological assessment [31].

Table 3 presents the types of intervention to which the groups, experimental and control, were submitted. Of these nine articles, four presented control groups where no intervention was performed [27, 29, 30, 32], four in which they did some form of exercises such as flexibility, balance and resistance training. The experimental groups diversified their interventions, varying between intensive resistance training with different materials, dance, strengthening and dual-task exercises. One of the articles did not present an experimental group with intervention [33]. The intervention times varied between 8 and 12 weeks.

4   Discussion

In the study by Pichierri et al. [28], the experimental dance group showed positive improvements for most of the gait parameters during dual-task and average and faster speeds, showing that adding a cognitive part to the program would be essential to improve physical fitness in the elderly since simultaneously performing two tasks is common in everyday life and represents a highly advantageous capacity for the individual [36]. Exercises with dual-tasks have had greater evidence in the decrease of variability, being important in daily life, since both walking and other activities of daily living need this ability to perform different tasks simultaneously, being essential to work the cognitive function with other types of interventions. Also, Joung and Lee [34] demonstrated that a creative dance training program influenced gait and balance performance in the elderly population. This programme offered participants opportunities to explore various movements and create their patterns, allowing them to focus on the space around them and their bodies.

Strength, endurance, and balance interventions have also been shown to improve different spatial-temporal parameters of gait. In the study by Pichierri et al. [26] who demonstrated in the control group that, only doing strength and balance exercises, there were improvements in different spatial-temporal parameters, such as cadence, step time, gait cycle time, total support phase time, unimodal and bipedal. However, this was only in simple task conditions and at comfortable gait speed, or also in the study by Granacher et al. [29], which demonstrated that nine weeks of core strengthening training resulted in significant improvements in trunk muscle strength, spinal column mobility and dynamic balance (stride speed). The study by Jiménez-García et al. [27] also revealed that an intensive aerobic training programme with suspension exercises effectively improved gait speed.

Kitazawa et al. [30] demonstrated, through a different exercise programme with a hammock, that this type of programme can maintain and improve gait and cognitive function in the elderly population, being an easy type of physical activity that requires attention and concentration. There was a deterioration (0.05%) in gait performance in the control group, although not clinically significant. This decline may have been due

Table 1. Characteristics of the studies

Author/date	Score (PEDro scale)	Population	Objectives	Conclusions
Jiménez-García et al. (2018) [27]	6	82 elderly (>60 years)	To evaluate the effects of a program of intensive interval exercise (HIIT) involving suspension exercises (TRX)	The HIIT programme with TRX had benefits in gait speed, lower limb performance, grip strength and subjective perception of health-related quality of life
Pichierri et al. (2012) [28]	6	31 elderly (mean age 86.2 ± 4.6 years)	To compare two training groups with an additional intervention programme of a dance video game. To investigate the effects of the programmes on physical and psychological parameters	A cognitive-motor intervention may result in an improvement of gait under dual-task conditions
Granacher et al. (2013) [29]	7	32 elderly (63–80 years)	To evaluate the effects of a strength training programme for core instability (CBT) on trunk muscle strength, spinal mobility, dynamic balance and functional mobility	TFC proved to be a viable exercise programme for the elderly, with a good adherence rate
Kitazawa et al. (2015) [30]	7	60 elderly (71–89 years)	To evaluate the effect of a dual-task exercise programme with a net (DTR) on cognitive function and gait	Dual-task exercise can improve cognitive skills and gait

Table 1. (*continued*)

Author/date	Score (PEDro scale)	Population	Objectives	Conclusions
Pothier et al. (2018) [31]	3	90 elderly (>60 years)	To compare the impact of aerobic/resistance exercises, computerised cognitive training and the combination of two interventions with active control conditions on spontaneous walking speed (PWS- *Preferred walking speed*)	Aerobic/resistance and computerised dual-task training are two interventions in which PWS can be clinically improved
Wollesen et al. (2014) [32]	7	38 elderly (mean age 72.7 ± 4.7 years)	To evaluate the effect of a task execution training programme on gait stability	It improved walking ability and maybe a good method of preventing falls
Spartano et al. (2019) [33]	5	1352 elderly (mean age 68.6 ± 7.5 years)	To explore associations of physical activity/sedentary time with physical capacity	Adults 50–64 years: moderate to vigorous PA (MVPA) was better related to PA Adults >75 years: total steps in gait is more related to higher gait speed
Joung and Lee (2019) [34]	6	82 elderly (65–80 years)	To investigate the effect of a creative dance (CD) programme on fitness, balance and mobility	CD and stretching exercises can benefit fitness and balance, but CD can improve dynamic balance and mobility more than stretching

(*continued*)

to inactivity compared to the experimental group and may have reflected the expected decline in gait and physical capacity in an older population. However, in this study, there

Table 1. (*continued*)

Author/date	Score (PEDro scale)	Population	Objectives	Conclusions
Schättin et al. (2016) [35]	6	27 elderly (>65 years)	To compare conventional balance training with video game-based exercise on the prefrontal cortex, execution functions and gait performance	Training with the video game positively influences gait execution and performance functions

were no improvements in step length during single and dual-task, and one of the reasons for this factor may have been that they used a fixed speed.

In the study by Schättin et al. [35], the game training programme improved the spatial-temporal parameters of gait in dual-task conditions and the control group (balance training) showing improvements in single-task conditions. Training through play brought together motor and cognitive functions positively influencing gait performance in dual-task conditions. This could be another interesting way to train gait and cognitive function in individuals.

In the study by Wollesen et al. [32], dual-task training showed reduced variability (decreased stride width) of gait, which indicates a more stable gait pattern even during dual-task conditions. However, it did not show significant improvements in stride length under dual or single-task conditions, which may be explained by the fact that they used a fixed gait speed, as in Kitazawa's study. We can verify that the studies presented here that included dual-task in the intervention had a positive impact on gait and its parameters, especially on variability, this being an important factor for balance and reducing the likelihood of falls. The studies that had a dance program through a video game as an intervention showed significant improvements in speed, time in the bipodal support phase and step length in gait [28, 34]. This type of training has the potential to improve balance and gait. In addition, rhythmic and patterned movements during dance can promote proprioception and the somatosensory system, and may help in a better gait pattern and performance [34].

Spartano et al. [33], presented two groups, one aged 50–64 years and the other aged 75 and over, in order to explore the associations of physical activity with physical ability in younger and older adults. They demonstrated that achieving at least 5 min/day of MVPA was associated with a 0.062 m/s increase in walking speed, across all age groups. For the older group, every 5000 more steps per day achieved were related to approximately 0.045 m/s more gait speed. It is estimated that gait speed changes in small amounts (0.03–0.05 m/s) can be considered clinically significant in subjective assessments. These results may be associated with the fact that the decline in PA and physical function have

Table 2. Parameters and measurements of gait and physical activity assessment

Author/data	Parameters and measures of gait evaluation	Parameters and measures of physical activity evaluation	Parameters and measures of physical activity evaluation
Jiménez-García et al. (2018) [27]	Walking speed: TUG	–	BMI; Body composition (InBody 720); Grip strength (grip dynamometer); Health-related quality of life (36-item Short-Form Health Survey (SF-36))
Pichierri et al. (2012) [28]	The gait's spatial and temporal parameters (GAITRite Platinum Software V4.0 and GAITrite treadmill). 4 types of gait: "normal", "fast", "fastcog" and "normalcog"	–	Accuracy of foot positioning; Gaze behaviour (ASL Mobile Eye); Fear of falling (The Falls Efficacy Scale International (FES-I) questionnaire)
Granacher et al. (2013) [29]	Gait pattern: OptoGait System	Physical activity levels: Freiburg Questionnaire	Dynamic balance (Functional Reach Test); Functional Mobility (TUG); Spine mobility (MediMouse System); Trunk muscle strength (4 Norsk machine); Cognitive function (MMSE)
Kitazawa et al. (2015) [30]	Gait: TUG	–	Cognitive function (Touch-M System and Touch Panel-Type Dementia Assessment Scale); Balance (TUG); Quality of life (Medical outcome study short form-8 (SF-8))

(*continued*)

an influence on each other. Also in this study, there was a difference in the amount of PA in relation to the different age groups, with 38% of adults aged 50–64 achieving the 150 min per week of MVPA recommended in the literature. In the age group of ≥75 years the amount of recommended PA decreased by 15% compared to the previous

Table 2. (*continued*)

Author/data	Parameters and measures of gait evaluation	Parameters and measures of physical activity evaluation	Parameters and measures of physical activity evaluation
Pothier et al. (2018) [31]	Spontaneous walking speed: 6MWT and TUG	–	Neuropsychological assessment (The Rey Auditory Verbal Learning Test, The Color-Word Interference Test (CWIT), The Baddeley DT); Grip strength; STS; Physical performance test
Wollesen et al. (2014) [32]	Stride length and width, maximum vertical impact of the stride: 30-s walking test at constant speed on the electric treadmill	–	–
Spartano et al. (2019) [33]	Walking speed: walk for 4 m at average speed	Physical activity: Actical accelerometer	– Lower limb strength: sit and stand test five times, – Grip strength (JAMAR dynamometer)
Joung e Lee (2019) [34]	– Gait performance: dynamic gait index (DGI), – Gait speed: 10-min walking test	–	Cognitive function: MMSE Korean version; Physical fitness: senior fitness test; Balance: Berg Scale; Mobility: TUG

(*continued*)

age group, also demonstrating that sedentary time increased by approximately one hour per age group due to the decrease in MVPA. Walking speed also showed a decrease from 1.23 to 1.08 m/s between age groups. A greater amount of PA and a shorter time of sedentary lifestyle were associated with a greater gait speed in older people aged ≥75 years. These relationships may demonstrate how the amount of PA and speed can vary with different age groups in younger and older adults. In this review, only this article made this relationship in different age groups and it may be interesting to investigate further on this relationship with ages.

Table 2. (*continued*)

Author/data	Parameters and measures of gait evaluation	Parameters and measures of physical activity evaluation	Parameters and measures of physical activity evaluation
Schättin et al. (2016) [35]	Spatial and temporal parameters of the gait (speed, cadence, step length): Physilog by motion sensors	–	Performance functions: test for attentional performance; Measurement of prefrontal activity: portable EEG (Alpha-Active); Fear of falling: the shortfalls efficacy scale international; Cognitive function (MMSE); Depression (GDS)

The study by Pothier et al. [31] has shown that participating in just one active intervention (either physical or cognitive) already helps to improve VEM in healthy older people. VEM tends to decrease from 12 to 16% per decade after age 63.

Thus, answering the research question of this review, physical activity has a great impact on gait and its parameters, and doing regular physical activity, even as little as 5 min per day can positively influence gait speed. Step length tends to decrease with age, since it is related to speed, a reduction in speed will lead to a reduction in step length. So, by improving speed we can increase stride length. Regarding the width of the step, physical exercise also positively influences this parameter. The temporal parameters, which eventually suffer from ageing and sedentary habits, are also positively influenced by physical activity. All these gait parameters will influence the stability and balance of the individual.

5   Conclusion

Loss or alteration of gait with associated pathological conditions is known to be associated with mortality, especially in the elderly, so it is important to talk about gait dysfunctions in physiotherapy. Various therapeutic methods have been used to improve gait, such as resistance training, aerobic endurance, balance, multi-component exercise programs and flexibility [37]. Evidence suggests that exercise interventions can be used to restore or maintain functional independence in older adults and subsequently help prevent institutionalisation and increased healthcare costs [19].

All the different types of interventions presented in this review led to some positive change in gait pattern, so strengthening exercises, aerobic activity, balance training or even slightly different activities such as dance will help to improve gait pattern and its

Table 3. Types of interventions in the studies

Author/date	Experimental group (EG)	Control group (CG)	Intervention time	Results
Jiménez-García et al. (2018) [27]	HIIT group (n = 28): warm-up (10'), squat exercises (4 intervals of 4', intensity, 90–95% of HRmax + active rest intervals + 3' active rest intervals at 50–70% (25'); return to calm (10') MIIT group (continuous intensity training) (n = 27): same with intensities of 70% and 50% HRmax for squat exercises and active rest intervals, respectively	CG (n = 27) maintained an average daily lifestyle without engaging in systematised exercise activities	12 weeks, 2×/week	The HIIT group showed post-intervention improvements – in BMI (p = 0.002 and p < 0.001, respectively) – in gait speed (p < 0.001 for both) – in SF-36 domains: general health (p < 0.001 for both) – changes in health (p < .001 for both) – vitality (p = 0.002 and p = 0.001 respectively) – physical capacity (p = 0.036 and p < 0.001 respectively)

Table 3. (*continued*)

Author/date	Experimental group (EG)	Control group (CG)	Intervention time	Results
Pichierri et al. (2012) [28]	Dance group (GD, n = 15): Warm-up (5 min) + resistance training (25 min) and balance training (10 min) + progressive dance video game programme (10–15 min)	GD (n = 16): Warm-up (5 min) + resistance training (25 min) and balance training (10 min)	2 weeks, 2×/week, 40 min/session Groups of 3/4 people	In the "fastcog" condition: GD showed a significant increase in speed (p = 0.041) and a decrease in the time of the unimodal support phase (p = 0.029) compared to GC The comparison between the GD pre-and post-intervention showed significant improvements in all gait performance parameters. Significant improvements in GD in step time and fast gait performance in dual-task conditions (speed, time in bipedal support phase and step length)
Granacher et al. (2013) [29]	EG: Core strengthening training Warm-up (10 min) + core strengthening exercises (moderate intensity) + return to calm (5 min)	CG: maintain day-to-day normative activities	9 weeks, 2×/week, 60 min/session, 18 sessions	Statistically significant group × test interactions for the parameters stride speed and gait variability, as for performance in the Functional reach test, the effect size between 0.41 and 0.59

Table 3. (*continued*)

Author/date	Experimental group (EG)	Control group (CG)	Intervention time	Results
Kitazawa et al. (2015) [30]	EG: dual-task exercises using a net, which forms 24 squares on the floor. Each user should walk from one side of the net to the other to not step on the net	CG: maintain day-to-day normative activities	8 weeks, 1×/week, 60 min/session	Significant improvement in time on the TUG (0.98 s, 11.5%; p < 0.001) in the EG relative to baseline, whereas in the CG, time worsened significantly (0.4 s, 0.05%; p < 0.02) relative to baseline
Pothier et al. (2018) [31]	G1—aerobic/resistance training + cognitive dual-task training; G2—aerobic/resistance training + computer classes; G3- flexibility training + cognitive dual-task training	CG: flexibility training + computer classes	3 months, 3×/week	Significant clinical improvement in VEM was observed in groups 1–3 (0.008–0.14 m/s; effect size: small to moderate, p < 0.001) but not in CG (p = 0.601)
Wollesen et al. (2014) [32]	EG: 1st-6th week—training of daily activities with high fall risk (e.g. walking, obstacles) with cognitive or motor tasks, 7th-12th week—training of task prioritisation, task alternation and transfers	CG: did not do any training during the 12 weeks	12 weeks, 1×/week, 1h/session	With a simple task: no significant changes in step length from pre to post-intervention or between groups. Decrease of step width from pre to post-intervention in both groups (EG: −2cm; CG: − 1.89cm) With dual task: a significant change in step (p = 0.00) in group × time interaction. No significant differences for step length

(*continued*)

Table 3. (*continued*)

Author/date	Experimental group (EG)	Control group (CG)	Intervention time	Results
Spartano et al. (2019) [33]	Group 50–64 years old: keep up their daily routine; Group > 75 years: maintain their day to day		8 days	38% of adults (50–64) achieved 150 min of MVPA per week. Elderly aged >75 years, only 15% achieved <5 min of MVPA per day. Individuals who achieved at least 5 min/day of MVPA had 0.062 ± 0.013 m/s more walking speed than those who did less than 5 min/day at both ages (p < 0.0001). For the association of PA with gait speed, results were only observed in the >75 years group
Joung e Lee (2019) [34]	DG (dance group): first free dance, then sequential dance and finally the final dance	FG (flexibility group): stretching exercises. 3 sets × 10–30 s	8 weeks, 2×/week, 90 min/session	Significant improvement in DG: – in lower limb strength and flexibility, – in balance and mobility (time in TUG, DGI and speed in 10MWT), Significant improvements in DG and FG: – in upper limb strength and flexibility

(*continued*)

Table 3. (*continued*)

Author/date	Experimental group (EG)	Control group (CG)	Intervention time	Results
Schättin et al. (2016) [35]	GG (game group): specific exercises of the game. Warm-up (5 min) + body of the session (20 min) + cool down (5 min)	EG (balance training group): conventional training, static and dynamic exercises	8–10 weeks, 24 total sessions, 3×/week, 30 min/session	The spatial-temporal parameters of gait improved – in the EG with the dual-task (normal gait speed: p = 0.002, fast gait speed: p = 0.001, cadence at normal speed: p = 0.001, stride length at fast speed: p = 0.005) – in the EG with a single task (normal speed: p = 0.009, fast walking speed; p = 0.049 and cadence at normal speed: p = 0.003)

parameters, especially in speed. Thus, despite the fact that most studies have verified only the gait speed, we can conclude that maintaining an active lifestyle helps in the maintenance of gait and its parameters, especially speed, and that this, when regressing with age, can influence other functions such as balance or quality of life.

Being the elderly population more prone to sedentary life style, gait is going to be one of the functions to develop limitations, and we can verify through this review that different types of intervention that promote physical activity help to improve gait.

Limitations:

This review has some limitations, in the search, selection and evaluation of the studies, for having been carried out by only one person, being usually done by two people, in the search results for not having used the same search terms in the different databases, in the interpretation of the studies and having used few databases.

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Chronic Pain and Functional Mobility - Relationships and Impact on the Quality of Life of the Elderly

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Abstract. Introduction: Individual ageing is defined as a progressive process of change. Chronic pain is more than a sensory event because it involves emotional and behavioural responses. It causes consequences at a psychological, social, and economic level and a physical level with limitations in mobility. Limitations may result in a decrease in functional capacity and social participation, affecting the quality of life of the elderly. Materials and Methods: Observational, cross-sectional, correlational and comparative study, with a sample of 48 elderly people. This sample was divided into two subgroups, the group with chronic pain (n = 31) and without chronic pain (n = 17). The Numerical Pain Scale (NPS) was applied to assess the intensity of chronic pain, the Time up and go (TUG) test to assess functional mobility and a quality of life (QoL) scale WHOQOL-Bref. The data collected was analysed using the SPSS programme. Results: Statistically significant differences were found in QoL's "Physical" domain between individuals with and without chronic pain (p = 0.032). No statistically significant differences were found in the TUG values between the sample subgroups (p = 0.126). A negative correlation was observed between the maximum intensity of chronic pain and the physical domain of QoL (r = −0.505). No statistically significant correlations were found between the maximum pain intensity and the TUG values, nor between the TUG values and the QL domains. Conclusion: It was not possible to verify that chronic pain influences functional mobility in elderly people. However, chronic pain was shown to have a negative impact on the physical domain of QL.

Keywords: Chronic pain · Functional mobility · Quality of life · Elderly

1 Introduction

Portugal is the fourth country in the European Union with the highest percentage of elderly people [1]. In 2015, around 20% of the Portuguese population was aged 65 years or more, and projections predict that in 2060 it will reach 29% [2].

Individual ageing should be understood as a natural, dynamic, progressive and irreversible process that occurs throughout the individual's life [3]. It is influenced by biological, social, economic, cultural, environmental and historical factors, thus being defined

as a progressive process of biopsychosocial change of the individual throughout the life cycle [4]. It is associated with normal physiological changes that affect the human body, its systems and organs, and several changes may occur that affect functionality, mobility and health [5, 6]. It is characterised by the high incidence of chronic and degenerative diseases, often associated with chronic pain [7]. Changes in balance, strength, and cardiovascular status are common and generally associated with reduced social interactions, resulting in limitations in social participation [8, 9].

In Portugal, in age groups above 65 years old, the prevalence is between 55.9 and 62.5% and chronic pain is one of the main reasons for seeking healthcare and has a tremendous financial impact, increasing healthcare costs [10–14]. It is related to limitations in mobility [14, 15], difficulties in performing activities of daily living [15], increased risk of falling and fractures, cognitive deficits [14] and a decrease in quality of life in elderly individuals [10, 14–16]. In addition to the pain itself, these individuals commonly experience fatigue, anxiety, depression, sleep disturbance and social isolation [13, 17–20].

Both ageing [6] and chronic pain are related to changes in mobility [14, 15]. Mobility limitations are impairments in movement that affect between one third and half of the people aged over 65 years [21–24], limiting the ability of individuals to move around in different environments in order to perform functional tasks and activities of daily living at home, at work and in the community [25].

The risk factors most commonly associated with mobility limitation include advanced age, low physical activity levels, obesity, impaired strength or balance, and chronic diseases. Mobility limitations can cause serious physical, psychological and social consequences for the elderly and are often the first observable indicator of declining functionality [26]. These limitations may result in a decrease in quality of life and psychosocial health, with reduced social participation, leading to isolation and loneliness of the elderly individual [23–29].

The WHO defines the quality of life as "an individual's perception of their position in life in the context of the cultural and value system in which they live and concerning their goals, expectations, standards and concerns" (p. 28). It contemplates the influence of physical and psychological health, level of independence, social relationships, personal beliefs and its relation with characteristics of the environment [30].

The following are considered predictors of worse quality of life: being female, comorbidities, overweight, sedentary behaviour, mobility limitations, the existence of previous falls, chronic pain, dependence in daily life activities, taking multiple medications, unfavourable economic conditions, depression, isolation and loneliness [14, 23, 29, 31–36].

Therefore, the objective of this study is to assess the relationship between chronic pain, mobility and its impact on the quality of life of elderly people.

2   Materials and Methods

2.1   Type of Study, Sample and Ethical Aspects

This study is an observational, cross-sectional, correlational and comparative study that took place between July 2020 and June 2021. The sample is non-probability, consisting

of 48 elderly people living in the community or institutionalised in municipalities of the interior of Portugal.

The study obtained a positive opinion from the Ethics Committee of the Polytechnic Institute of Castelo Branco (Opinion Project No. 180 /CE-IPCB/2020).

2.2   Inclusion and Exclusion Criteria

The inclusion criteria were age 65 years or over, ability to walk independently and signing the Free Informed Consent Form.

Exclusion criteria were the pain caused by oncological situations, progressive neurological changes, history of fracture or surgery or prosthesis in the lower limbs in the last six months and MMSE score indicating moderate or severe cognitive impairment.

2.3   Procedures

After the completion of the informed consent by the participants, sociodemographic data were collected, as well as information regarding the presence, duration, location and intensity of pain, assessed through the Numerical Pain Scale (NPS). A cognitive function assessment questionnaire, the Mini-Mental State Examination (MMSE), was also applied to verify the exclusion criteria.

The World Health Organization's Abbreviated Quality of Life Assessment Tool (WHOQOL-Bref) and functional mobility assessed the quality of life using the Timed Up and Go test (TUG).

2.4   Instruments

The measures used to refer to the assessment of cognitive function through the MMSE, pain intensity through the Numerical Pain Scale, quality of life through the WHOQOL-Bref and functional mobility through the TUG test.

The MMSE is a valid test for cognitive function and allows distinguishing between subjects with and without cognitive disorders [37]. Performance on the MMSE is influenced by age and education, and cut-off values have been defined according to literacy [38].

The NPS is considered a valid and reliable scale for measuring pain intensity [39, 40]. Individuals with chronic pain prefer the NPS to other measures of pain intensity, given its easy understanding and execution [41, 42].

In the TUG test, the individual has to stand up from a chair, walk a distance of 3 m, return to the chair, and sit down again [43]. It is used to quantify functional mobility, a reliable and valid test for this purpose [43]. The normative values are divided into three age groups (60–69, 70–79 and 80–99 years) [44] and allow the identification of elderly people with deficits in mobility and its determinants such as strength and balance [44].

The WHOQOL-Bref consists of 26 questions, 2 of which refer to the general perception of health and the remaining 24 are organised into four domains: Physical, Psychological, Social Relationships and Environment [45]. It is an instrument with good temporal stability, appropriate to assess the individual's perception of quality of life, presents

acceptable internal consistency values, and has good discriminative power [45]. The score is comparable to that used in the WHOQOL-100 [46]. Higher scores correspond to a better quality of life [45].

2.5 Statistical Analysis

Statistical data analysis and processing were performed using the Statistical Package for the Social Sciences, version 24.0 for Windows (SPSS Inc.).

The frequency distribution was performed for the analysis and description of the sample. Spearman's non-parametric correlation test was used to correlate the variables.

The Mann-Whitney test was used to verify the statistically significant differences between the group with chronic pain and the group without chronic pain regarding the number of medicines taken, age, BMI, functional mobility test - TUG and the quality of life scale - WHOQOL-Bref. The statistical significance value determined was p ≤ 0.05.

3 Results

3.1 Characterisation of the Sample

The mean age of participants was 81.33 ± 8.46 years (between 65 and 95 years), mostly female (68.8%), widowers (60.4%), with no education (37.5%) and residing in a nursing home (62.5%).

Regarding mobility, 31 participants had mobility problems, 18 used walking aids, and 11 reported having fallen in the last three months (Table 1).

Regarding the presence of pain, 34 (70.8%) reported pain and, of these, 31 had chronic pain. According to these data, participants were divided into two groups (Table 2), one with chronic pain and another without pain. In the group with chronic pain predominate women (80.6%), residents in a nursing home (67.7%) and with mobility problems (77.4%).

When comparing one group with the other, it is possible to verify that the group with chronic pain has a higher percentage of individuals who use walking aids, with a higher number of falls and who reveal practising less physical activity than those without chronic pain. In addition, it shows a higher mean in terms of age and number of medications taken per day, although without statistically significant differences for both age (p = 0.698) and medication (p = 0.805).

3.2 Scores Obtained in the Measurement Instruments

Through Table 3 it is possible to verify that the minimum pain intensity presents an average of 4.10 points in the NPS and the maximum an average of 6.52. The average number of medications taken per day is 7.11 ± 3.73 (between 0 and 16).

When analysing the scores by subgroups of the sample (Table 4), those with chronic pain have lower scores in the "Physical", "Psychological" and "Environmental" domains and this difference is more notable in the "Physical" domain, where this group has a mean score of 54.95 points compared to 67.02 in the group without chronic pain. On the

Table 1. Sample characterization (n = 48)

		Mean ± SD	N (%)
Age (Years)		81.33 ± 8.46	–
Gender	Women	–	33 (68,8%)
Marital status	Single	–	7 (14,6%)
	Married	–	9 (18,8%)
	Widow	–	29 (60,4%)
	Divorced	–	3 (6,3%)
Level of schooling	No schooling	–	18 (37,5%)
	Less than 4 years	–	14 (29,2%)
	4 years (1st cycle)	–	12 (25,0%)
	6 years (2nd cycle)	–	2 (4,2%)
	9 years (3rd cycle)	–	2 (4,2%)
BMI categories	Underweight	–	1 (2,1%)
	Overweight	–	23 (47,9%)
	Obese class I	–	9 (18,8%)
	Obese class II	–	3 (6,3%)
	Healthy	–	12 (25,0%)
Medication		7.00 ± 4.00	–
Smoking	Yes	–	2 (4,2%)
	No	–	42 (87,5%)
	Ex-smoker	–	4 (8,3%)
Mobility problems	Yes	–	31 (64,6%)
Walking aid users	Yes	–	18 (37,5%)
Falls (last 3 monts)	No	–	37 (77,1%)
Falls number		1,27 ± 0,65	18 (100%)
Regular physical activity	Yes	–	25 (52,1%)
Physical activity before Covid-19	More	–	24 (50,0%)
Pain	Yes	–	34 (70,8%)
Chronic Pain	Yes	–	31 (91,2%)

other hand, in the "Social" domain, the group with chronic pain shows a higher score (67.47) than the group without chronic pain (60.78).

Between groups, regarding the WHOQOL-Bref, statistically significant differences were found (p = 0.032) in the "Physical" domain of quality of life (Table 4). It may be inferred that the individuals in the sample who do not have chronic pain present a better

Table 2. Sub-samples characterization

		Chronic pain (n = 31)		No chronic pain (n = 17)	
		Mean ± SD	N (%)	Mean ± SD	N (%)
Age (years)		81.97 ± 7.16	–	80.18 ± 10,59	–
Gender	Men	–	6 (19,4%)	–	9 (52,9%)
	Women	–	25 (80,6%)	–	8 (47,1%)
BMI (Kg/m^2)		27.15 ± 4.49	–	28.40 ± 3.9	–
Medication		7.11 ± 3.73	–	6.81 ± 4,56	–
Smoking	Yes	–	1 (3,2%)	–	1 (5,9%)
	No	–	29 (93,5%)	–	13(76.5%)
	Ex-smoker	–	1 (3,2%)	–	3 (17.6%)
Residence	Nursing home	–	21 (67,7%)	–	9 (52,9%)
	Day center	–	4 (12,9%)	–	4 (23,5%)
	Community	–	6 (19.4%)	–	4 (23,5%)
Mobility problems	Yes	–	24 (77,4%)	–	7 (41,2%)
	No	–	7 (22,6%)	–	10(58,8%)
Walking aid users	Yes	–	15 (48,4%)	–	3 (17,6%)
	No	–	16 (51,6%)	–	14(82,4%)
Falls (last 3 monts)	Yes	–	9 (29%)	–	2 (11,8%)
	No	–	22 (71,0%)	–	15(88,2%)
Regular physical activity	Yes	–	15 (48,4%)	–	10(58,8%)
	No	–	16 (51,6%)	–	7 (41,2%)
Physical activity before Covid-19	Yes	–	15 (48,4%)	–	9 (52,9%)
	No	–	16 (51,6%)	–	8 (47,1%)

Table 3. Chronic pain characterization (n = 31)

		N (%)	Mean ± DP	Minimum	Maximum
Pain location	Upper limb	6 (19,4%)	–	–	–
	Lower limb	11 (35,5%)	–	–	–
	Trunk	14 (45,2%)	–	–	–
Minimum pain intensity		–	4.10 ± 1.97	0	8
Maximum pain intensity		–	6.52 ± 1.96	3	10
Medication		–	7.11 ± 3.73	0	16

Table 4. WHOQOL-Bref results in pain sub-samples

	Chronic pain (n = 31)			No chronic pain (n = 17)			*p*
	Mean ± SD	Minimum	Maximum	Mean ± SD	Minimum	Maximum	
Physical health	54.95 ± 17.90	21.43	85.71	67.02 ± 14.03	46.43	96.43	0,032*
Psychological health	61.29 ± 17.02	20.83	87.50	67.40 ± 18.00	29.17	100.00	0,278
Social relationships	67.47 ± 14.96	25.00	100.00	60.78 ± 11.70	50.00	83.33	0,054
Environmental health	62.80 ± 16.04	25.00	90.63	67.83 ± 13.43	43.75	93.75	0,418
General health	53.23 ± 21.64	0.00	100.00	64.71 ± 17.81	25.00	100.00	0,054

quality of life in this domain. As regards the other domains, no statistically significant differences were found.

As for functional mobility of the sample, Table 5 shows that there was meantime in the TUG of 19.19 ± 13.76. When the times were analysed by age (Table 5), all means were above the normative values for each age group. Regarding the TUG values, it was verified that nursing home residents present a higher meantime.

Table 5. TUG time by age and residence

TUG (seconds)		N	Mean ± SD	Minimum	Maximum
Sample		48	19.19 ± 13.76	7.54	59.89
Age (years)	60–69	6	9.78 ± 1.56	7.80	12.60
	70–79	13	13.98 ± 6.80	7.54	26.50
	80–99	29	23.47 ± 15.72	9.28	59.89
Residence	Nursing home	30	24.33 ± 15.14	8.32	59.89
	Day center	8	11.60 ± 3.89	7.54	20.10
	Community	10	9.84 ± 1.72	7.77	12.60

As to the TUG values for individuals with chronic pain, the average was 21.71 ± 15.56, while this number was much lower for individuals without chronic pain, around 14.59 ± 8.23 (Table 6). In both groups, the averages are higher than the normative values of the TUG in all age groups.

3.3 Correlations of the Variables Under Study

Table 7 shows a negative correlation with statistical significance between the maximum intensity of chronic pain and the physical domain of quality of life (r = −0.505) and a negative correlation between medication and the psychological (r = −0.386) and social (r = −0.376) domains of the quality of life scale - WHOQOL-Bref. There was also a positive correlation with statistical significance between the number of medications taken and the times performed in TUG (r = 0.377) and between age and the times performed in TUG (r = 0.463). No statistically significant correlations were found between maximum pain intensity and the functional mobility measure (TUG), nor any other quality of life domain besides the physical one. The TUG values also showed no relationship with the various quality of life domains.

4 Discussion

The present study aimed at assessing the relationship between chronic pain functional mobility and its impact on the quality of life of elderly individuals.

The analysis of the results showed that most elderly individuals with chronic pain are female [80.6%], as in other studies [16, 47, 48]. Reasons for women having lower

Table 6. *TUG* time by sub-samples

	Chronic PAIN (n = 31)			No chronic pain (n = 17)			p
	Mean ± SD	Minimum	Maximum	Mean ± SD	Minimum	Maximum	
TUG (seconds)	21.71 ± 15.56	7,54	59,89	14.59 ± 8.23	7,80	37,00	0,126

Table 7. *Spearman* correlations

		Pain intens.	Medication (n° drugs)	Age	TUG	WHOQOL-Bref domains				
						Phys. health	Psych. health	Social relat	Environ. health	General health
Pain intensity	Correl. coeff	1,000	−,146	,071	,227	−,505**	−,324	,173	−,081	−,109
	Sig		,459	,705	,220	,004	,075	,351	,663	,558
Medication (n° drugs)	Correl. coeff	−,146	1,000	,051	,377*	−,321	−,386*	−,376*	−,363	−,176
	Sig	,459		,795	,048	,096	,042	,048	,058	,369
Age	Correl. coeff	,071	,051	1,000	,463**	−,148	,029	,203	,177	,243
	Sig	,705	,795		,009	,426	,875	,274	,341	,187
TUG	Correl. coeff	,227	,377*	,463**	1,000	−,320	−,208	−,072	−,294	,047
	Sig	,220	,048	,009		,080	,262	,702	,108	,801
Phys. health	Correl. coeff	−,505**	−,321	−,148	−,320	1,000	,750**	,315	,416*	,440*
	Sig	,004	,096	,426	,080		,000	,085	,020	,013
Psych. health	Correl. coeff	−,324	−,386*	,029	−,208	,750**	1,000	,475**	,661**	,497**
	Sig	,075	,042	,875	,262	,000		,007	,000	,004
Social relat	Correl. coeff	,173	−,376*	,203	−,072	,315	,475**	1,000	,412*	,304
	Sig	,351	,048	,274	,702	,085	,007		,021	,096
Environ. health	Correl. coeff	−,081	−,363	,177	−,294	,416*	,661**	,412*	1,000	,418*
	Sig	,663	,058	,341	,108	,020	,000	,021		,019
General health	Correl. coeff	−,109	−,176	,243	,047	,440*	,497**	,304	,418*	1,000
	Sig	,558	,369	,187	,801	,013	,004	,096	,019	

pain thresholds and tolerance and a tendency to feel greater intensity and discomfort with pain are explanations for this result [47, 49]. Also, maladaptive coping strategies may lead to chronic pain [47]. Chronic pain syndromes such as migraine, headache, low back pain, neck and knee pain are also more prevalent in women [50, 51].

It was also possible to verify that most individuals with chronic pain (67.7%) reside in nursing homes, being an expected result since more than 80% of the elderly residing in nursing homes report chronic pain [48].

Regarding age and the number of medications taken per day, although a higher mean was found in the group with chronic pain than those without chronic pain, these differences are not statistically significant. However, other studies report that taking medication is associated with pain [36] and that advancing age increases the likelihood of the onset of chronic pain [52].

One of the aims of this study was to understand the relationship between chronic pain and functional mobility. According to the literature, chronic pain is associated with changes in mobility [14, 15, 53]. According to the TUG, Stubbs et al. found that individuals with chronic musculoskeletal pain had more mobility limitations [14]. One explanation is that it is suggested that nervous system mechanisms associated with age-related mobility impairments may be accelerated by the presence of pain [54]. It is also proposed that chronic pain promotes changes in cognition and, consequently, limitations in mobility, namely through its interference with selective attention, and may act as a form of distraction during gait [55]. Factors such as musculoskeletal pathologies and pain-related depression may also contribute to limitations in mobility [15, 55]. Another possible cause is the belief that elderly people with pain stop performing certain activities for fear of its onset and exacerbation, thus becoming less physically active, which promotes their physical deconditioning and results in a cycle of pain permanence and disability [56, 57].

Thus, it would be expected that individuals with chronic pain would present greater mobility deficits compared to those without chronic pain; however, this was not verified. No statistically significant differences were observed to prove this premise in this study.

Furthermore, it was expected that individuals who reached higher pain intensities would perform higher TUG times, presenting greater mobility limitations. However, these effects were not observed. This may be explained because pain intensity alone does not encompass the heterogeneity and complexity of the pain problem in the elderly [58]. In this regard, one study concluded that pain distribution rather than intensity was shown to be more strongly associated with mobility limitations and disability [15].

One of the unexpected findings found in this study was that, although the mean of the TUG when checked without being by age subgroups was higher in the group with chronic pain, when analysing these values by age groups, in the 70–79 years old range the mean of the TUG was shown to be higher in individuals without chronic pain. This result is probably a consequence of the small sample size, mainly concerning the individuals without chronic pain and a higher value of the standard deviation of the TUG times, which possibly indicates that there are one or more subjects with very high values that may have contributed to this result.

Regarding the influence of chronic pain on the quality of life of the elderly, the hypothesis raised was that chronic pain negatively influences the quality of life, as referenced in several studies [14, 18, 59].

In the present study, this was verified: individuals with chronic pain presented lower scores in the "Physical", "Psychological", and "Environmental" domains of the WHOQOL-Bref. However, when comparing the groups, only in the physical domain were there statistically significant differences, which agrees with another study [60].

Regarding the relationship between the maximum intensity of chronic pain experienced by these individuals and QoL, a negative correlation with statistical significance was only found in the physical domain of the WHOQOL-Bref, showing that individuals who experience higher pain intensity have a lower quality of life in the physical domain. This was also observed in the study by Tse et al., where the physical component of quality of life correlated negatively with pain intensity [60].

In the study of Cunha et al., a weak correlation was found between pain intensity, assessed through the VAS and the physical and psychological domains and no correlation was found in the social and environmental domains. Possible justifications for these results are that the instrument used, the VAS is unidimensional and assesses only pain intensity [36]. Although pain intensity has some effect on the quality of life, it does not solely explain the relationship between chronic pain and quality of life and leads individuals with chronic pain to have a lower QoL compared to individuals without pain, since many other factors are involved, such as social support, coping strategies, pain catastrophising and depression [59, 61].

Concerning the relationship between functional mobility and quality of life, no statistically significant correlations were found between the TUG values and the various domains of the WHOQOL-Bref in individuals with chronic pain. However, it is proposed that changes in functional mobility may interfere with the quality of life, both in its physical and mental domains [14, 31, 33], leading to a decrease in social participation, promoting isolation and loneliness of the elderly individual [23]. It is also suggested that mainly those who experience pain in the lower limbs, namely knees and hips, have more limitations in mobility, which in turn increases the risk of falls and disability to perform activities of daily living, leading to a reduction in quality of life [60]. Despite this, in this study, there were no statistically significant differences in the distribution of the TUG values between the group of subjects with chronic pain in the lower limbs and individuals with chronic pain in other locations.

4.1   Limitations of the Study

The limitations of this study are that the sample was of convenience and small, conditioned by the fact that it was carried out in a pandemic period.

In addition, some individuals revealed some difficulties in understanding some questions of the WHOQOL-Bref, which may be due to the low levels of education in the sample.

The Numerical Pain Scale was used to assess pain, but this scale only assesses its intensity. It would have been interesting to assess other dimensions of pain.

5   Conclusion

In this study, it was not possible to verify that chronic pain influences functional mobility in elderly individuals.

Chronic pain negatively impacted the quality of life, mainly in the physical domain. In addition, the maximum intensity of pain correlated negatively with this same domain of QoL.

Functional mobility in the elderly with chronic pain was not associated with the quality of life in its domains.

It will be essential to understand the relationship between these same variables in a larger sample and with fewer differences between them in future studies. In addition, it is crucial to understand the impact of chronic pain on the mobility and quality of life of the elderly, taking into account other aspects of pain besides its intensity, namely its emotional, affective and behavioural dimensions, its impact on ADLs and the factors which aggravate/relieve it.

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
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Perceived Coronavirus Threat: Translation and Cultural Adaptation of the Perceived Coronavirus Threat Questionnaire to Brazil

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Abstract. The COVID-19 pandemic has had major impacts on the mental health of the general population. Negative consequences related to fear, anxiety, stress and insecurity are associated with a higher risk of developing psychiatric disorders. The present study aims to describe the process of translation and cultural adaptation of the Perceived Coronavirus Threat Questionnaire (PCTQ) to the Brazilian context. This investigation is characterized as transversal and with a quantitative approach. For the process of translating and culturally adapting the Perceived Coronavirus Threat Questionnaire (PCTQ) to the Brazilian context, the steps recommended by Beaton were followed. The Coronavirus Perceived Threat Questionnaire was adapted by a committee of experts and that has shown good applicability. We will continue with the other steps of the validation process so that we can make it available for use in Brazil in the future. It is also concluded that the participation of experts was effective for the validation of the instrument and proof of the representation of the proposed model. In addition, the instrument presents itself as an important tool in aging, since the assessment of the perceived threat of covid enables interventions that reduce stress, insecurity and fear, preventing the decline of mental health and the development of anxiety and depression.

Keywords: Mental health · COVID-19 · Social isolation

1 Introduction

In Late December 2019, a set of pneumonia cases of unknown cause were reported in Wuhan, China. Later, viral RNA analysis identified great similarity with SARS-COV, being named as Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-COV-2) [1]. In January, the World Organization (WHO) established a public health emergency of international importance [2].

As of February 11, 2020, the WHO has named the 2019-nCov infection as COVID-19 (Coronavirus Disease-2019) [3]. In March of the same year, the universal impact caused by the disease led the WHO to characterize COVID-19 as a pandemic [4], at the same time the transmission of the new coronavirus (SARS-CoV-2) came to be considered community in Brazil [2].

The COVID-19 pandemic is the biggest public health emergency facing the international community in decades [5]. To prevent the spread of the virus, preventive measures were adopted, such as quarantine and social distancing in several regions of the world, in order to control the spread and lethality of cases, causing, however, indiscernible impacts on the mental health of the general population [6]. Despite preventing the spread and contagion of the virus, social confinement has brought negative consequences around the psychological state of society, mainly related to fear, anxiety, stress, depression, sleep disorders or anger [7–9].

This scenario stems from causes that go beyond the reduction of contact with other people, but also due to economic issues, fear of contagion, being in public places, leaving home and even the impediment to saying goodbye to those who die [10, 11]. As if that were not enough, the COVID-19 pandemic is a threat that also includes the uncertainty that permeates the social and health situation, giving rise to a condition that is perceived as potentially dangerous, unpredictable and uncontrollable [11].

Public health authorities, media and the focus of research during epidemics have shown little attention to the demands of mental health, generally devoting their efforts to understanding the physical and biological effects of illness. However, successful coping with COVID-19 emerges as a vital indicator of the population's mental health [13]. In this way, it is essential to adopt measures that aim to reduce the psychological impacts that the pandemic and it is preventive measures have unleashed on the population [5].

In this context, it is necessary to adapt and make available a measurement instrument that assesses the perceived threat of the coronavirus for Brazil. Conway et al. [14] developed a battery of COVID-related questionnaires of great scientific and clinical relevance, including the Perceived Coronavirus Threat Questionnaire (PCTQ)**,** which assesses and individual's perception of the threat of COVID. The intensification of feelings such as fear, stress and insecurity is associated with an increased risk of developing psychiatric disorders [5]. Thus, the present study aims to describe the process of translation and cultural adaptation of the Perceived Coronavirus Threat Questionnaire (PCTQ) to the Brazilian context.

2   Methods

2.1   Procedures

Translation and Adaptation

This investigation is characterized as transversal and with a quantitative approach. For the process of translating and culturally adapting the Perceived Coronavirus Threat Questionnaire (PCTQ) to Brazil context, the steps recommended by Beaton et al. [15]. This process involves adapting items, questionnaire instructions and response options, then a suggested evaluation process is presented whereby an advisory committee or

developers review the process and determine whether this is an acceptable translation [15].

For this study, the following steps were proposed for cultural adaptation: translation, back-translation, review by a committee of judges and pre-test [16]. In this way, the cross-cultural adaptation process seeks to promote equivalence between the source questionnaire and the target questionnaire based on content and aims to maintain the integrity of the measurement instrument from the original language to the target language of the adaptation [15]. It is also recommended that translation be done by independent and qualified translators [16].

The process began with the cultural adaptation and assessment of the psychometric properties of the original instrument in English, following the following steps:

(a) *Initial Translation:* performed by two qualified translator, with proficiency in English and command of Brazilian Portuguese, so that at the end two translations could be originated, respectively. After the translation stage was completed, the researchers and translator met and defined the consensus version of the PCTQ.

(b) *Back-Translation:* a third translation, which was unaware of the purpose of the study, was asked to translate the instrument into it is consensual version into English (language of origin). This fact allowed the researchers to check for incompatibilities with the original version. At this stage, the back-translated instruments were sent to the authors, in order to verify that, after the entire process, the scale remained faithful to the original.

(c) *Review by a Committee of Judges:* to review all translated versions and check for irregularities between the original version and the adapted version, the instrument went through a committee of expert judges, so that, in this way, a cultural equivalence of the instrument was achieved, where four types of equivalence must be considered in the instrument.

For this study, the committee of judges was composed of six experts, all with training in the area of Mental Health, experience in clinical practice and research and who have expertise in assessment instruments and in the themes addressed in the study. The judges were chosen by e-mail, an explanatory letter for access to the digital instrument and a useful platform on acceptance, and then the link to access the digital Google Forms was sent. On the platform, the judges were invited to sign the Free and Informed Consent Form, starting the validation stage with the experts. After the expert's assessment, the Content Validity Index (CVI) was calculated for all items in the Coronavirus Perceived Threat Questionnaire.

However, the evaluation committee analyzed all the items of the instrument using the Likert-type response scale, with four response options, as follows: one = not equivalent; two: little equivalent; three: equivalent; four: very equivalent. For the analysis of the CVI, the criterion proposed by Lynn in 1986 was used, where it is recommended that for six or more judges the expected value is less than 0.78. Therefore, the index score was calculated by adding the items that had the scores "three" and "four" assigned by the judges, thus dividing it by the total number of responses [17]. After this process, the pre-final version of the instrument was obtained, enabling the pre-test stage. For a better understanding of all stages of this study, Fig. 1 below summarizes the entire

methodological process of translating and culturally adapting the Perceived Coronavirus Threat Questionnaire (PCTQ) to the Brazilian context.
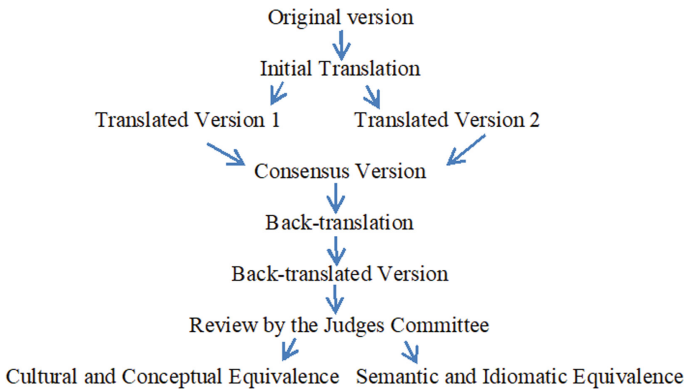

Fig. 1: Process of translation and cultural adaptation of the perceived coronavirus threat questionnaire to the Brazilian context. Source: research authors, 2022.

Given the ethical and scientific rigor, the research project was submitted to the Ethics Committee in Research on Human Beings of the Federal University of São Carlos and was approved under CAE number 4.595.946, respecting all ethical principles and the recommendations. There is also authorization from the authors to validate the PCTQ for the Brazilian context.

3   Results and Discussion

As is known, methodological studies are developed in stages, the first being the process of translating the instrument into the language to be adapted, in this context the PCTQ was translated from English into Brazilian Portuguese by two independent, qualified translators with domain of the Portuguese language, thus giving rise to two translation versions (Table 1).

In the present study, a cross-cultural translation and adaptation was carried out for the Brazilian context of an instrument to assess the individual's perception of the threat of COVID. To carry out this study, it was necessary to follow all the principles of good practices for a translation and a cross-cultural adaptation of instruments, where an applied methodology was based on a complex and detailed study that doesn't involve just a simple translation.

In order obtain semantic, experimental and conceptual equivalence between the original version and the new translated version, thus ensuring that the instrument was fully adapted to the local culture, we sought to ensure that the psychometric properties of the instrument are maintained, aiming at greater validation of the instrument. The cross-cultural adaptation of an instrument is a faster, cheaper and more efficient process than developing a new instrument, in addition, the date obtained ca be compared with international data [18].

Table 1. Translation of the perceived coronavirus threat questionnaire.

Original	Tradução 1	Tradução 2
Perceived Coronavirus Threat Questionnaire	**Questionário de Ameaça Percebida do Coronavírus**	**Questionário sobre Ameaça Percebida do Coronavírus**
1. Thinking about the coronavirus (COVID-19) makes me feel threatened	1. Pensar no coronavírus (COVID-19) me faz sentir ameaçado(a)	1. Pensar sobre o coronavírus (COVID-19) me faz sentir ameaçado(a)
2. I am afraid of the coronavirus (COVID-19)	2. Tenho medo do coronavírus (COVID-19)	2. Tenho medo do coronavírus (COVID-19)
3. I am not worried about the coronavirus (COVID-19)	3. Não estou preocupado (a) com o coronavírus (COVID-19)	3. Não estou preocupado(a) com o coronavírus (COVID-19)
4. I am worried that I or people I love will get sick from the coronavirus (COVID-19)	4. Estou preocupado(a) que eu ou as pessoas que amo fiquem doentes com o coronavírus (COVID-19)	4. Estou preocupado(a) que eu ou as pessoas que amo fiquem doentes com o coronavírus (COVID-19)
5. I am stressed around other people because I worry I'll catch the coronavirus (COVID-19)	5. Estou estressado(a) ao redor de outras pessoas porque me preocupo em pegar o coronavírus (COVID-19)	5. Fico estressado(a) com outras pessoas porque me preocupo em pegar o coronavírus (COVID-19)
6. I have tried hard to avoid other people because I don't want to get sick	6. Tenho tentado muito evitar outras pessoas porque não quero ficar doente	6. Tenho me esforçado muito evitar outras pessoas porque não quero ficar doente

Source: research authors, 2022.

Literature tells us that the first stage of the translation process involves the translation of the scale from it is original language to any other language, for which independent, qualified translators are needed, preferably having the language of the instrument as their mother tongue and knowing the objectives [16].

The process of adapting an instrument to another language is a complex and rigorous process, given that a simple translation cannot be carried out due to cultural and language differences. Consideration should be given to language, cultural context and lifestyle. Thus, in order to adapt an instrument from one language to another, technical, linguistic and semantic aspects must be taken into account [19].

There is also the need for there to be no communication between translators during the entire process; there must be a coordinator fluent in the foreign language during the development of the independent translation and at least one translator must be familiar with the subject matter of the instrument to facilitate the translation of area-specific terms [20].

With the two translations carried out, the synthesis of the translations was developed, this step was carried out by the researchers who joined the two translation versions and unified in a version called the consensual version. The PCTQ consensus version was back-translated by another independent translator as recommended in the literature.

The reverse translation of the consensual version of the instrument into it is original language lust be performed by an independent, qualified outsourced translator whose mother tongue is the language of the instrument and who is unaware of the objectives [15, 16].

Following the steps proposed with the back-translation of the instrument, it was sent to the authors of the original instrument, in order to verify if it remained faithful to the original version, even after the entire process. Subsequently, the review was carried out by the Committee of Experts, composed of six judges, all with training in the health area (psychology, nursing or medicine). In addition, the judges had clinical and research experience in the subject. The translation process during adaptation, experts must be adjusted and adjusted at this stage, the equipment must ensure that the version is fully culturally adjusted to evaluate its final version [18].

The literature shows that the function of the committee of judges is to compare the original and final versions of the instrument to achieve cross-cultural equivalence [15, 16]. For the validation process, the use of quantitative analyzes becomes important to give greater consistency, validity and reliability to the instrument to be validated. It is very common the process of external validation of an instrument, such as content analysis and semantic analysis, which is usually performed by judges. However, it is also necessary to verify the internal validity of the questionnaire, that is, if the instrument measures what it proposes to measure, since the lack of this process can compromise the results found by the researchers [21].

With the execution of the judges' assessment, it was possible to calculate the Content Validity Index (CVI), which is calculated from the analysis of the versions of the instrument (original; translation one, translation two and consensual version). Calculation based on Likert responses, where items that scored one or two should be revised or even excluded, while items that scored three or four were calculated based on the sum of responses, divided by the total number, and the recommended agreement value must be greater than or equal to 0.78 [17] and thus it was analyzed how equivalent the instrument was even after the entire process, it is also worth mentioning that with the completion of the CVI, the pre-final version was given.

To calculate the CVI of each item of the instrument, simply add the answers three and four of the participants of the expert committee and divide the result of this sum by the total number of answers, according to the following formula: CVI = Number of answers three or four/ Number total responses. The acceptable index of agreement among the members of the expert committee must be at least 0.80 and, preferably, greater than 0.90 [22]. The CVI is an essential index in the development of measures, as it assesses the degree of relevance and representativeness of each item of an instrument (Table 2).

At this stage, content validity was based on the Percentage of Agreement between the judges and the IVC. The validation stage is important because, after developing the concept and formulating it is dimensions, the researcher submits it to a group of judges who are considered experts in the field, as content validation is based on judgment [23].

Currently, the pre-final version of the instrument is ready to be pre-tested with the Brazilian population and later the psychometric properties of the Brazilian version of the PCTQ will be tested. The original version of the instrument showed excellent psychometric properties [14] and we hope that the Brazilian version will be similar. The pre-test

Table 2. Instrument content validity index perceived coronavirus threat questionnaire (PCTQ).

Pre-final adapted version with suggestions from the judges	CVI
Questionário de Ameaça Percebida do Coronavírus	1,00
1. Pensar sobre o coronavírus (COVID-19) me faz sentir ameaçado (a). Opções de resposta *	1,00
2. Tenho medo do coronavírus (COVID-19). Opções de resposta *	1,00
3. Não estou preocupado (a) com o coronavírus (COVID-19). Opções de resposta *	1,00
4. Fico preocupado(a) que eu ou outras pessoas que amo adoeçamos pelo coronavírus (COVID-19).Opções de resposta *	1,00
5. Estou estressado (a) ao redor de outras pessoas porque me preocupo em pegar o coronavírus (COVID-19). Opções de resposta *	0,83
6. Tenho tentado muito evitar outras pessoas porque não quero ficar doente. Opções de resposta *	1,00

[*] 1. Definitivamente não é verdade para mim; 2. Na maioria das vezes não é verdade para mim; 3. De certo modo não é verdade para mim; 4. Indeciso; 5. De certo modo é verdade para mim; 6. Na maioria das vezes é verdade para mim; 7. Sempre é verdade para mim. Source: research authors, 2022.

phase will be carried out with individuals aged 18 years or over, who had a minimum level of reading instruction, signed the Free and Informed Consent Term (ICF) and had access to the internet. To analyze the psychometric properties of the instruments, the sample size calculation will be carried out with the help of a statistician.

4   Conclusion

This study describes methodological aspects of the process of translation and cultural adaptation of the PCTQ to the Brazilian context, an important step in the development and adaptation of questionnaires and scales. The understanding of such procedures becomes essential for researchers and health professionals concerned with using increasingly reliable and adequate measures and instruments for certain health conditions in different territories around the world, taking into account the adaptation to the local culture that the instrument will be applied.

The Coronavirus Perceived Threat Questionnaire was adapted by an expert committee and has shown good applicability. We will continue with the remaining steps of the validation process so that we can make it available for use in Brazil in the future. It is also concluded that the participation of experts was effective for the validation of the instrument and proof of the representation of the proposed model. In addition, the instrument presents itself as an important tool for betrayal in aging, since the assessment of the perceived threat of covid enables early interventions that reduce stress, insecurity and fear, preventing the decline of mental health and development. of anxiety and depression, risk factors for health problems in the elderly.

It is suggested to carry out investigations using this instrument in different care environments and to share information with the scientific community, in order to contribute

to the construction of global knowledge about the effects of social isolation imposed by the COVID-19 pandemic on societies around the world.

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Prevalence of Risk for OSAS in Individuals with Metabolic Syndrome, in the Population of the Municipality of Santa Cruz

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Abstract. **Introduction**: Obstructive sleep apnea (OSA) is a respiratory disorder characterised by episodes of apnea or hypopnea of the upper airway, recurrent during sleep. Recent evidence has indicated the existence of a relationship between metabolic disorders and exacerbation of risk of OSA. The objective is to assess the prevalence of risk of OSA in individuals with metabolic syndrome (MS). **Materials and methods**: Cross-sectional observational analytical study, with a sample of 300 individuals from the island of Santiago in the municipality of Santa Cruz. After obtaining informed consent, a questionnaire was applied to collect sociodemographic and clinical profile data, which allowed the diagnosis of MS and the Berlin questionnaire for OSA screening. Statistical analysis was performed using IBM SPSS Statistics® version 20, with a significance level of 0.05. **Results**: it was found that 17% had MS and 29.2% were at high risk of OSA. The mean age was 42.62 years and 63.7% of the individuals were female. The relationship between OSA and MS proved to be significant (p = 0.007). On the other hand, there were no statistically significant relationships between OSA and gender (p = 0.115) and no significant differences in the mean ages (p = 0.233). **Conclusion**: It was found that there is a statistically significant prevalence for the risk of OSA in individuals with Metabolic Syndrome.

Keywords: Obstructive sleep apnea · Metabolic syndrome · Cardiometabolic risk factors · Diabetes Mellitus · Black race

1 Introduction

Obstructive sleep apnea (OSA) is a respiratory disorder characterised by recurrent episodes of partial or complete collapse (hypopnea/apnea) of the upper airway during sleep, resulting in cessation of airflow [1–3].

The prevalence of OSA worldwide is estimated at 10% in individuals aged 30–70 years, by the *Wisconsin Sleep Cohort Study*. It was also estimated to occur 50% in

men and 30% in women in a Swiss community study and 26% in men in a study with Australian men [4]. In Portugal, the prevalence in individuals diagnosed over 25 years of age is 0.89, and 48.4% of these had severe OSA.

The risk factors (RF) that predispose to the development of OSA are male gender, middle-aged individuals (50–60 years), obesity, increased cervical volume, smoking and alcohol habits, sedative/hypnotic drugs and craniofacial changes [1].

The main complications can be divided into cardiovascular, where cardiac arrhythmias, arterial hypertension, ischemic heart disease, pulmonary hypertension and stroke can occur. There are also neuropsychological complications such as depression and emotional disturbances, family and social problems, and occupational and road accidents [3–5].

Cardiovascular diseases are the first cause of mortality in Cape Verde and respiratory diseases the fourth, according to data published by the Ministry of Health for the year 2012. The prevalence of hypertension in Cape Verde has a rate of 44.1% and, in addition to this particularly important risk factor, there is a high prevalence of diabetes mellitus (13%), hypercholesterolemia (23%) and obesity (10%) [6]. According to the results of the 2007 study on the *assessment of RF for non-communicable diseases in Cape Verde*, in the adult population aged 25–64 years, the prevalence of overweight, obesity, hypercholesterolemia and the prevalence of three or more RFs were higher in female individuals. On the other hand, the prevalence of hypertension, hyperglycemia and consumption of tobacco and alcohol were more pronounced in males [7].

Cardiovascular diseases are one of the main consequences of OSA, and several studies have shown this increased risk of cardiovascular diseases and for other comorbidities such as type 2 diabetes mellitus and obesity, which are components of the metabolic syndrome (MS) [8–12]. MS results from the association between central obesity, increased triglycerides, reduced HDL cholesterol, arterial hypertension and increased glucose [13]. According to the criteria of the *International Diabetes Federation* (IDF), the diagnosis of MS is made in the presence of central obesity in association with two of the remaining four components. Worldwide, the prevalence of MS estimated by the IDF is 20–25% and in a more recent study carried out by a sample of 8573 individuals from Indonesia, it showed a prevalence of 21.66% [13, 14]. In Portugal, the prevalence of MS estimated by the *PORMETS* study is 36.5% and 49.6% and 43.1%, according to the *Adult Treatment Panel III* (ATP III), *IDF and Joint Interim Statement* criteria, respectively [15].

Several authors have been studying the association between OSA and MS due to their common characteristics, mainly obesity. It was called "Z syndrome" for the combination of MS and OSA to reflect the association between its components [16].

Considering the high prevalence of RF in the Cape Verdean population, questions arise regarding the prevalence of MS and its relationship with other factors, such as the presence of undiagnosed sleep disorders. It is also important in this population to assess the sensitivity of the community to the importance and confluence that the presence of sleep disorders can have on pharmacological treatment, disease evolution and social relationships. It is necessary to inform and alert, but this will only be possible if we know the real dimension of this problem in a population where there is a lack of studies on these pathologies.

2 Materials and Methods

The present study is of the analytical observational cross-sectional type, carried out in the population of the island of Santiago, municipality of Santa Cruz (Cape Verde), the non-random sample consisting of a total of 300 individuals who attend the municipal health center. Two questionnaires were applied, a general characterisation questionnaire to collect anthropometric and demographic data and a sleep questionnaire—Berlin questionnaire. First, the individuals who went to the appointment or accompanied others to the health center were contacted to participate in the study and those who accepted signed an informed consent and had an explanation regarding the study and the use of their data beforehand.

For the measurement of weight and height, the participant was asked to remove shoes and any other object that could interfere with the measurement, and only integer values for weight and values up to two decimal places for height were considered. Blood pressure was measured with the participant sitting, leaning back and with the arms resting on the legs and asked to be as relaxed as possible. A second measurement was repeated after 2–3 min. To measure the abdominal, waist and cervical circumferences, a tape measure (in cm) was used, and the measurements were performed in an orthostatic position without any clothing in the area to be evaluated. Age, gender, glucose, HDL cholesterol, triglycerides, alcohol and tobacco consumption, sedative medication and craniofacial changes were collected by interview with the participant, with the answers "Yes", "No" or "I don't know". The analysis of parameters for the characterisation of MS, blood pressure, waist circumference, glucose, HDL cholesterol and triglycerides was performed according to the IDF criteria.

2.1 Berlin Questionnaire

The Berlin questionnaire applied was the translated and validated version for the Portuguese population, individually and numerically coded [17]. It is considered high risk of OSA in the presence of two or more categories with a positive score and low risk in the presence of none or only one category with positive score.

2.2 Sample Characterisation

For the selection of the sample, the following inclusion criteria were defined and applied: individuals living in the municipality of Santa Cruz, individuals with MS and adults over 18 years of age. Exclusion of individuals residing in the municipality for less than 1-year, current residence outside the island or the country and pregnant women. The present sample is non-probabilistic, for convenience composed of 109 male individuals (36.3%) and 191 female individuals (63.7%), aged between 18 and 89 years, with the mean age being of 42.62 ± 16.992 years old.

2.3 Statistical Analysis

Data were coded and inserted into IBM SPSS Statistics® version 20 (Statistical Package for the Social Sciences) for processing and analysis. A $p < 0.05$ was established as

a statistical significance level. Non-parametric statistical tests of independent samples were performed in the analysis of the relationship between the "Presence of MS and Risk for OSA" and the "Risk for OSA and Gender", in which case the Chi-square test was used. To analyse the relationship between "Risk for OSAS and Age", the T-student parametric test of independent samples was used, and Levene's Test for Equality of Variances was used to analyse the significance level.

2.4 Ethics

The project was sent to the Health Delegate of the municipality of Santa Cruz and to the Health Director of Cape Verde. After receiving authorisation from these entities, the study was submitted to the National Ethics Committee for Health Research (CNEPS) of Cape Verde.

Before data collection, all participants signed an informed consent, having previously been explained about the study. This study guarantees the confidentiality and anonymity of all information collected from the participants, their data being used only for scientific purposes and with limited access to the research team. The research team declares that there are no conflicts of interest.

3 Results

The baseline characteristics and anthropometric and demographic measurements of the population studied are shown in Table 1. The sample consisted of 300 individuals, the youngest being 18 years old and the oldest 89 years old, with an average weight of 71.45 kg and an average BMI of 26.26 kg/cm^2 and an average height of 165.05 cm.

Table 1. General characteristics of the sample under study.

	n	Minimum	Maximum	Mean	Standard deviation
Age (years)	299	18	89	42.62	16.992
Weight (kg)	300	37	153	71.45	14.954
Height (cm)	300	139	194	165.05	9.719
BMI (kg/cm^2)	300	15.06	46.19	26.26	5.218
Abdominal perimeter (cm)	300	62	126	88.83	12.506
Waist circumference (cm)	300	57	119	83.68	11.171
Cervical perimeter (cm)	300	29	49	35.10	3.108
Systolic blood pressure (mmHg)	295	80	190	127.13	19.711
Diastolic blood pressure (mmHg)	299	50	120	79.87	12,870

Caption: BMI—Body mass index

MS was diagnosed in 17.0% of the sample. Table 2 shows the prevalence of MS and its RF, where high waist circumference and hypertension are among the most prevalent, with 48.0% and 49.0% respectively, in a total sample of 300 individuals.

Table 2. Presence of MS and related factors.

		n	%
Presence of MS	No	249	83.0
	Yes	51	17.0
Arterial hypertension	No	153	51.0
	Yes	147	49.0
High glucose	No	113	75.8
	Yes	36	24.2
Low HDL cholesterol	No	47	44.8
	Yes	58	55.2
High triglycerides	No	65	62.5
	Yes	39	37.5
High waist perimeter	No	156	52.0
	Yes	144	48.0

Caption: HDL—high density lipoprotein; SM—Metabolic Syndrome

According to the Berlin questionnaire, 29.3% of the sample are at high risk of OSA, with 36.3% of males and 63.7% of females, in relation to other risk-related factors of OSA; their prevalence is highlighted in Table 3.

To relate the risk of OSA in individuals with the presence of MS, the chi-square test of independence was used. According to the statistical analysis, it was observed that the risk of OSA is related to the presence of MS, with a $p = 0.007$ (Table 4).

It was found that 45.1% of individuals with the presence of MS have a high risk of OSA and, on the other hand, 26.1% of individuals without the presence of MS have a high risk of OSA. The high risk of OSA was shown to be higher in individuals with the presence of MS. The relationship between the presence of MS and the risk of OSA is illustrated in Graph 1.

Analysing separately the number of MS factors and their relationship with the risk of OSA, we observed a greater number of individuals at high risk of OSA with 2 and 5 MS factors associated. Among the individuals who have MS ($\geq$3 factors) there was a greater number of individuals with 3 and 5 MS factors associated with a high risk of OSA. These relationships are found in Graph 2.

The risk of OSA is not related to gender, ($p = 0.115$), Table 5. It was observed the existence of a high risk of OSA in the male gender of 29.5% and in the female gender of 70.5% (Table 5). Females are at higher risk for OSA, although they are not statistically significant.

Table 3. Risk of OSA and related factors

		n	%
Risk of OSA	Low risk	212	70.7
	High risk	88	29.3
Snores	No	134	50.8
	Yes	130	49.2
Someone noticed that he stopped breathing during sleep	Almost every day	1	0.3
	3–4 times a week	16	5.3
	1–2 times a week	15	5.0
	1–2 times a month	19	6.3
	Never or almost never	249	83.0
How often you feel tired or fatigued after a night's sleep	Almost every day	25	8.3
	3–4 times a week	22	7.3
	1–2 times a week	16	5.3
	1–2 times a month	14	4.7
	Never or almost never	223	74.3
During the day you feel tired or unable to face it	Almost every day	14	4.7
	3–4 times a week	7	2.3
	1–2 times a week	10	3.3
	1–2 times a month	9	3.0
	Never or almost never	259	86.6
Have you ever dozed off or fell asleep while driving	No	286	95.7
	Yes	13	4.3
Gender	Male	109	36.3
	Female	191	63.7
Smoking	No	270	90.3
	Yes	29	9.7
Alcoholism	No	271	90.3
	Yes	29	9.7

(*continued*)

Regarding age, it was found that there are differences in the means for the risk of OSA, with a p = 0.003. Individuals at low risk of OSA have a mean age of 40.72 years, while individuals at high risk of OSA have a mean age greater than 47.18 years (Table 6). Regarding waist and abdominal perimeters, it was observed that there are statistically significant differences in the means with the risk of OSA, with p = 0.000 and p = 0.000 respectively (Table 6). Individuals at low risk of OSA have average waist and abdominal

Table 3. (*continued*)

		n	%
Sedative medication	No	271	90.3
	Yes	29	9.7
Medication for OSA	No	299	99.7
	Yes	1	0.3
Craniofacial changes	No	298	99.7
	Yes	1	0.3

Caption: OSA—Obstructive Sleep Apnea

Table 4. Relationship between the presence of MS and the risk of OSA.

Presence of MS and the risk of OSA					*p* value
			Risk of OSA		0.007
			Low risk	High	
Presence of MS	No	n	184	65	
		% within presence of MS	73.9%	26.1%	
		% within risk of OSA	86.8%	73.9%	
		% of total	61.3%	21.7%	
	Yes	n	28	23	
		% within presence of MS	54.9%	45.1%	
		% within risk of OSA	13.2%	26.1%	
		% of total	9.3%	7.7%	

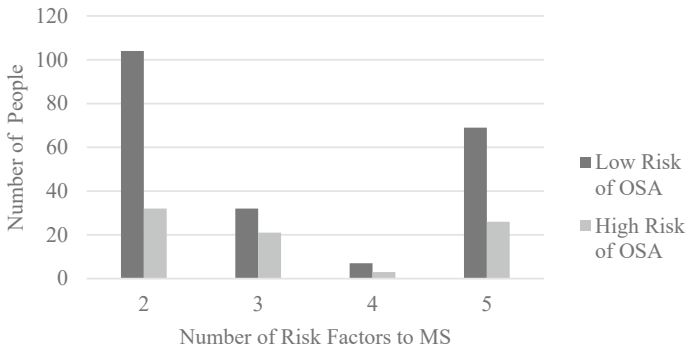**Caption**: OSA—Obstructive Sleep Apnea; MS—Metabolic Syndrome

circumferences of, respectively, 82.04 cm and 86.86 cm, while individuals at high risk of OSA have an average of these indices of 87.64 cm and 93. 57 cm respectively.

On the other hand, the cervical circumference showed no statistically significant difference in the means for the risk of OSA, with a p = 0.809 (Table 7). In individuals with a low risk of OSA the average is 35.02 cm and in individuals with a high risk of OSA the average is similar, 35.28 cm. The BMI showed statistically significant differences in the means, with a p-value of 0.001, with individuals at high risk of OSA having a BMI of 27.8 while individuals with a low risk of OSA have a BMI of 25.6 (Table 6).

Regarding the remaining factors, it was found that only glucose showed a statistically significant relationship for the risk of OSA (p = 0.020), while the remaining factors, smoking, alcoholism, HDL cholesterol and triglycerides, did not show a statistically significant relationship (Table 7). Among the individuals who have a high blood glucose level, 47.2% are at high risk of OSA while 26.5% of those who do not have high blood glucose are at high risk of OSA.
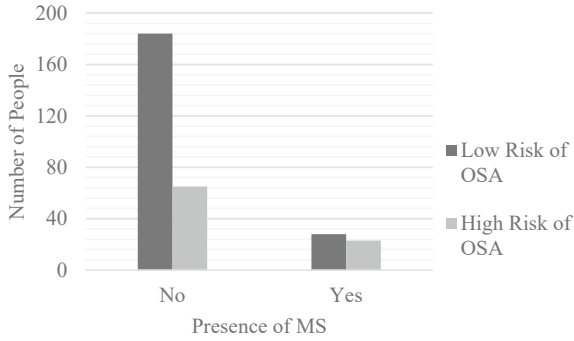
Graph 1. Relationship between the presence of MS and the risk of OSA. **Caption**: OSA—Obstructive Sleep Apnea; MS—Metabolic Syndrome.

Graph 2. Relationship between MS factors and risk of OSA. **Caption**: SM—RF factors of the metabolic syndrome; OSA—obstructive sleep apnea.

Table 5. Relationship between risk of OSA and gender.

			Gender		_p_ value
			Male	Female	
Risk of OSA	Low risk	n	83	129	0.115
		% within risk of OSA	39.2%	60.8%	
		% within gender	76.1%	67.5%	
	High risk	n	26	62	
		% within risk of OSA	29.5%	70.5%	
		% within gender	23.9%	32.5%	

Table 6. Risk of OSA, age and demographic and anthropometric factors.

	Risk of OSA	N	Mean	Standard deviation	p value
Age	Low risk	211	40.72	16.398	0.003
	High risk	88	47.18	17.610	
Body mass index (kg/cm^2)	Low risk	212	25.6065	4.82386	0.001
	High risk	88	27.8475	5.79348	
Abdominal perimeter (cm)	Low risk	212	86.86	11.072	0.000
	High risk	88	93.57	14.424	
Waist circumference (cm)	Low risk	212	82.04	10.208	0.000
	High risk	88	87.64	12.402	
Cervical perimeter (cm)	Low risk	212	35.02	3.144	0.502
	High risk	88	35.28	3.028	
Systolic blood pressure (mmHg)	Low risk	211	126.19	18.960	0.197
	High risk	84	129.48	21.421	
Diastolic blood pressure (mmHg)	Low risk	211	78.93	12.222	0.051
	High risk	88	82.13	14.127	

4 Discussion

According to the results obtained, there is a relationship between MS and OSA, seeing that individuals with MS have a higher prevalence for the high risk of OSA; on the other hand, gender is not related to OSA, nor does age show statistically significant differences in the means for the risk of OSA.

The relationship between MS and OSA has been the subject of studies for some years and numerous of these studies have indicated a relationship between these two entities, this relationship being known as "Z syndrome".

In line with the results of this study, Castaneda et al., in a review study with the objective of perceiving correlations between MS and OSA, reached the conclusion that the presence of MS may be the trigger in the development of OSA [18]. According to this review, excess weight is a crucial factor in the development of OSA, more important than age or gender. They also stated that waist circumference is related to the increased incidence of OSA and that central obesity has a greater impact on upper airway function than peripheral obesity, as the former is more closely related to deposits of neck fat. Unlike peripheral obesity, central obesity is linked to increased production of leptin with resistance to this hormone, which leads to a more marked narrowing of the upper airways during sleep and an increased likelihood of developing OSA. They also consider neck circumference to be the best predictor of OSA compared to peripheral obesity.

In this study, the BMI parameter showed significant differences in the means, with individuals at high risk of OSA having, on average, the highest BMI (27.8 kg/cm^2) and waist circumference also showing a higher mean in individuals at high risk of OSA (84.6 cm). On the other hand, in this study, neck circumference did not show

Table 7. Risk of OSA and other related factors.

			Risk of OSA		*p value*
			Low risk	High risk	
Smoking	No	n	193	77	*0.291*
		% within smoking	71.5%	28.5%	
		% within risk of OSA	91.5%	87.5%	
	Yes	n	18	11	
		% within smoking	62.1%	37.9%	
		% within risk of OSA	8.5%	12.5%	
Alcoholism	No	n	192	79	*0.832*
		% within alcoholism	70.8%	29.2%	
		% within risk of OSA	90.6%	89.8%	
	Yes	n	20	9	
		% within alcoholism	69.0%	31.0%	
		n	83	30	
High glucose (mg/dL)	No	n	73.5%	26.5%	*0.020*
		% within high glucose	81.4%	63.8%	
		% within risk of OSA	19	17	
	Yes	n	52.8%	47.2%	
		% within high glucose	18.6%	36.2%	
		% within risk of OSA	31	16	
Low HDL cholesterol (mg/dL)	No	n	66.0%	34.0%	*0.185*
		% within cholesterol HDL baixo	40.8%	55.2%	
		% within risk of OSA	45	13	
	Yes	n	77.6%	22.4%	
		% within cholesterol HDL baixo	59.2%	44.8%	
		% within risk of OSA	51	14	
High triglycerides (mg/dL)	No	n	51	14	*0.062*
		% within high triglycerides	78.5%	21.5%	
		% within risk of OSA	68.0%	48.3%	

(*continued*)

statistically significant differences in the means for individuals with OSA, unlike the study mentioned above, where neck circumference was considered the best predictor of OSA compared with peripheral obesity. In 2016 Lustosa et al. correlated the metabolic

Table 7. (*continued*)

			Risk of OSA		p value
			Low risk	High risk	
	Yes	n	24	15	
		% within high triglycerides	61.5%	38.5%	
		% within risk of OSA	32.0%	51.7%	

Caption: OSA—Obstructive Sleep Apnea

and nutritional profiles with the presence and severity of OSA and concluded that the abdominal circumference proved to be the most adequate predictor to assess the presence and severity of OSA [19]. However, it should be noted that this study has a smaller sample size (50) and most patients were middle-aged, so the results may not be applicable to other age groups [19].

In the study carried out by Williams et al. within the scope of "The metabolic syndrome outcome study (MetSO)" for the study of symptoms and sleep disorders in the black population with MS, with a sample of 1013 individuals, they obtained a high prevalence of insomnia and OSA that may be undiagnosed in the black population with SM [20]. In this study, the "Apnea Risk Evaluation System questionnaire" (ARES) was used to obtain the risk of OSA [20].

Although in the present study a different questionnaire was used to obtain the risk of OSA, the Berlin questionnaire, it proved to be a valid tool for screening the risk of OSA in patients with MS. According to Cepeda et al., in a total of 97 patients with MS, 65% were at risk of OSA [21]. The applied questionnaires were validated using PSG (standard exam in the diagnosis of OSA).

The Berlin questionnaire is a risk detection tool for OSA that has a sensitivity of 84% and a specificity of 38% for severe OSA, 77 and 44% for moderate OSA, and 76 and 59% for mild OSA, although the Stop-Bang questionnaire has been considered a more accurate tool to detect OSA [22, 23].

In a review study and meta-analyses carried out by Xu et al. with the objective of evaluating the association between OSA and MS, they included a total of 3612 patients with OSA and 2109 individuals without OSA between cross-sectional and case-control studies. They concluded that OSA is related to MS, although causality between these two disorders has not yet been demonstrated. Obesity was considered a factor that is strongly linked to MS and is also a risk factor for OSA, and with the increase in obesity, the association between OSA and MS has gained special recognition [24].

In this study, we observed that 47.2% of individuals who had high glucose were at high risk of OSA; in corroboration with this result, in another study carried out by Ramos et al. to assess the association between sleep disorders and DM in black individuals with MS, they observed the existence of a strong association between the risk of OSA and DM in this population. This association between the risk of OSA and glucose metabolic deregulation can be explained by a common existing factor, in this case obesity, which has been associated with a series of inflammatory and metabolic abnormalities that promote insulin resistance [25]. Li et al. also concluded that OSA is closely related to the presence

of factors such as obesity, insulin resistance, DM2 and other related metabolic diseases [26].

The strong relationship between OSA, obesity and DM2 have led to speculations about the bidirectional relationship between OSA and metabolic diseases. Bearing this in mind, Frammes et al. in 2018 studied this relationship and suggested two hypotheses of mechanisms that explain the existence of this bidirectional relationship. The first hypothesis considers obesity, glucose, insulin, and leptin as contributors to the development of OSA, although some studies have shown that metabolic factors can lead to the development of OSA independently of obesity. The other hypothesis considers the inverse relationship, where sleep apnea causes intermittent hypoxia and sleep fragmentation, which results in increased sympathetic activity, oxidative stress, inflammation, and tissue lipolysis and causes exacerbation of obesity and DM2 [27].

A 2006 study that studied OSA and its association with obesity, gender and age concluded that of the 1595 patients in the study, 65.2% had OSA, of which 71.1% were male and 50.3% were female. And even compared to the female gender, the male gender showed a 2.47 times greater risk of OSA according to the multiple logistic regression analysis. The male gender is considered a risk factor for OSA, and some explanation proposals are recognised, such as hormonal profile, where progesterone plays a protective role in women and testosterone increases pharyngeal collapsibility in men; type of distribution of body fat, by the accumulation of adipose tissue in the upper part of the body which causes a greater deposition of fat in the neck and consequent narrowing; anatomical, craniofacial, and functional changes [28].

In that same study, Daltro et al. also analysed the age group of the patients and found an increase in the frequency of OSA according to the age group, the most significant being >60 years, with a risk of 3.10 times greater than those aged 40–60 years old who presented a risk of 1.30 times, when compared to the younger ones. The prevalence of OSA was shown to be related to age, regardless of weight gain with it. In this study, they divided the sample at a cut-off point of 55 years and found that among people over 55 years of aged women showed a significant increase in AHI, about twice as high as men, which can be explained by menopause, since from this age onwards they will have already entered menopause and are thus without the protective hormonal function. Some studies have shown that most women with OSA are postmenopausal and older than men [29].

In this study, it was observed that gender is not related to the risk of OSA and that the female gender has a higher risk of OSA compared to the male gender, despite not being statistically significant. These results, which differ from literature, can be explained by the predominance of female individuals in the study, in a proportion of 2/3 due to the greater demand by women for health services. It should be noted that in this study the sample consisted of individuals who attended the health center, both as patients and companions, and there was a predominance of female individuals on both sides.

Another explanatory hypothesis for the fact that these results differ from literature may be justified, albeit partially, by the absence of more up-to-date studies regarding the prevalence of RF for non-communicable diseases in Cape Verde; the last study corresponds to the year 2007 in the adult population aged 25–64. In this study, the prevalence of overweight, obesity, hypercholesterolemia, and the prevalence of three or more RF were

higher in females. On the other hand, the prevalence of hypertension, hyperglycemia and consumption of tobacco and alcohol were more pronounced in males7.

Regarding age, this study showed significant differences in the means. It was on average higher in individuals at high risk of OSA, which was 47.18 years old. According to literature, the prevalence of OSA is associated with age, increasing with age. In the study by Daltro et al., middle-aged individuals have a risk of developing OSA about 1.30 times higher than young individuals.

The main limitation found in this study refers to the diagnosis of MS, where it was not possible to obtain measurements of triglycerides, HDL cholesterol and glucose in most participants (a minority had these measurements in their process), which were only acquired by interview to the participant. However, it was found that 48% of the sample had a high waist circumference, which is a parameter that gives access to central obesity and a component that should always be included in the MS diagnostic criteria, which can indirectly infer that, although it was not possible to obtain exact measurements of some parameters, it was possible to obtain a high prevalence of one of the most important parameters in the diagnosis of MS.

On the other hand, the questionnaire used to determine the risk of OSA is not considered the most accurate tool to detect the risk of OSA, although it has good sensitivity and specificity (84% and 38%).

Another limitation found in this study was the fact that the Berlin questionnaire was translated and validated to Portuguese, in a population where the mother tongue is Cape Verdean Creole and, although Portuguese is the official language of the country, it is not dominated by a considerable part of the population with a low level of education. Bearing in mind that there is no sleep questionnaire translated and validated for Cape Verdean Creole, the questionnaire used was applied by interview to be as uniform as possible and in some cases, there was a need for an explanation of some points in the mother tongue for a better understanding.

5   Conclusion

The risk of OSA proved to be prevalent in the study population with the presence of MS.

OSA is a disorder that presents itself as an important public health problem, especially in a population with a greater predisposition to cardiovascular diseases (black race). The associations found in this study are relevant and should alert health professionals so that these patients are increasingly adequately evaluated and treated. Most importantly, to alert and make the population aware so that they can focus more on the prevention of RF, considering the scarcity of resources for the diagnosis and treatment of OSA, especially in the municipality studied and in a country with a lack of studies in this area, making it difficult to know the dimensions and effects of these pathologies in the population. Considering the high prevalence of waist circumference obtained in the study, an indicator of obesity that is a common risk factor, we suggest the development of awareness campaigns in the community aimed at changing lifestyles, such as the regular practice of physical exercise and dietary re-education and avoid consumption of alcoholic beverages and smoking. The involvement of the whole society, not only of health professionals, is necessary to achieve better results.

Due to the scarcity of resources and the price associated with the standard exam for the diagnosis of OSA, especially in the municipality in question, sleep questionnaires are presented as valid, fast, and low-cost alternatives compared to PSG. However, it is necessary to translate and validate them into Cape Verdean Creole and thus make them more suitable questionnaires for this population.

Given the limitations of this study, it is also suggested to carry out further studies within the same context, but with an even larger sample or in other municipalities/islands to perceive regional differences; use of objective means for the diagnosis of MS and use of other sleep questionnaires and even objective measures such as PSG to validate the results of the questionnaires.

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