Measuring the Impact of Transportation in Quality of Life, Social Support, and Health.

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1. ABSTRACT

Transportation has a great impact on the evolution of societies, such as the level of communication, exchanges of goods and a great social importance. Through transportation the connection and contact with friends, family, and goods, basically with the community itself, becomes easier. One of the social functions of the transport system is to ease integration of urban areas in economic, social and recreational activities, providing adequate answers to the needs of population.

This paper presents the results of a preliminary investigation concerning the impact of mobility and accessibility in the quality of life, social support, and health in general. 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 Mobility and Accessibility choice and availability. The instrument used was a questionnaire based on self-assessment divided into 5 sections; Transportation Pattern, Quality of Life, Social Support, Health and Bio-Demographic characterization. The objective of this investigation is to demonstrate the impact of Transportation on Health, Quality of Life and Social Support.

2. INTRODUCTION

2.1 Social Sciences and Transport

Transport as well as Health and its sub-domains, such as Quality of Life and Social Support, have been gaining increasing attention in multidisciplinary research and public policies in recent years. This is due to a growing awareness of the relationship between transport and health. Cities in particular, are burdened by a wide range of transport-related exposures, and obstacles to health, but time has come for great opportunities for healthy change. Thus, transport and health, two disciplines that typically do not work together and that urgently need to share agendas and expertise.

When we think about "Transport" the first images that come to mind are vehicles and roads. However, it is the man who exercises the active role in traffic, both directly, pedestrians, motor vehicle drivers and non-motorized vehicles, and indirectly, transport system operators, transit authorities, engineers, and architects, etc. Transport involves the movement of people

(or goods) in a given time and space and there are inherent behaviors in this process . According to rational, psychological and sociological studies, these behaviors are extremely important in this field. The Social Sciences have also started to study the behavior in traffic, concerned with more dangerous and negligent behaviors. They also started to be concerned about the comfort and health promotion and quality of life of its users. A significant contribution was also made tackling social exclusion through knowledge in the areas of mobility and accessibility. Briefly, the social sciences linked to transport take into consideration all behaviors, from driver evaluation through the design of roads or sidewalks to the creation of policies that protect all the citizens. Today it is consensual that the world of transport is not just the act of moving but above all a human phenomenon with a high behavioral component.

2.2 Quality of Life, Social Support, and Health

Quality of life is difficult to define. For many people quality of life is based on the perception that each individual has about it, rendering it a subjective dimension, while for others, quality of life is an objective dimension (Ribeiro, 1994).

There are several aspects 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 aspects can be more or less significant.

When the concept of quality of life is mentioned, the concept of health is inextricably linked. As the definition of quality of life, health cannot be narrowly defined as the absence of illness or disability. Health is a positive definition, characterized by the presence of positive factors, as a youthful spirit towards life, a sense of joy and an acceptance of responsibility imposed by life and the absence of negative factors (Ribeiro, 2005). According to this definition, a healthy person will be a balanced individual both physically and mentally, 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 in their environment. A higher level of health provides more energy to engage in activities on a 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 well-being, as well as of disease. From the perspective of Pais Ribeiro, the author argues that the quality of life implies the following assumptions (in Castelo, 2001); it is not the absence of disease; it manifests itself in terms of well-being and functionality; it is defined by welfare which is a self-perceived dimension; covers physical, mental, social and environmental issues; it is a dynamic process.

The human and social sciences play a privileged role when it comes to the analysis of quality of life given the extensive experience in behavioral aspects. Nevertheless, operationalization of the concept of quality of life in relation to transport can be quite complex. Sometimes the improvements in the collective quality of life can negatively impact the individual quality of life. There is the example of the private car, which from a collective perspective creates congestion, environmental problems and difficulties in accessibility, whereas individually it provides the feeling of confidence, independence, security, and speed. On the other hand, the use of public transport promotes a more sustainable environment, biodiversity, less congestion, but drastically reduces the feelings of privacy, freedom, and comfort of the user.

Although quality of life can be a subjective concept to everyone, there are certain common aspects to most of the population, such as health, social relations, social justice, freedom, security, education, privacy, environmental quality, work, comfort, remuneration, physical

beauty and leisure (Steg & Groot, 2008), not forgetting that the importance given to each factor varies with the individual characteristics and is affected by several factors. These factors have been the focus of public policies related to transport, which aim to develop measures to promote the citizens' quality of life .Positive results are expected with the development of these measures, but also negative ones because the concept of quality of life and the associated values can be different for each individual. In this kind of development, there are two opposite sides to consider: the individuals oriented towards themselves and the individuals oriented towards altruistic and ecological values (Steg & Groot, 2008).

Social support is defined by the set of links that each individual holds and that includes intimate and formal relationships, with individuals or groups. Several types of research and studies 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 encompass 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 literature distinguishes 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, neighbors, community groups) (Moreira & Melo, 2005). Social support started to gain more importance in the scientific community and it may play an important role in the maintenance of health, as it can affect psycho-physiological factors and promote changes in behavior (Aguiar, 2011). According to Lazarus and Folkman (1986), social support can prevent stress, consequently, 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, meaning that is a more subjective than an objective dimension.

Several authors, like Caplan (1974), Kassel (1976) and Cobb (1976) provided 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. Kassel correlated the concept with an ecological perspective, where social conditions require special attention, defending that cutting social bonds can give rise to 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 and/or stress appeaser or of any other situation which may cause adverse effects on the subject. Caplan (1977) defined social support in the presence or in the absence of a base concept, the psychosocial support resources. Lin (1986) defined it as the support available through bonds that individuals create with each other, or through communities. Caplan and House (1980) related social support with the set of functions inherent in relations between individuals. Thois (1982) defined it as a function of the degree of satisfaction of social needs. Shumaker and Brownwell (1984) defined social support as being the exchange of resources among individuals (in Ornelas, 1994). According to Cobb social support is the information that leads the subject to believe he/she is beloved and people care about him/her; information that leads the person to believe she/he belongs to a network of mutual obligations (Ribeiro, 1999). According to this author, social support emerges as a common component in psychosocial factors such as isolation (e.g. consequence of losing a job) as well as psychological factors

related to health and disease events, such as losing a beloved one. Other authors, such as Singer and Lord (1984) argued that social support can be informational or material. The concept can also be distinguished in terms of who provides it; personal, interpersonal, by friends, or in social groups as community groups for example. According to these authors, social support protects against stress-induced disorders being as a mediator or moderator of stress; the non-existence of social support is a source of stress, the lack of social support itself generates stress; the loss of social support is a stress generator, whereas if the subject has social support and if he/she is deprived of it, the stress arises; social support is beneficial, a necessary and positive resource, either before or in the absence of sources of stress (in Ribeiro, 1999).

According to Dunst and Trivette (1990), social support refers to the resources at the disposal of individuals and social groups, such as family, in response to requests for help and assistance (in Ribeiro, 1999). The same authors argue that there are five social support components; constitutional, structural, functional and relational satisfaction. Research, already carried out in the fields of psychology and health, concluded that satisfaction with social support enhances the sense of well-being, both physical and psychological and thus social support is a variable that has an impact on life satisfaction (Aguiar, 2011). Further investigation found correlations between satisfaction with social support and somatic symptoms, as well as evidence that satisfactory social support levels could protect individuals against the onset of mental disorders (Ornelas, 2008). Currently, the most widely used social support measures can be divided into three categories: the dimension of networks, which focuses 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.

3. SURVEY
3.1 Objective
The purpose of this research is to (1) understand the relation between quality of life, social support, and transportation; (2) understand how mobility and accessibility could be important factors in the quality of life, health and social support in the elderly; and (3) study transportation attitudes, perception, desires, and the needs of the population.

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 internally and descriptively analyzed. After each one is analyzed, the relationship between the four 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 three questions: (1) Is there a correlation between variables related to Quality of life, Health, and Social Support (2) Is there a correlation

between variables of Quality of life, Health and Social Support related to Transport (3) Are there significant differences between groups of individuals regarding variables of Quality of life, Health and Social Support related to the frequency of chosen mode of transportation.

3.2 Methodology
3.2.1 Participants

The population studied consisted of 539 individuals. 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, 20 were Post-Adolescent (20-25y) (3.8%), 139 Adults (26-39y) (26.4%), 323 Middle-aged (40-64y) (61.4%), 41 Third age (65-79y) (7.8%) and 3 Fourth age (80-90y) (0.6%). 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.

3.2.2 Tool

The tool will be divided into the following sections:

Transportation Patterns: This is an introductory section. It aims to collect some information regarding the individuals' transportation choices namely how the daily activity is defined, which transport is chosen (Car, Public Transport, Walking Cycling), how the transport hinders them on a daily basis and the level of satisfaction with the public transport in general.

The quality of life: This section is about the quality of life experienced by the interviewee. As already referred, the quality of life is difficult to define. For some, quality of life is based only on the amount of material goods they own, whereas for others depends on the amount of spiritual goods. For many people quality of life is based on 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).

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 scale of self-fulfilment, 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.

3.2.3 Data Collect Procedure

The questionnaire was created using Google tools (Google Spreadsheets), 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% (α = 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

4.1 Quality of Life, Health, and Social Support

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

Measure	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Considering the last year, how satisfied or unsatisfied you felt about your life in general last year?	-										
2. How do you define the time with your family?	.287**	-									
3. How do you define your daily activity?	.300**	.200**	-								
4. In general, you say that your health is.	.383**	.225**	.372**	-							
5. Recently how much emotional problems, limited your activity in a group of friends or family?	-.332**	-.177**	-.168**	-.286**	-						
6. SF36_Total	.206**	.075*	.141**	.397**	-.176**	-					
7. ESSS Total	.431**	.350**	.269**	.339*	-.396**	.158**	-				
8. ESSS Satisfaction with Friends	.343**	.215**	.235**	.280**	-.324**	.125**	.853**	-			
9. ESSS Intimacy	.391**	.347**	.215**	.216**	-.362**	.169**	.762**	.540**	-		
10. ESSS Satisfaction with Family	.379**	.444**	.185**	.270**	-.320**	.116**	.732**	.509**	.520**	-	
11. ESSS Social Activities	.280**	.112**	.180**	.215**	-.261**	.093*	.757**	.603**	.377**	.299**	-

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

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

Table 1 - Correlations between the items and scales of quality of life, health, and social support.

### 4.2 Transport modes and Quality of Life, Health and Social Support

Comparing the frequency of use of the four transport modes studied with satisfaction with life in general, the study reveals that individuals who use the car or public transport do not present significant differences (p> 0.05) according to the frequency of use. Contrarily, individuals who walk (p = 0.039) and cycle (p = 0.009) more frequently present significant statistical differences. This study also reveals that walking (R = 0.110, p = 0.02) and cycling (R = 0.134, p = 0.007) have positive statistical correlations with overall life satisfaction, the higher the frequency of use, the more positive are the satisfaction levels.

Despite no significant statistical correlation, the car and public transport users tend to have less positive life satisfaction when the frequency of use of the respective mode of transport is higher.

Satisfaction with life in general

| Car	Public Transport	Walking	Cycling
3,7588	3,6889	3,8635	4,1628
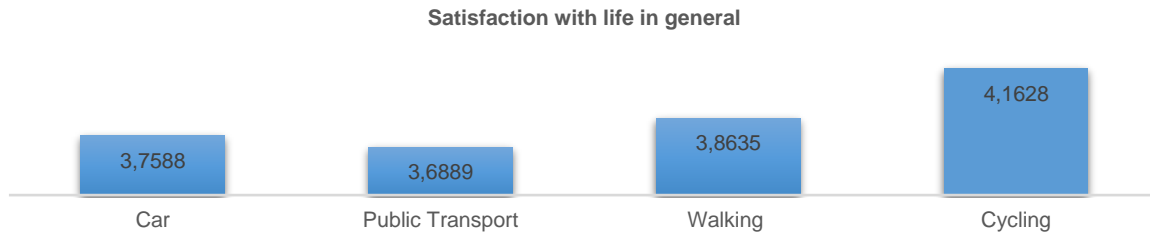
Graph 1 - Average level of satisfaction with life regarding mode of transportation

Regarding the frequency of use of the modes studied and the contact with the family, the analysis done in this research showed that the individuals who use the car more frequently have greater contact with the family, being the only group to present significant differences between groups ($p = 0.001$) and a significant statistical correlation ($R = 0.183$, $p < 0.001$). Regarding the other mode of transportation, the individuals who use Public Transportation the most, are those who have less contact with the family, presenting a significant negative statistical correlation ($R = -0.106$, $p = 0.031$). Concerning walking and cycling, individuals did not present differences ($p > 0.001$) or significant statistical correlations.

Contact with Family

| Car	Public Transport	Walking	Cycling
4,2969	3,9889	4,092	3,9767
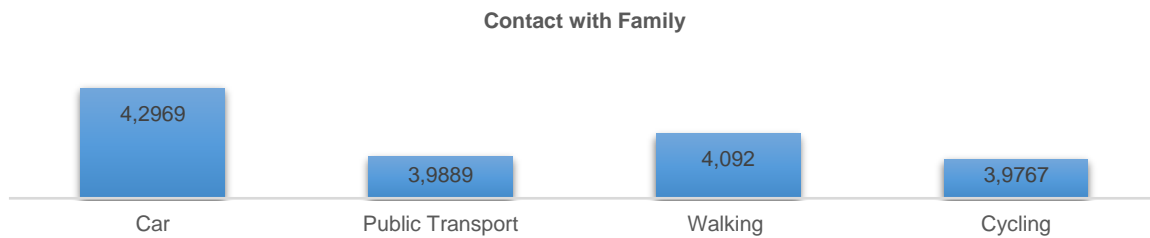
Graph 2 - Average of the contact with the family regarding mode of transportation

Relative to the levels of daily activity, individuals who walk more frequently ($p < 0.001$) presented significant differences according to the frequency of use, however, individuals who choose to walk ($R = 0.138$, $p = 0.004$) and to cycle ($R = 0.112$, $p = 0.024$) present positive correlations between the frequency of the mode used and daily activity.

Daily Activity

| Car	Public Transport	Walking	Cycling
3,9009	3,9778	3,9761	4,186
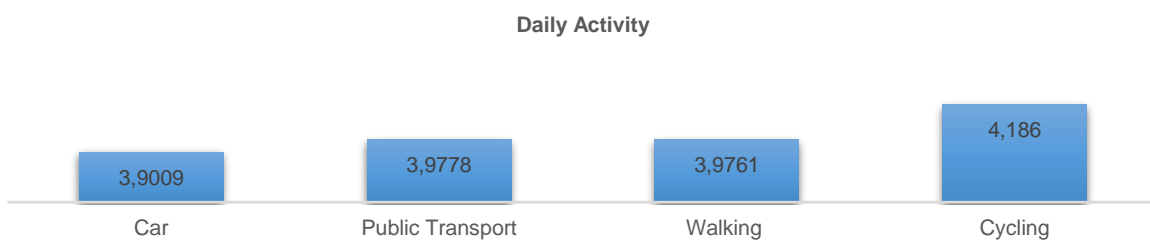
Graph 3 - Average daily activity level regarding mode of transportation

Exploring the health level, the study shows that individuals who choose to walk (R = 0.142, p = 0.003) and cycle (R = 0.153, p = 0.002) have significant statistical positive correlations with their Health perception. The analysis also showed that the group with the highest levels of health is the one that cycles more often and the group with the lowest levels of health corresponds to the group that uses the car more frequently.

Health

| Car	Public Transport	Walking	Cycling
4,0921	4,2022	4,2048	4,5238
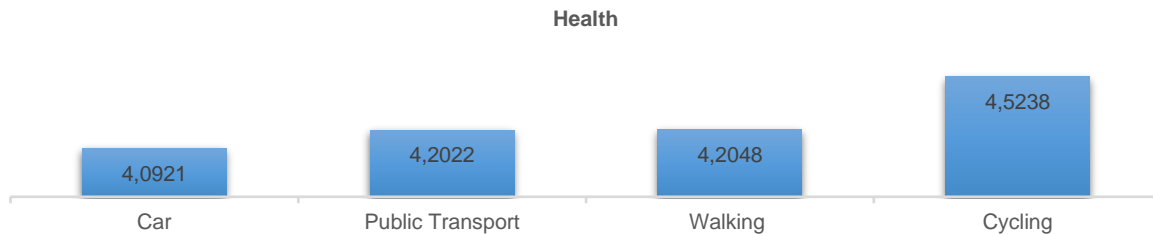
Graph 4 - Average health levels regarding mode of transportation

When exploring the scale of functionality, the analysis showed that the only group that showed positive correlations according to the frequency of use was the group of individuals who walk the most (R = 0.185, p <0.001). However, the group with the best level of functionality is the one that chooses to ride a bicycle and the one that presents lower levels is the group that chooses to use the car.

Functionality

Car	Public Transport	Walking	Cycling
19,5395	19,8068	19,9274	20,093
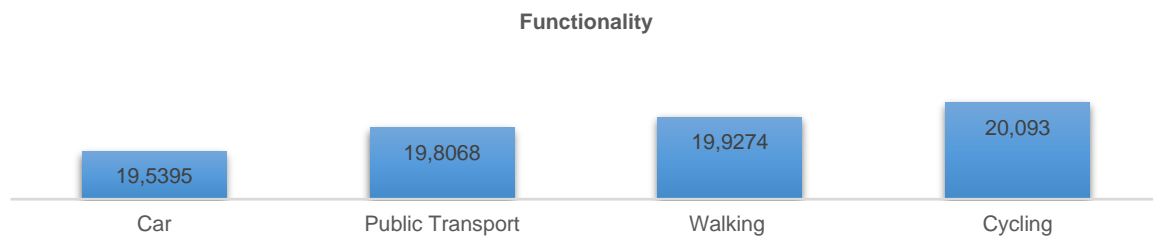
Graph 5 - Average levels of functionality regarding mode of transportation

Concerning the emotional problems that limit activities with friends and family, the study shows that the group of individuals with the lowest limitations is the group that chooses to cycle (M = 1.500, SD = 0.96903) with a significant statistical negative correlation (R = -0.124, p = 0.013). The group that presents the greatest number of emotional problems is the group that uses public transport as the main mode of transportation.

Emotional Problems

Car	Public Transport	Walking	Cycling
1,9251	1,9444	1,8185	1,5
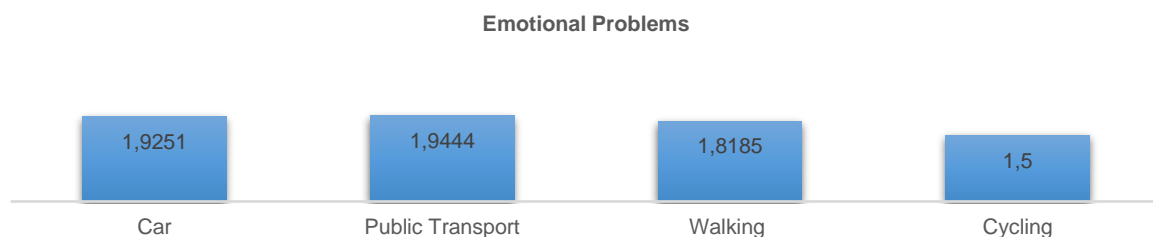
Graph 6 - Average level of emotional problems that limit activities with friends and family regarding mode of transportation

Analyzing issues such as weight, blood pressure, and cholesterol levels, the table below shows the levels of correlation between these three factors and the use of transport.

Transport	Body Weight	Blood Pressure	Cholesterol
Car	-.153**	0.057	.100*
Public Transport	-0.046	0.003	-0.006
Walking	-.099*	-0.046	-0.053
Cycling	-.160**	-0.053	-.100*

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

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

Table 2 - Correlations between modes of transport and weight, blood pressure and cholesterol levels regarding mode of transportation

In relation to the social support scale, in general, the group that presents positive correlation is the Cycling group (R = 0.136, p = 0.007). Dividing the scale into its four subscales, the "Satisfaction with Friends" subscale, only the Walking (R = 0.114, p = 0.017) and Cycling (R = 0.144, p = 0.004) groups show a positive correlation. In the subscale, "Intimacy" there are no correlations between modes of transport. In relation to "Family Satisfaction", the Car group (R = 0.122, p = 0.009) is the group that presents a positive correlation and the Public Transport group (R = -0.114, p = 0.021) presents a negative correlation. Finally, in the "Social Activities" subscale, the groups that show positive correlation are the active transports, Walking (R = 0.123, p = 0.009) and Cycling (R = 0.161, p = 0.001).

Social Support Total
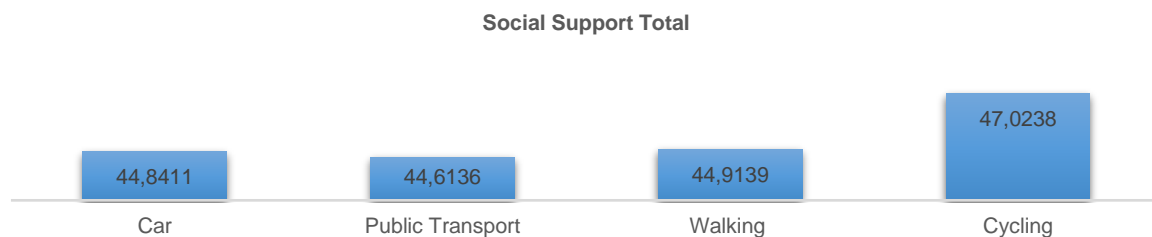
Graph 7 - Mean of the levels of the total social support scale regarding mode of transportation
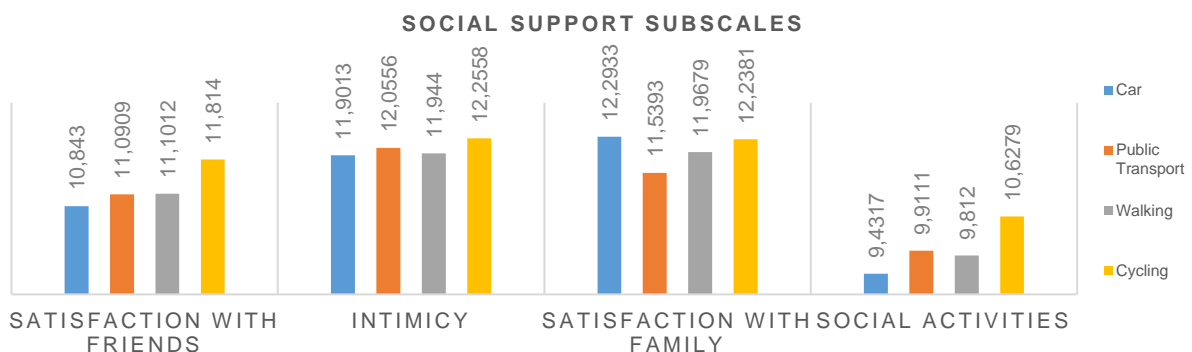
Graph 8 - Average levels of social support subscales regarding mode of transportation

Regarding the frequency of use of modes of transport, car, public transport, walking and cycling, this study shows that individuals who experience the least difficulties in transportation and limitations are the individuals who most frequently use the bicycle (M = 1.7857, SD = 0.87054) being also the only mode of transport that presents a significant correlation of (R = -0.187, p <0.001). Regarding the remaining modes of transportation, walking (M = 2.2218, SD = 1.03931) is the mode of transportation that presents the least difficulty in transportation followed by the car (M = 2.3156, SD = 1.20378) and public transport (M = 2.4157, SD = 1.07459).

Dificulties

Car	Public Transport	Walking	Cycling
2,3156	2,4157	2,2218	1,7857
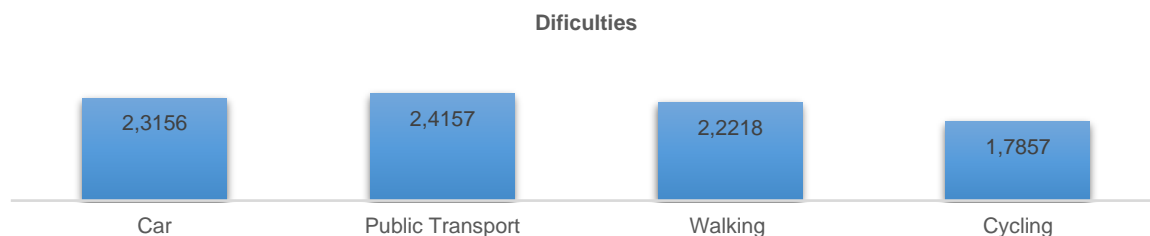
Graph 9 - Average level of transportation difficulties and limitations regarding mode of transportation

The data analysis shows that the individuals who experience fewer transport limitations are more satisfied with their lives in general (p<0.001) presenting a negative correlation (R = -0.285, p < 0.001), and the same conclusions for time with family (p=0.025) also presenting negative correlation (R = -0.131, p = 0.003). Regarding daily activity, the analysis does not show any correlation or significant differences between groups.

Regarding the Functionality and Social Support Scale, the analysis shows negative correlation in all subscales, Functional Scale (R = -0.232, p < 0.001), Social Support Total (R = -0.228, p < 0.001), Satisfaction with Friends (R = -0.136, p = 0.002), Intimacy (R = -0.141, p = 0.001), Satisfaction with Family (R = -0.200, p < 0.001) and Social Activities (R = -0.198, p<0.001).

Regarding Health in General, the analysis shows that people with more limitations present a low level of Health (R = -0.170, p < 0.001), and the emotional problems limit their activity with friends and family (R = 0.164, p < 0.001).

5. CONCLUSION FROM DATA ANALYSIS AND SURVEY LIMITATIONS

The quality of Life is a concept related to the general well-being, including the physical, mental, psychological and emotional well-being, social relationships, such as family and friends, health, education and other parameters that affect human life. A concept related to Quality of Life is the concept of Social Support, which means having support to turn to in times of need or crisis that provides a broader focus and positive self-image, and it can take different forms namely emotional, tangible or intangible and may come from various sources, such as family, friends, pets, neighbors, co-workers, organizations. Social Support improves the quality of life and provides a protection against adverse life conditions. These two life domains (Quality of Life and Social Support) have been studied by many disciplines including psychology, medicine, sociology, nursing, public health, social work, and in recent years, engineering related to the Transportation.

Following the analysis of the questionnaire, regarding availability, the results show that the participants who have greater Mobility and Accessibility availability have a more positive evaluation of Health, Quality of Life and Social Support, and more positive evaluation in the

majority on their subscales. Regarding the participants' choices, the results show that there are significant differences in the majority of the studied domains.

The results corroborate the great impact that Mobility and Accessibility have on Quality of Life, Social Support, and Health, therefore Transport Policies should place great importance on these domains.

This study also showed that active transport, that is, walking and cycling promote better levels in the perception of health, quality of life and social support. However, this perception cannot be made by its flexibility in the matter of mobility, but also by a part of activities of an active and non-sedentary lifestyle. A healthily active lifestyle promotes physiological and chemical reactions, such as the release of endorphins, by many known as the "pleasure neurotransmitter" that can induce, as the name implies, feelings of pleasure and satisfaction. Thus, it can be concluded that transport that promotes physical activity can be included in a routine of mobility, bringing personal, social and environmental benefits. To conclude, this study showed that the less limited individuals, regarding transportation, have better levels of perception concerning health, quality of life and social support.

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.

6. DISCUSSION and FURTHER CONCLUSIONS
6.1 Active Transportation and Physical Activity

At the beginning of the 21st century, some of the biggest political issues have been related to the environment, the sustainability, quality of life and population welfare because the great mass of the population inhabits urbanized areas, which today reach 53% of the world's population. In this way, the planning and urban design must involve material aspects such as infrastructure, equipment and green spaces and the immaterial aspects, such as security, confidence, and sense of belonging (Barton & Tsourou, 2000; Frank et al., 2006; Schipperijn et al., 2010).

The urban design can influence positively and negatively the well-being and quality of life of the population. This way a broad range of sciences, such as engineering, architecture and the various human and social sciences must join efforts and knowledge to promote better living conditions (Tzoulas et al., 2007) ensuring access to goods and services, public spaces, an environment with low levels of pollution and provide a comfortable, secure and efficient transportation system. The offer of shared spaces with favorable material conditions such as infrastructure and accessibility and immaterial conditions as for security and trust provides to the population a healthy environment that encourages the practice of physical activity, walking and cycling can contribute to the building of relationships with the neighbors and foster the sense of belonging to a place. The relationship of spaces designed by a need-sensitive of the populations can have a direct impact on the quality of life and social support of the subject and indirect impact such as the reduction of environmental pollution (Whitford, 2001).

There has been a tendency on the part of several countries to study the topic of sustainable mobility through the use of environmentally friendly modes of transport in order to provide wider access to urban space, making the largest possible number of people independent of their conditions, whether physical, psychological or economic. According to Günther (2003), mobility is essential to the development and well-being of the human being. Sustainable

mobility is the set of policies for transport and movement that aims to provide broad and democratic access to the urban space through the prioritizing of modes of public transport and non-motorized effectively, socially inclusive and environmentally sustainable (Aguiar, 2010).

Encouraging the walking and cycling traveling behavior brings many benefits to our communities and also to its inhabitants. Evidence suggests that increasing the number of walkers and cyclists can improve the economic activity, promote accessibility, reduce congestion, improve safety and public health through a healthy way of traveling.

In the history of cities, we noticed that the cities took shape based on the motorized mobility pattern. The construction of bridges, roads, parking lots and the reduction of sidewalks size encourages the car use behavior and at the same time discourages the use of soft modes of mobility. However, nowadays it seems that soft modes of mobility are reborn. More bicycles and walkers are seen, but the reasons for that are not clear yet. Is this because the oil price is increasing or because it is fashionable and fancy? Is it because the population is aware of the ecological and environmental impact of the motorized mobility modes? What is indisputable is that this is a favorable period to change the mobility patterns, and something needs to be done to avoid the chaos that the unsustainable car use might bring to our lives.

6.2 Physical Activity Benefits

According to the American College of Sports Medicine, "physical activity" refers to any bodily movement produced by skeletal muscles, and results in an expense of energy (Nelson et al. Al. 2007), including both the occupational activity and leisure. On the other hand, it is described that exercise as a subclass of physical activity, defined as a body movement planned, structured, and repetitive, executed with the purpose of improving or maintaining one or more components of physical fitness (Gomes, 2010). Physical activity is defined as any physical movement produced by skeletal muscles that are bigger than energy costs originated in the rest state (Dobbins, 2001). This physical activity is included in many activities, such as sports activities, these collective and individual, games, dance, daily walks among others.

However, the developed society where we live today provides a more comfortable lifestyle where all the scientific and technological advancement has had a negative impact on issues of physical activity, promoting increasingly sedentary lifestyles in the population. This fact, in a medium to long term, will bring some repercussions on physical and mental health. There are interests in several areas of study, such as economics, biology, medicine, and psychology that recognize the need for sport and physical activity as key to lower levels of inactivity and thereby restoring good levels of health both physical and mental (Aguiar, 2011).

In developed countries, it is estimated that more than two million deaths per year are due to sedentariness, and sixty to eighty percent of the world's population is not active enough to enjoy health benefits. Although the benefits of physical activity to the quality of life and psychological and physical well-being are described and substantiated, it is noteworthy that in recent years there has been an exponential incidence of a sedentary lifestyle and physical inactivity in the population on a daily basis (Pombo, Martins & Palmeira, 2010). Consequently,it is becoming increasingly relevant and necessary to create research models that evaluate and study the factor "physical activity" when related to health, both physical and mental, and its implications in the sedentary lifestyle (Caspersen, 1985). Nowadays, the so-called "developed" society has increasingly cooperated with the breakup between the existing link between physical activity and man. What formerly was done by the human physical effort, now is replaced by machines and other technological devices. It can then be assumed that physical activity, regardless of its nature, was present in the development of human beings, then to

what extent will the exclusion of it be a good choice for our lives? Is the range of diseases we know today due to the fact that we eliminated the biggest sources of vitality from our lives? It is therefore urgent for physical activity to play an important role in our lifestyles in order to enjoy high levels of energy and vitality.

Exercise is positively related to health, mainly in the mental, social and physical aspects of it. Research done by various health professionals suggest that the practice of physical activity, with moderate intensity, reduces the mortality rate and the risk of contracting diseases such as respiratory, cardiovascular, diabetes such as anxiety, depression. Based on this research evidence was found that sport can increase academic performance, assertiveness, confidence, emotional stability, intellectual functioning, internal control locus, memory, perception, positive body image, self-control, sexual satisfaction, well-being and effectiveness at work. On the other hand, sport can decrease absenteeism at work, alcohol abuse and of other substances, anger, irritation, anxiety, confusion, depression, headaches, hostility, phobias, psychotic behavior, tension, type "A" behaviors and errors at work (Cruz et al., 1996)

There is no doubt that the practice of sport or physical activity with appropriate frequency, intensity, and duration fit in the group of healthy lifestyles, when properly dosed can provide feelings of pleasure, the release of serotonin, a neurotransmitter with great importance when it comes to reducing levels of anxiety, depression, mood swings, panic, self-control and can still contribute to the prevention of social stress and burnout levels (Habib, 2000; Duncan, 2010).

To take advantage of the benefits of physical activity to achieve a healthier lifestyle and combat the sedentary lifestyle, physical activity does not require to be a daily activity of high intensity, involving pain and suffering and long periods of time. What is needed is to include physical activity in our daily lives moderately and on a regular basis, thus adopting a more active lifestyle in their daily routines.

Physical activity is beyond combating sedentariness because regular and moderate physical activity can contribute to the change of living standards of adulthood, acting as a preventive agent of degenerative diseases and contribute to significant gains on the locomotion levels, can also prevent obesity and cardiovascular problems as well as help to decrease the stress and increase the feeling of well-being.

6.3 How To Promote Walking and Cycling

How can we encourage walking and cycling behavior? In order to promote walking and cycling, the efforts of national or regional governments are not enough, a long-term strategic planning and the inclusion of the population in the plan are also necessary. Connectivity, mixed land use, safety and high quality of public spaces are several aspects about this urban design that are part of a successful sustainable mobility plan that includes walking and cycling, (NZ Transport Agency, 2008).

Walking and cycling should be promoted as suitable and safe transport modes, but in order to do this it is essential first to create networks that connect key geographical points. This connection between points must be made in a timely manner through walking and cycling, and it should be safe, direct and attractive. Connectivity is an extremely important factor. A good network of connection within neighborhoods and between nearby neighborhoods designed with sensitivity to the needs of the population encourage the adoption of soft modes of mobility. These connections should be carefully planned, they should have good visibility for their users combined with traffic-calming strategies to reduce the speed of the car flow creating and ensuring safe conditions and encouraging walking and cycling. We can also think of

infrastructures and services available along the bike lane, such as drinking fountains or some kind of service stations with drinks and snacks for the users. The bike lane should not be built as a means to an end, but rather to provide pleasure and satisfaction to the cyclist allowing the bike lane and allow him/her to discover the potential of the city.

People are less likely to walk and cycle if the sidewalks are in bad conditions and with insufficient lighting, because they will feel a lack of security both accidental and crime. (McIndoe, 2005) The mixed land use is very important in this sustainable mobility planning. Public spaces that promote coexistence of activities, including office business, street trade, leisure facilities for all age groups encourage the connection between generations and between people from different cultures or people with different economic conditions. If these mixed spaces were planned carefully for sustainable mobility plans, the coexistence of activities could contribute to all their users for common causes, such as the reduction of the car use.

The circunstances that promote cycling or walking are very important for a change in the population's behavior regarding the choice of transportation. Many people imagine themselves moving in the city walking or cycling. However, this thought may never become real because there are many factors that hinder this kind of behavior. Factors such as habit, the accommodation to car use, fear or feelings of insecurity that roads can cause or misinformation or wrong beliefs about what travelling by soft modes of mobility is in reality. Circunstances that encourage walking and cycling can serve as a "teaser" that foster changes in behaviour. It could begin as a peer group activity, as something different from their routines, basically begining as a leisure activity and hopefully this type of leisure activity can bring a new awareness about the use of soft modes as the subject experiences what it is like to travel by soft modes of mobility. As a result of this experience, the awareness about the reality of sharing the city through the soft modes of mobility changes and therefore the subject of the experience adjusts his/her beliefs based on a real life experience.

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