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Measuring the Impact of Transportation in the Elderly

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Abstract

The demographic pyramid is changing. There has been a growth in the elderly population owing to low birth rates, medical and technological improvements and the aging of the baby boomers. Every citizen needs to feel integrated in society. Mobility and accessibility problems cause unequal access to vital resources, which will create gaps among the population and can raise damaging situations for society itself, as revolt, social exclusion, discrimination, insecurity and disrespect for the same.
This paper presents the results of a preliminary investigation concerning the impact of transportation in the Elderly. The population studied consisted of 539 individuals. The research question was to understand whether there were differences in Health, Quality of Life and Social Support, and respective subscales, among the participants considering their Transportation choice and availability. The instrument used was a questionnaire based on self-assessment divided into 4 sections; Transportation, Quality of Life, Social Support and Health. The objective of this investigation is to demonstrate the impact of Transportation on Health, Quality of Life and Social Support particularly in elderly.

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Keywords: Mobility; Accessibility; Quality of Life; Elderly; Transportation

1. Objective

The purpose of this research is to understand the differences between elders and no elders regarding quality of life, health social support, and transportation and understand how Transportation could be important factors in the quality of life, health and social support in the elderly.

Quantitative analysis is a type of analysis which is based on logical positivism and refers to the set of methods used for quantitative analysis and description of the phenomenon. This is a more objective and a more accurate analysis. In the Quantitative method, the data analysis is simple but sophisticated, responses can be compared directly and easily clustered, and there are many different ways to collect relevant data.

In this research, there are four important main aspects to be analyzed, Health, Quality of Life, Social Support and Transport. Each of these will be descriptively analyzed. After each one is analyzed, the relationship between the four

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aspects will be explored. The first step is to establish a relationship between these aspects: Health, Quality of Life and Social Support. Then they will be separately related to Transport issues. Using this methodology, the interaction of these four aspects can be examined in multiple ways: (Transport to Quality of Life; Health to Transport; Transport to Social Support; Health to Quality of Life then Social Support and so on), seeking answers to these two questions: (1) Is there a correlation between variables of Quality of life, Health and Social Support related to Transport (2) Are there significant differences between groups of individuals regarding variables of Quality of life, Health and Social Support related to the Limitations on Transportation.

2. Literature review

2.1. Demographic Changes

The demographic pyramid is changing. The growing number of the population aged over 65 is a cause for concern because it represents a change of scale in a problem usually addressing minorities and soon facing a very significant part of the population.

Directed to countries around the world and international organizations, the United Nations Population Fund (UNFPA, 2012) and HelpAge International in its report of 2012 "Ageing in the Twenty-First Century: the Celebration and Challenge" call for the sensitivity and the importance in relation to global ageing, defending urgent progress at the level of policies to enhance the quality of life of elder population. According to the UNFPA (2012) reports, there will be a worldwide increase of 10.3% from 2012 to 2050, rising from 11.5% of elderly people above 60 years to 21.8%. Figure 1 shows this relationship with expected numbers in different world regions (Fig. 1).

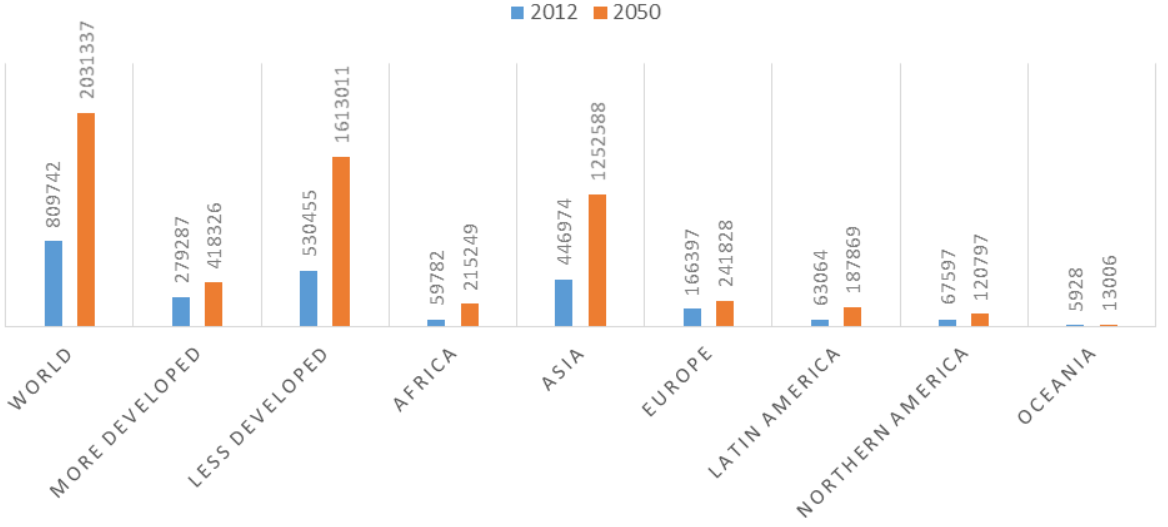

Figure 1 - Indicators of aging and older persons: World and Regions, 2012 and 2050

Source: UNFPA. Ageing in the Twenty-First Century: A Celebration and a Challenge. New York, and HelpAge International, London. 2012

Population aging is a universal fact and has social and economic impacts. The population aging is characterized by increasing the proportion of people aged 65 years or more. This increase does not occur uniformly in all countries in the world. The first countries where it was registered this demographic aging were interestingly the more developed countries, where since 1970 the population grows according to negative rates, while in less developed countries this demographic change occurred later but faster. With the changes in the demographic pyramid and with the percentage growth of the elderly population in the world, it is crucial to realize what changes are required to take. There is an

urgent need to think about strategies to create a "Favorable Ageing", providing a better quality of life, better integration, and participation of older persons in society.

Statistics estimated that between 2050 and 2100 the average life expectancy increases to 81 in males and 94 in females. We can also think of these values in economic terms. Practical and in simple terms, in 2001 there was an elderly person for twelve people considered active. If the statistics for 2050 do not fail this proportion will be quite different, an elderly person for three people considered active.

2.2. Aging: Biological and Social Transformations.

Normal aging, which gives the name of senescence, is a universal event, is the aging mechanism of organic tissues, a natural process (Xavier, 2004), including all of the universal characteristics of aging such as wrinkles, gray hair. The term "elderly" or "old age" is easily associated with concepts such as lack of autonomy, quality of life and health. The aging process is characterized by a variety of transformations, not only physically and psychologically that originate from a more limited adaptation and progressively less efficient. The most common are arthritis, osteoarthritis, hypertension, heart disease, diabetes, hearing and visual impairment.

It is very common when we talk about aging to refer people over the age of 65, however, at a biological level, aging occurs at the end of the second decade of life, accentuating up from the third decade (Gottlie et al, 2007). Besides this type of features, there are also extrinsic factors such as the individual's behavior towards the environment that surrounds him and vice versa. The combination of the two factors, intrinsic and extrinsic give us the result to the adaptability of the subject to the world around him, as a circular motion, where the subject creates changes in the environment that surrounds him and the environment creates changes in the subject, maintaining this a constant creation (Birren & Cunningham, 1985).

Biologically the notion of "adaptation" is related to the concept of "stress", where the goal of this relationship is to preserve the physical and psychological well-being of the individual. The concept of “stress” was for many years only a biological concept related to the warning, danger, attack, and escape skills. Nowadays the concept of stress is much applied in the social sciences, as well associated with the difficulties caused in the daily basis. In this case, stress is a "phenomenon" that occurs when there is an imbalance between environmental and social requirements and response capabilities perceived by the subject. This depends on the psychological and physical state, interpretations of reality, self-image and subjective experiences of life.

Erikson (1998) argues that the subject reaching the 8th stage of development (from 60 years) may achieve greater or lesser satisfaction or/and adaptation to new conditions of life, depending on the degree of integrity or despair that has reached to this stage. This component refers to all psychological processes; memory, intelligence, cognition, perception, emotions, feelings, motivation, personality, self-regulatory behaviors (Correia, 2007). In the psychological component, we can also mention areas affected by aging: (1) perception concerns the analysis operation that allows the collection of stimuli (through the senses) of the environment and its transformation; (2) intelligence is associated with knowledge, experience, and understanding of the world; (3) memory refers to the ability to store and retrieve all information acquired during life (in old age, the memory is most affected when it comes to recent events); (4) personality refers to the way of thinking, of acting in the every day. We must bear in mind that aging may be loaded with possible feelings of insecurity, instability, loneliness, anxiety bodily and psychological changes.

2.3. Quality of Life, Social Support and Health

Quality of life is a difficult definition concept. For some, quality of life is based only on the amount of material goods, for others spiritual goods. For many people quality of life is based on the belief that quality of life and the perception that the individual has about it, for others, quality of life is an objective dimension and to others a subjective dimension (Ribeiro, 1994). According to Bowling (1995 in Dias, 2006), the concept of quality of life health-related is a subjective concept and regards to the perceived health effects on the ability to live, evaluating the positive and negative aspects of it such as well-being, physical and mental health. Bowling adds some factors such as functional

capacity, social interactions quality, somatic sensations and ability to deal with stress. Guyatt (1993) defends that several external factors, not directly related to health, can influence how the quality of life is perceived; low income or highly unstable, lack of free time, poor environmental quality (Guyatt, Fenny & Patrick, 1993). Cramer (1994) argues that the quality of life must be evaluated regarding physical health, psychological health, independence, social relationships and environment components. On the other hand Patrick and Deyo (1989 in Ribeiro, 1994) consider that quality of life shall be assessed taking into account the categories such as limitations, impairments, functional state, perception and functional opportunities. There are several indicators that should be taken into account in the quality of life; health, friends and family, social justice, freedom, security, education, identity, privacy, environmental quality, social relations, work, biodiversity, leisure time, money, comfort, beauty, external challenges, status, religion/spirituality and material goods. However the importance given to each of these factors can be more or less significant. When the concept of quality of life is mentioned, there is another concept that is related to, the concept of health. As the definition of quality of life, health is not limited just to be defined as the absence of illness or disability. Health is a positive definition, characterized by the presence of positive factors, as a youthful attitude towards life, a joy and an acceptance of responsibility that life imposes and the absence of negative factors (Ribeiro, 2005). According to this, a healthy person will be an individual balanced in physical and mental level, well-adjusted to their social and physical environment, being in full control of their mental and physical capabilities, with the ability to adapt, to changes facing the variations in their environment. A higher level of health provides more energy to engage in the activities of daily basis, whether they be industrial, social, cultural or personal (Ribeiro 2005). Thus, health may influence the whole experience of life, including both the perceptions of the well-being, as the disease. From the perspective of Pais Ribeiro, the author argues that the quality of life implies the following assumptions (in Castelo, 2001); it's not the absence of disease; it manifests itself in terms of well-being and functionality; is defined by a set of welfare which is a dimension self-perceived; covers physical, mental, social and environmental issues; it is a dynamic process; it just has meaning in ecological issues related.

Social support is defined by the set of links that each individual holds and that includes intimate or formal relationships, with individuals or groups. There are several types of research and studies that found a correlation between social support and health, whether physical or mental. Social support can come from a variety of sources in different modalities (individually or in a group), frequency and duration. Social support can acquire various functions, such as companionship, emotional support, cognitive guidance, counseling, social adjustment, help services, and access to a new peer group (Doron & Parot, 2001). Another definition found in the literature distinguish dimensions as direction, that is, if social support is received or given, the layout, the measurement form, the content (emotional, instrumental, informational or evaluative) and the social network where it can be found (family, friends, neighbours, community groups) (Moreira & Melo, 2005).

According to Lazarus and Folkman (1986), social support can prevent stress, so, the social support moderates the impact of environmental stress and promotes health. However, the positive effects of social support depend on the perception and satisfaction that the individual has about it, and so, the social support is more subjective than an objective dimension.

Caplan (1974), Kassel (1976) and Cobb (1976) constituted the basis for the definition of social support. The term "social support" was introduced by Caplan, and this concept does not only cover the nuclear family and friends, it also includes the informal neighborhood-based services and the help provided by community services. Cassel, correlated with an ecological perspective, where social conditions must have a special attention, defending that cutting the level of social bonds can produce situations of imbalance and a greater vulnerability. Cobb in turn defined social support as the information that the individual is accepted and is an integral part of a social network (in Ornelas, 1994). This same information would serve as protection in crisis situations, so to Cobb social support would be a kind of crisis, stress appeaser or any other situation which may cause adverse effects on the subject.

There is a strong correlation between social support and health. Studies already made in the fields of psychology and health concluded that satisfaction with social support is a dimension that helps in increasing the well-being, both physical and psychological and ascertain that social support is a variable impact on life satisfaction (Aguiar, 2011). Further investigation found correlations between satisfaction with social support and somatic symptoms, as well as evidence that a satisfactory social support could protect him against the onset of mental disorders (Ornelas, 2008).

According to Singer and Lord (1984) studies in this field, the relationship between social support and health can include into four categories:

1) Social support protects against stress-induced disorders; 2) The absence of social support is a source of stress. Considers that the lack of social support is itself a generator of stress; 3) The loss of social support is a stressor; 4) Social support is beneficial in the sense that it is considered that social support makes people stronger and better able to face the vicissitudes of life, that is, that social support is a feature, in the existence or in the absence of sources of stress (Ribeiro, 1999).

Currently, the most widely used social support measures can be divided into three categories: the dimension of networks, which focus on the social integration of the individual in a group; the dimension of support received, which focuses on the support that the individual actually receives or is considered to have received, and; the extent of perceived support, which focuses on the support that the individual believed to have available in case of need (Ornelas, 1994). So with these three categories, social support is seen as a process that involves the interaction between the individual and support network.

2.4. Transports in Elderly Population

In all cases transportation is a mean to an end, although it can be an enjoyable activity where the passenger can enjoy the journey time in leisure or work activities. For older people who are no longer part of the workforce, transportation is a way to maintain social bonds. As a result, the transport is strongly linked to independence, freedom of movement, choice, social activity and community involvement (Davey & Nimmo, 2003).

Since the elderly are not part of the workforce, they tend to have more leisure time and want to use it to enjoy pleasurable activities, such as traveling. This leads us to think that the demand for mobility tends to increase with age, but this mobility capability is becoming more limited due to the natural effects of senescence. This could rise a confrontation between a desire to travel and an inability to perform it, which can bring imbalances to a psychological, physical and social dimension.

Mobility is undoubtedly one of the primary survival functions. Thus, the issue of mobility must be seen and studied through an ecological, social and environmental perspective. A qualitative analysis of the concept of "mobility" should include factors such as, the psychological benefits associated to autonomy in mobility; exercise benefits associated with promoting health by helping to strengthen the muscle and bone structure as well as help prevent or decrease the impact of chronic diseases, community involvement, and enabling social contact with peers. Mobility is also one of the key factors to achieve healthy ageing and provide a good quality of life in the elderly. The quality of life during ageing is strongly related to the level of mobility available, where changes in health status frequently have origin in the lack of mobility and accessibility available to the elderly (Davey, 2004). We can even say that mobility has a positive effect on quality of life of the elderly because mobility ensures a more active ageing. However to make this happen, in a positive and healthy way, is necessary to create a transport system adapted to the needs of the elderly. Thus the need and importance of promoting mobility emerges, resulting from a process of inclusion of this population segment.

Metz (2000), Alsnit and Hensher, Banister and Bowling (in Sant'Anna, 2007) tried to understand the concept of mobility when associated with the elderly population. This system should be not just to ensure the dignity, inclusion and safety for the elderly but the entire population. To make this possible a detailed analysis of current transportation systems is needed focusing on the gaps between what the individual wants to do and what he can effectively do. This should aim to increase and provide more option for the users being compatible to their needs and also overcome the mobility and accessibility barriers to make urban infrastructures available to all and effectively promote social inclusion and general welfare. This restructuring should be based also on the premise that the urban spaces should be adapted to the population, avoiding social discrimination, creating a feeling of independence, a growing sense of

empowerment, leading to an extension of social spheres, contributing to higher levels of quality of life (Sá & Elali, 2012).

The psychological benefits in mobility capability, linking it with such feelings of vulnerability, anxiety and safety in the urban environment; Benefits of physical activity, walking outdoors and as mobility could delay the adverse effects of senescence; Benefits of participating in social and community activities creating a robust network of social support (Metz, 2000). However the study of this relationship must be built on a multidisciplinary knowledge.

3. Methodology

3.1. Participants

The population studied consisted of 539 individuals from Lisbon. At the time of the data collection, the individuals' age ranged from 20 to 90, and the mean being 47 (M=47.16, SD=13.170). Regarding age group, 438 are no Elders (less than 60 years old) and the remaining 88 elders (60 years old or more). Regarding gender, 312 (59%) were male and the remaining 217 (41%) were female.

In this research group, 148 (27.8%) had a monthly ticket for Public Transport compared to 385 (72.2%) who did not. Moreover, 504 (94.4%) had a driving license and only 30 (5.6%) did not.

3.2. Survey

Initially, a bibliographic review was made on the themes: mobility, accessibility, sustainability, quality of life, social support among others, which gave rise to four knowledge axes previously presented. Basically these axes deal with the following subjects: "Mobility Choices", "Quality of Life", "Social Support" and "Health". After building each knowledge axis, and based on these, an initial questionnaire was developed. The questions were elaborated and grouped in a pilot test made available to some colleagues who, when answering the test, also pointed out the doubts and suggestions for the elaboration of a new, clearer and more concise questionnaire.

The questionnaire was divided into the following sections:

Mobility Choices: This is an introductory section. It aims to collect some information regarding the individuals' transportation choices.

The quality of life: This section is about the quality of life experienced by the interviewee regarding the subjective perception about this construct. This section includes questions about the quality of life, how it changed in the previous year, how they contact the family, and how their daily basis activity is defined.

Social Support Scale: This instrument consists of 12 items and is organized into four factors, satisfaction with friends (3 items), Intimacy (3 items), satisfaction with family (3 items) and social activities (3 items). It is a statement rating, consisting of twelve statements with which the individuals can "totally agree", "agree mostly", "do not agree nor disagree," "disagree mostly" or "totally disagree" where the subject must indicate the level of agreement with the statement on a Likert scale, in which the scores range from 1 point to 5 points.

General Health: It is a section based on self-assessment about health. It is a section that considers the perception of individuals regarding their state of health, both physical and mental, items regarding physical functioning, general health, vitality, social aspects, impairments and blood pressure, weight, and cholesterol level. It assesses both negative and aspects of health, limitations, and difficulties performing daily tasks and limitations in social activities.

3.3. Data Collect Procedure

The questionnaire was created using Google tools (Google Forms), the link was sent to several individuals by email and also available on the social network Facebook, to fill it in.

From the 539 questionnaires collected in 2016, a database was built in the SPSS (Statistical Package for the Social Sciences) Software for Windows version 22.0.0.

Data were processed using the SPSS software with a significance level of 5% ($\alpha = 0.05$).

Aiming to meet the objectives proposed in this research, the first technique used for the data treatment was made through a descriptive analysis, where all variables studied were determined: sample, mean, median, standard deviation, minimum and maximum values.

In order to check the accuracy and validity of the instruments and, more precisely, of the items that constituted the same ones, the Cronbach Alpha test was used.

The inferences were tested according to the normality and homogeneity where the Kolmogorov-Smirnov test and the Levene test were used (Maroco, 2007).

In the comparison between groups, the parametric test was performed to compare populations from independent T-Student samples to check whether their assumptions were confirmed, the assumptions of Normality and Homogeneity (Maroco & Bispo, 2005), otherwise the non-parametric test was used to compare Populations from Mann-Whitney independent samples. This comparison was made to determine if there were significant differences (Maroco, 2007).

4. Results and conclusions from data analysis and survey limitations

There are no significant gender differences ($p = 0.167$), but men ($M = 2.21$) have lower values compared to women ($M = 2.34$) regarding the perception of transportation difficulties and their limitations in life.

Analyzing driving licenses, there are statistically significant differences between the groups ($p = 0.005$), where the group that has a driving license has lower values ($M = 2.24$) compared to those who do not ($M = 2.82$), regarding transportation difficulties and their impacts on life.

Comparing the values of limitations between elderly and non-elderly due difficulties to access transport or difficulties while travelling, the study reveals that the elderly present a greater limitations level than the non-elderly, where this difference is statistically significant ($p = 0.01$).

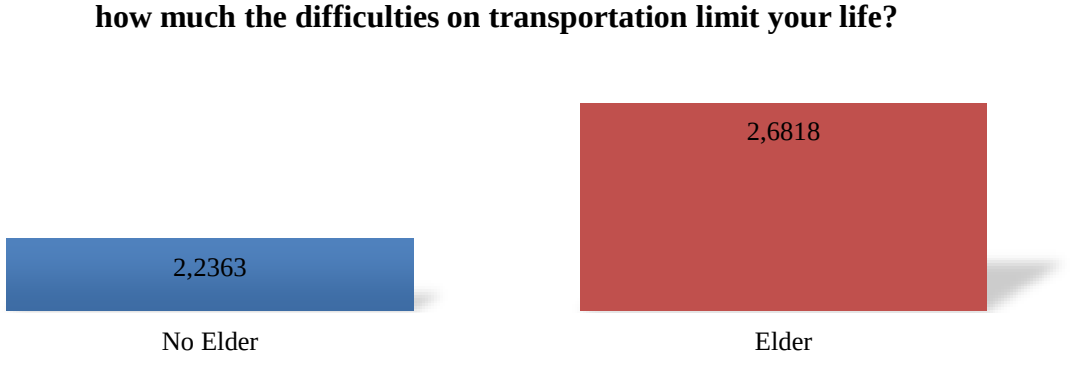

Figure 1 – Transport difficulties between elderly and non-elderly

Comparing the values of satisfaction with life in general between elderly and nonelderly, considering the levels of transport difficulties (Never - Few Times - Moderately - Often - Always), the present study reveals that satisfaction values are decreasing in both groups, but the elderly have lower values in all cases than the non-elderly. In the comparison of groups, this analysis present statistically significant values ($p < 0.01$).

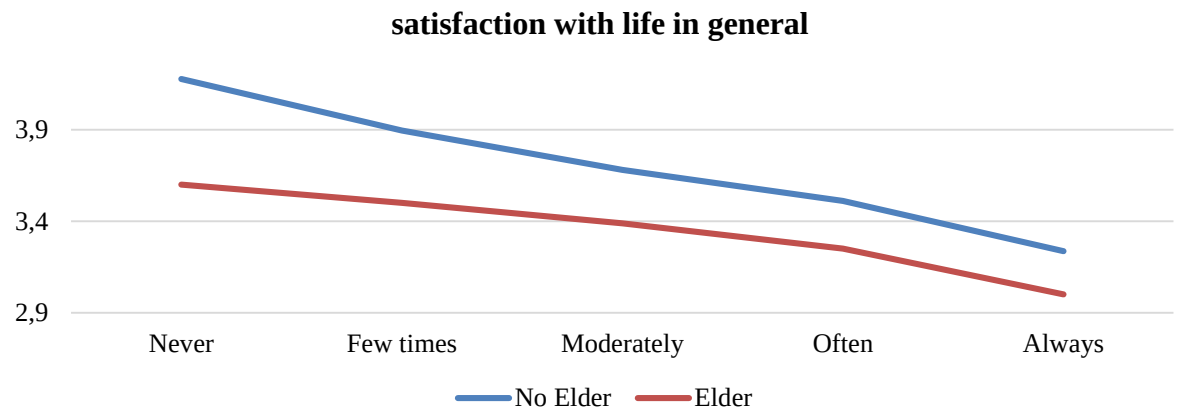

Figure 2 – Satisfaction with life regarding the elderly and non-elderly and the level of limitation

Comparing the values of contact with the family between elderly and non-elderly, considering the levels of limitations due to transportation, the present study reveals that the values of contact with the family decrease in the two age groups. The elderly, however, they present in all cases lower levels than the non-elderly. In the comparison of groups, this analysis presented statistically significant values ($p = 0.025$).

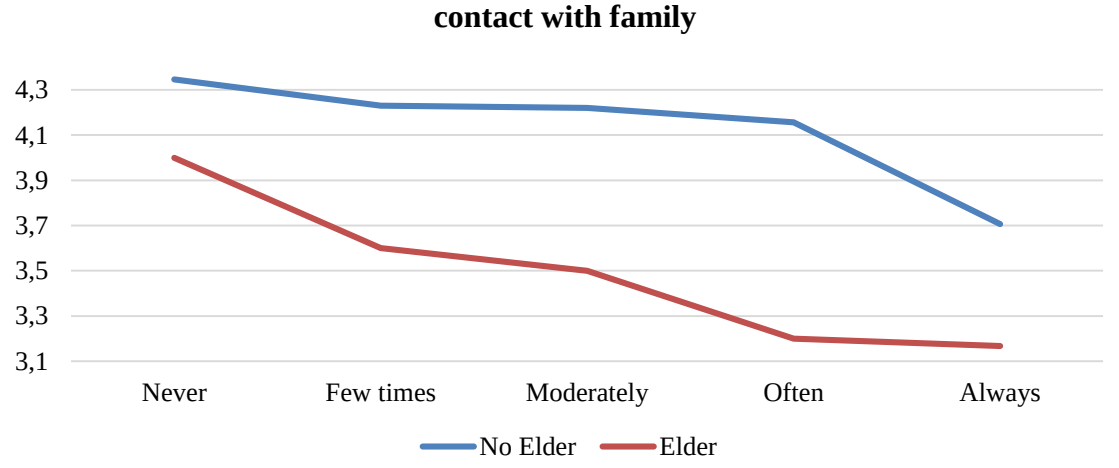

Figure 3 – Contact with the family taking into account the elderly and non-elderly and the level of limitation

Regarding the levels of daily activity, the study reveals that the two age groups present a decrease in daily activity due to the increase in the limitation caused by transportation difficulties. The difference between groups is not statistically significant, presenting a tendency ($p = 0.09$).

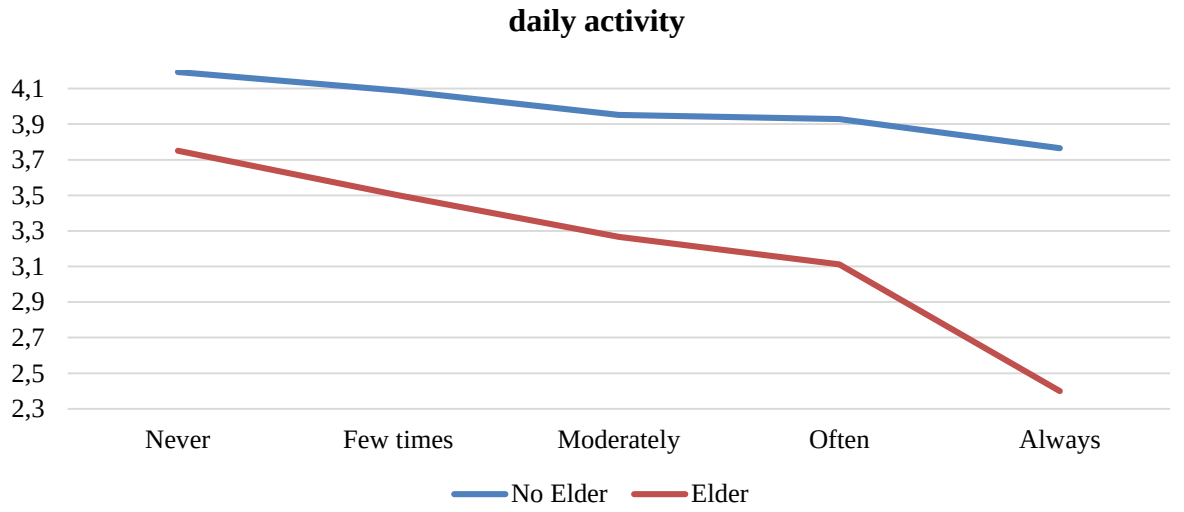

Figure 4 – Daily activity taking regarding the elderly and non-elderly and the level of limitation

Exploring health levels, the study shows that the two age groups present better health levels when the difficulties in transportation are smaller or null, decreasing with the increase of transport difficulty, presenting a significant difference between the groups ($p < 0.01$).

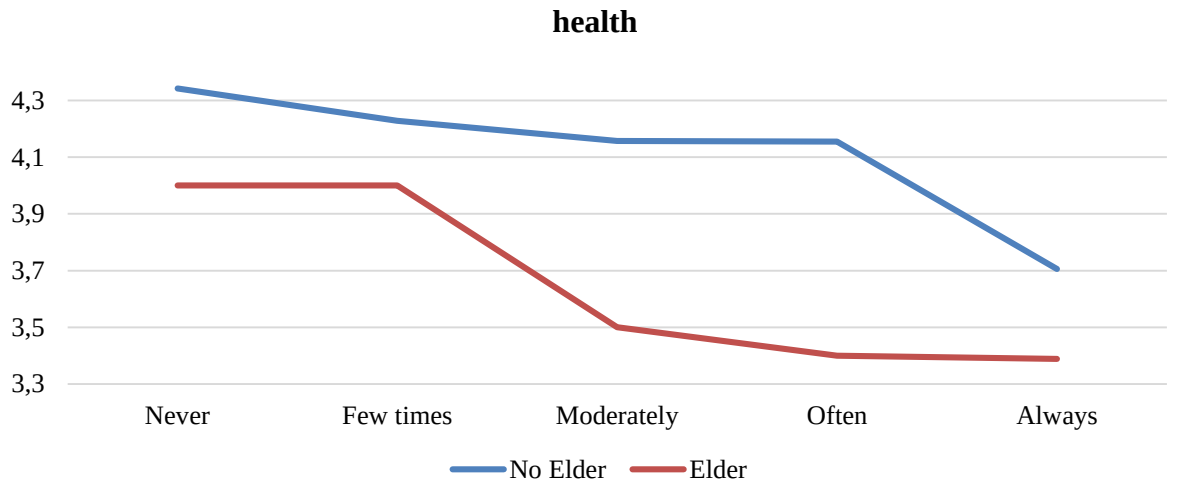

Figure 5 – Health taking regarding the elderly and non-elderly and the level of

Regarding functionality (resistance, agility, endurance), the analysis shows a decrease in functionality levels with increasing limitation. However, this analysis shows a particularity compared to the other analyzes. At the "Always" difficulty, level the elderly age group presents higher levels of functionality than the non-elderly age group.

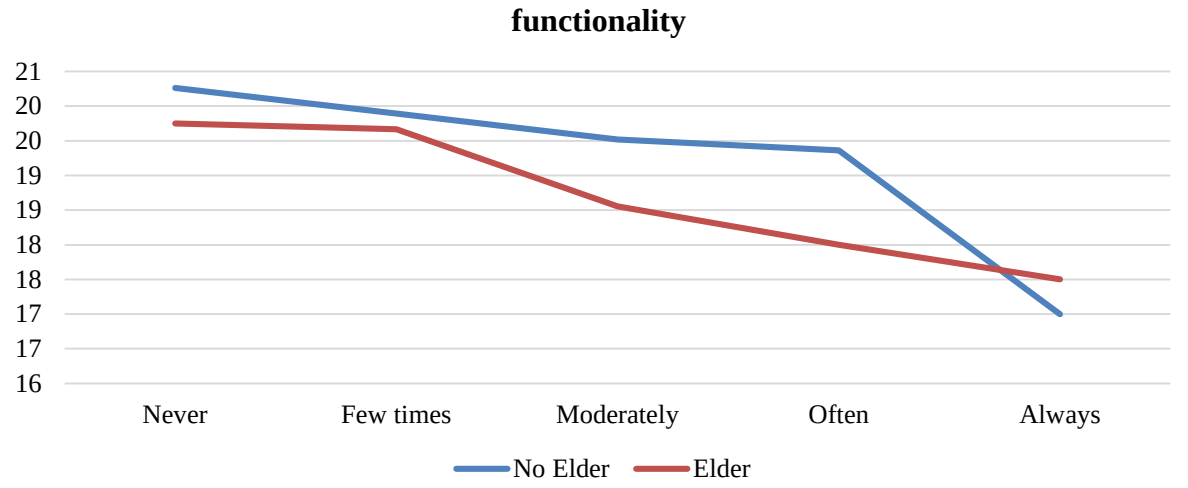

Figure 6 – Functionality regarding the elderly and non-elderly and the level of limitation

Regarding the scale of total social support, the analysis shows a decrease in the total score of the scale with the increase of limitations, where the elderly age group presents inferior values comparatively with the non-elderly range.

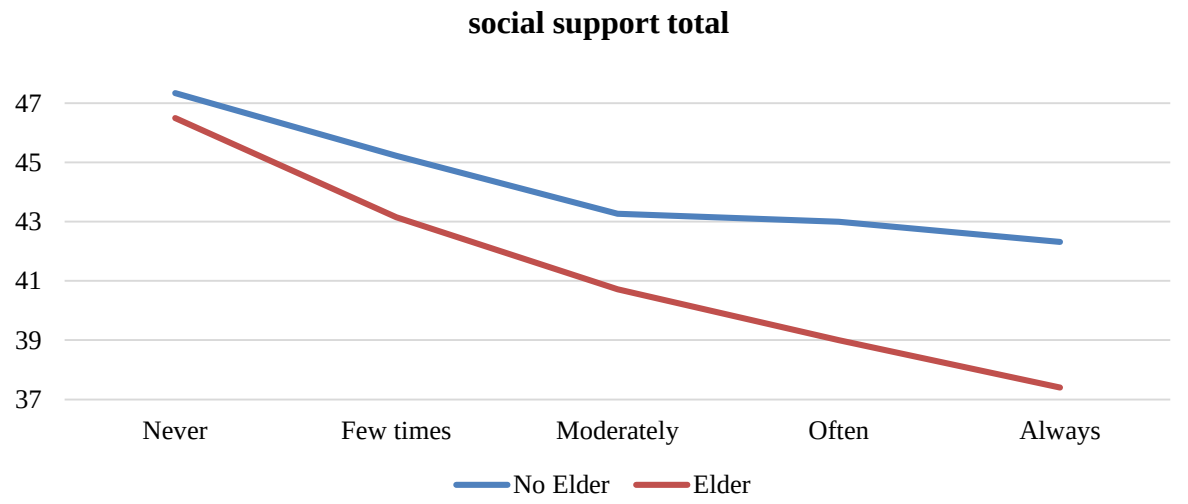

Figure 7 – Total social support scale regarding the elderly and non-elderly and the level of limitation

Analyzing only the elderly group, the study showed that there is a decrease in values and significant differences in all subscales, Satisfaction with Friends ($p = 0.033$), Satisfaction with Family ($p = 0.013$), Intimacy ($p < 0.01$) and Social Activities ($p < 0.001$).

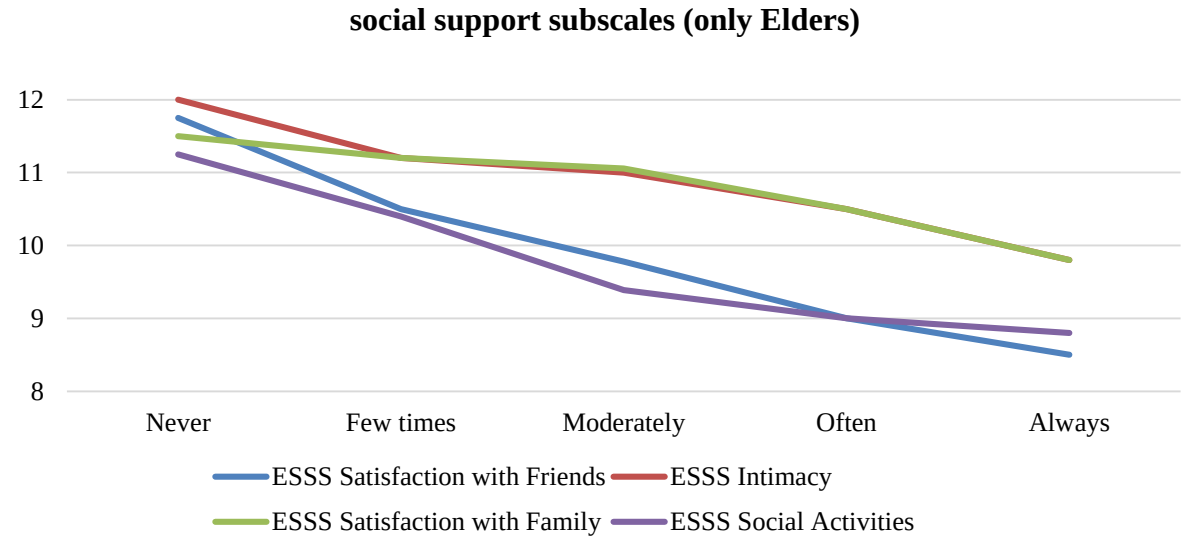

Figure 8 – Social support subscales regarding only the elderly age group and the level of limitation

Regarding the correlations between the items corresponding to the quality of life, health, and social support regarding age and limitations, the present study shows that there are significant correlations, positive or negative, almost all the items. The values of the correlations are presented in the table below.

Table 1 – Table of correlations of items regarding age and limitations

	Age	How much the difficulties on transportation limit your life?	Satisfaction with life in general	Contact with family	Daily activity	Health	Functionality	Social Support Total	ESSS Satisfaction with Friends	ESSS Intimacy	ESSS Satisfaction with Family	ESSS Social Activities
Age	1	,112*	-,196**	-,293**	-,257**	-,218**	-,097*	-,125**	-,114**	-,136**	-,136**	0,017
How much the difficulties on transportation limit your life?	-	1	-,285**	-,131**	-0,053	-,170**	-,232**	-,228**	-,136**	-,141**	-,200**	-,198**

** The correlation is significant at the 0.01 level (2 extremities).

* The correlation is significant at the 0.05 level (2 extremities).

5. Conclusions

Accessible and well-designed communities benefit the entire population. To succeed, the accessibility initiatives need to take into account external constraints, including accessibility, priorities, availability of technology and knowledge, and cultural differences. For older people who are no longer part of the workforce, the transportation system is a way to maintain social bonds. As a result, the transport is strongly linked to independence, freedom of movement, choice, social activity and community involvement.

Claiming that individual crisis arises due to a failure in the socialization and response difficulties, we can say that the interaction of individuals with the community depends on the environment supports and on the availability of conflict moderators. In a crisis, we can find that the negative event implies change and comes as a new problem for the individual, which can be perceived as difficult to solve. Moreover, the events that generate conflict can be avoided, with transitions commonly associated with changes in lifestyle, new responsibilities or developing new social relations. Is also related to the nature of the problem and to the individual's resources, regarding its material, physical or psychological network level. The crisis comes when the individual's methods for dealing with emotions and with external problems, prove to be insufficient, making people feel anxious, insecure and lack of control.

A crisis is considered as a period of great instability due to two main factors, one related to the initial impact and the other with tension or stress levels. The first refers to the recognition that the individual is in a situation that requires a response, followed by feelings of vulnerability. Then, the individual uses its resolution tools to stop the conflict. This dissipates the tension or stress when he recognizes that it is able to solve the conflict, it has also occurred due to a development in adaptability, in other words, an increase in the adjustment rates between the individual and the requirements and challenges provided by the environment.

The adaptation process can be facilitated by the level of integration provided by the environment or by the increase in individual skills. A large number of crisis situations requiring significant adaptation processes to enable the stability and well-being, avoiding being devoid of means of exchange of goods and services. Otherwise, it may lead to new crises and consequently to social isolation. Adaptation may involve biological, social or self-reference, so a certain state of adaptation is also a specific and temporary situation. New breakage situations may arise as a result of stress factors or other environmental changes, so inevitably adaptation periods alternate with periods of transient imbalance.

The study shows that the elderly group present greater limitations in life due to transport, comparing with the non-elderly group. Following the analysis of the questionnaire, the analyzes show that there are significant differences in Quality of Life, Health and Social Support between the two age groups, elderly and not elderly. The results show that the non-elderly group presented more positive values in the three constructs studied. In both age groups, the values are decreasing with the increase of the limitations perceived by the participants. However studying the functionality, the elderly group presents better values than the non-elderly group when the limitations are "always" perceived, this can be due to the level of sedentarism that the younger generations have presented and also possibly to the level of dependence of the technology.

Regarding the limitations of this research, this survey was focused on three concepts: quality of life, health, and social support. Three very broad concepts that are difficult to standardize. Thus this research is based on the participants' subjective perception. The fact that the participants were contacted through email and social networks, excluding in this preliminary study the info-excluded individuals, represents another limitation.

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