**Universidade de Aveiro**
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Secção Autónoma de Ciências da Saúde

**ANA SOFIA MARTINS FERREIRA CANEDO GARRIDO**

# LIFE EXTENSION ATTITUDES AND THE WISH TO BECOME A CENTENARIAN

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Dissertação apresentada à Universidade de Aveiro para cumprimento dos requisitos necessários à obtenção do grau de Mestre em Gerontologia, realizada sob a orientação científica do Doutor Óscar Ribeiro e da Doutora Margarida Cerqueira, equiparados a Professores Adjuntos da Escola Superior de Saúde da Universidade de Aveiro

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*"Ninguém escapa ao sonho de voar, de ultrapassar os limites do espaço onde nasceu, de ver novos lugares e novas gentes. Mas saber ver em cada coisa, em cada pessoa, aquele algo que a define como especial, um objeto singular, é fundamental. Navegar é preciso e reconhecer o valor das coisas e das pessoas, é mais preciso ainda".*

*Antoine de Saint-Exupéry*

**palavras-chave**

Atitudes, anti longevidade, centenários, extensão da vida humana, pro longevidade, opinião pública.

**resumo**

**Introdução:** Com o avanço galopante da biologia e o aumento contínuo da esperança média de vida torna-se imperativo analisar as atitudes das pessoas em relação à extensão da vida humana e como estas se relacionam com as atitudes em casos de elevada longevidade do tempo de vida. **Objetivos:** O objetivo deste estudo é analisar, numa amostra de pessoas mais velhas, a relação entre atitudes pró e anti- longevidade, as atitudes em relação aos centenários e a vontade de chegar aos 100 anos. **Métodos**: Elaboração de um questionário com recurso a alguns itens selecionados da Life Questionnaire -Extension ( LEQ ) e à Aging Semantic Differential (ASD), cujo o objecto atitudinal foram os centenários. Inclui ainda uma questão sobre a vontade de chegar aos 100. O instrumento foi administrado a uma amostra de 141 indivíduos com idade mínima de 60 anos de idade. Informações sociodemográficas (idade, sexo, estado civil, existência de filhos e netos e o nível educacional) e relativas à auto-perceção do estado de saúde e da qualidade de vida também foram obtidas. **Resultados:** Os resultados globais sugerem que na amostra considerada não há, por grande maioria, atitudes de pró- ou anti- longevidade mas que há uma tendência prolongevista. O estado civil (ser casado / viver junto), nível educacional superior, auto-perceção positiva do estado de saúde e a vontade de viver até aos 100 anos foram os preditores dessa tendência. **Conclusão**: São necessários mais estudos sobre a opinião pública acerca da extensão da vida humana e das variáveis contextuais e construções psicológicas que sustentam as atitude positivas e / ou negativas em relação às vidas extremamente longas para se obter dados mais conclusivos. Também são necessárias novas análises sobre a versão em Português do LEQ.

**keywords** Attitudes, anti- longevity, centenarians, life extension, pro-longevity, public belief.

**Abstract**

**Background**: With the galloping advances in biology and the continuous increase in life expectancy it is important to examine people's attitudes regarding life extension possibilities and how these relate to attitudes towards living an extremely long life. **Objectives:** The objective of this study is to analyze the relationship between pro- and anti-longevity attitudes; attitudes towards very old people (centenarians) and the willingness to live until the age of 100 years in a sample of older adults. **Methods:** Selected items from the Life-Extension Questionnaire (LEQ), the Aging Semantic Differential (ASD) using centenarians as an attitudinal target and a question about the willingness to live until the age of 100 were administered to a sample of 141 individuals aged at least 60 years old. Socio-demographic information (age, gender, marital status, children and grandchildren's existence, educational level), perceived health status and perceived quality of life were also obtained. **Findings:** Overall findings suggest that there are no overwhelmingly pro- and anti- attitudes toward life extension in the considered sample, but that there is a prolongevist trend. Marital status (being married/living together), higher educational level, positive perceived health status and willingness to live to age 100 were found to be significantly related with this trend. **Conclusion:** Further studies are needed on the public opinion regarding human life extension and on the contextual variables and psychological constructs that may affect more a positive and/or negative attitude toward extreme longevity to gather more conclusive data on this subject. Further analyses of the Portuguese version of the LEQ are also needed.

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## Introduction

With the promising discoveries about aging that have taken place in the last decades it may be conceivable that one can reach 90 years old and keep the health and liveliness of a 50 years old person (Miller, 2002). Presently there are numerous debates surrounding the topic of human life span extension (Dumas & Turner, 2007; Kogan, Tucker & Porter 2011) and issues from diverse scientific backgrounds, particularly from bioethical debates, have been extensively brought to discussion; yet, public beliefs and attitudes regarding life extension have not been particularly studied (Kogan, Tucker & Porter, 2011) nor their potential associations with attitudes towards those who have reached an extreme old age (e.g. centenarians) as well with the personal wish to live to the age of 100.

Different concepts are used in studies about prolonging life expectancy and so it is useful to clarify their meaning. Longevity refers to the number of years that a single person lives, from birth to death (Kristjuhan, 2013), and life expectancy summarizes mortality at all ages, referring to the number of years that an average subject in a population is expected to live (Kristjuhan, 2013; Olshansky, 2013). Current projects aiming at prolonging or extending lifespan have been of great interest, and are now becoming possible namely through bioscience and medicine. Genes (Kenyon 2010; Kim 2007; Willcox, Willcox, Hsueh & Suzuki 2006), medicines (Kenyon, 2010; Wareham, 2012), hormone therapy (Kass, 2004), stem cells (Dumas, 2007; Kass, 2004) and caloric and methionine controlled restriction (de Grey, 2002; Kim, 2007; Miller, 2002; Oliveira, Tahara, Gormbert, Barros, & Kowaltowski, 2008) may help to find pathways to increase life extension and altogether these techniques are ought to make a greater influence (Kenyon, 2010) and substantially increase human life span (Miller, 2002).

Although significant modifications to the human lifespan may be a futuristic goal, the rising of life expectancy brings immediate repercussions for contemporary society. Such consequences relate with various social, political and economic issues as increased public expenditure in health, pension crisis, uneven distribution of natural resources and overall changes in political representation (Dumas & Turner 2007). Such consequences make it timely to know what people think on the possibility of living longer and of investing human resources on a “life extension scientific project”. In fact, even if life-extension technology has the potential to drastically alter the shape of an

individual's life and of society as a whole it is required and prudent to think about whether the benefits at stake will be offset by hidden costs (Bhattacharya & Simpson, 2013).

## 1. Public beliefs and attitudes towards life extension

With the objective of understanding the public opinion about life extension Calnan, Montaner & Horne (2005) conducted a study in the United Kingdom with 1187 participants. The main results revealed that about 37% of the respondents indicated that gene therapy, which would extend average like expectancy, should be banned and 30% believed it should be freely available; genetic technologies for treating or detecting diseases were appreciated but general interventions that aim to change "natural" processes were less acceptable. In Australia, two qualitative studies were conducted to identify the public attitudes toward life extension, and both presented a significant polarization in their findings with some participants strongly supporting life extension and others opposing with the same intensity (Pastridge, Underwood, Lucke, Bartlett & Hall 2009; Underwood, Bartlett, Partridge, Lucke & Hall, 2008). One of these studies was about public attitudes toward life-extension and anti-ageing research with a focus on ethical issues. The participants that favoured life-extension and anti-ageing attitudes focused on the potential to personally extend their longevity or remain youthful for longer if the personal cost to them were acceptable; on the other hand, those who were uncertain or opposed attached greater importance to societal implications and ethical issues many of which have been projecting in debates among bioethicists (Pastridge, Underwood, Lucke, Bartlett & Hall, 2009). Some years later, with a bigger and more representative sample, similar results were found by the same researchers: participants would support the development of technologies to increase life span but a reduced number of them said that they would personally use a life-extension technology (Pastridge, Lucke, Bartlett & Hall, 2011).

In face of the lack of studies focusing on American older adults' views and attitudes towards extending the healthy lifetime, Cicirelli (2011) also conducted an exploratory study that aimed to relate elders' attitudes towards life extension to psychosocial and background factors. The author found that attitudes were more positive toward an extended life span than "living forever", and that more positive attitudes were related to greater desired age, less death acceptance, greater goal seeking, greater internality, to a lower age and to non-Christian-religious affiliation. More recently, in Canada,

Dragojlovic (2013) demonstrated a good support for a radical increase in life expectancy resulting from advances in regenerative medicine. This researcher concluded that respondents were strongly supportive of the prospect of extended lifespan, with more than half desiring to live 120 years if scientific advances made it available. In addition, almost half of participants agreed that this rise of expected lifetime would be possible by 2050. These results contrasted with the previous studies of public opinion in the ambivalence regarding the assignment of benefits to anti-aging biotechnology, the negative effects of extended lifespan and the morality of proposition.

## 2. Pro- and anti-longevity attitudes

Whereas the study of public opinion on life extension issues is still very recent and several studies have found some ambivalence regarding the positioning towards lifespan, in overall the debate around life-extension often relates to a more pro- or anti-longevity leaning position.

Attitudes pro- and anti- longevity are related to the position about deliberate interventions that change the "natural" aging process either by genetic, pharmacological and/or caloric reduction processes, not including the promotion of longevity through life-style changes (Kogan, Tucker & Porter 2011). Prolongevitists believe that the actual life span is not quite enough and that the humanity can live more years. In this line of reasoning, there's a need to know the biological limits by human intervention in the aging process so that one can stop, slow or reverse it (Hayflick, 2002). A longer life will mean more time to enjoy valuable things like friendship, love and satisfying work (Bhattacharya, 2013). Although enthusiastic on the possibility of living longer, people advocating these attitudes recognize that life extension could bring costs such as the rise of age-associated brain disorders, loss of meaning due to fulfilled desires, depreciation of repeated experience and the mental state of feeling old (Wareham, 2012), but they also believe that promising life extending technologies and social context's changes may prevent some of these consequences (Kenyon, 2010; Moody, 2002; Wareham, 2012). The positive social benefits of life extension are mostly related to wisdom and experience, although these could be old stereotypes since there isn't any evidence that wisdom grows proportionally with aging (Callahan, 2009). Intergenerational relationship and enhancement of individuals' life goals are also some of the benefits of the additional time that an extended life could bring to the humanity (Kogan, Tucker & Porter 2011).

On the opposite side of a pro-longevity attitude, several researchers who support anti-longevity attitudes state that age and death should not be faced negatively (Hauskeller, 2011). Youth and old age are both recognized as part of the natural cycle (Moody, 2002), and searching for a “Fountain of Youth” has always been a delusion. According to this position there is no moral urgency in pursuing the maximum human life span since the humanity has others priorities like saving lives of children from third-world countries. Investing in research for lifetime extension would constitute discrimination since it would benefit those who will probably live a few decades anyway (de Grey, 2004). Although inevitable, aging is not a genetically programmed process especially in organisms as complex as humans, so there are no quick fixes that will permit the scientists to treat aging as if it was a disease (Hayflick, 2001; Olshansky, Hayflick & Carnes, 2002). Anti-longevity defenders also support that life extension technologies would result in an explosive growth of the elderly population that could bring bad consequences to healthcare capacity, social support and to society as a whole. Moreover, according to those who advocate this position, there is no guarantee that the disabilities of age would be cured if lifetime extension opportunities became available (Moody, 2002).

## 3. Life extension attitudes and the centenarian population

Supposing that biomedical advances have put centenarian status within the potential range of all of us (Kogan, Tucker & Porter, 2011) it seems relevant to examine how individuals respond to such possibility and to explore if this has a specific relation with pro- or anti-longevity attitudes as well as with attitudes held toward those who live 100 years or more. Particularly on this last issue, although presently there are several studies focusing on attitudes toward elderly people, namely among those have or will have direct contact with the oldest population, such as health professionals (Liu & Norman, 2012) and university students (Gonçalves, Guedes, Fonseca, Pinto, Martin, Byrne & Pachana, 2011), little information is available on centenarians as a specific attitudinal target. This group often related to a positive image of achieving a “special age landmark” might not be universally seen through such optimistic lens; in fact, centenarians may elicit different beliefs and feelings and possibly influence individuals’ attitudes towards life extension issues. In addition, a more positive or negative attitude towards centenarians may be related to own wishes to live to the age of 100, though it has not been considered as a potential influencing variable in previous studies on the willingness to become a centenarian (e.g. Huohvanaine, Strandberg, Pitkala, Karppnen & Tilvis, 2012).

The present study is part of a larger Portuguese research project on Portuguese Centenarians (PT100 – the Oporto Centenarian Study) and aims to analyze the attitudes towards life span extension and towards centenarians in a sample of community-dwelling older adults (aged 60+). Main objectives were (i) to explore the association between pro- and anti-longevity attitudes and attitudes towards centenarians; (ii) and to examine which factors affect people's attitudes towards life extension (pro- and anti-longevity global attitude) and their willingness to live to the age of 100. As attitudes towards such specific aging related topics have seldom been studied, particularly in the Portuguese context (Ribeiro & Araújo, 2013), we intend to add to the body of knowledge concerning this relevant topic. Also, we believe the relationship between life extension and centenarians is timely because, at present, medical advances have been followed by rising life expectancies as well as growing numbers of people living an extremely long life (Carnes, 2003; Cicirelli, 2011; Kogan, Tucker & Porter, 2011) especially in European countries.

## 4. Methodology

### 4.1 Participants

A convenience sample of 141 individuals aged 60 and over was recruited from the surrounding geographic area where the PT100 project takes place (Northern coast side region of Portugal). All participants were volunteers randomly recruited among community-dwelling clients of senior citizen centers, senior universities and outpatients of a regional hospital. In order to integrate the study, participants had to be at least 60 years, express their willingness to respond to a questionnaire and present no major cognitive disorders.

### 4.2 Measures

A questionnaire tapping into the socio-demographic characteristics (age, gender, marital status, children and grandchildren's existence, educational level) was followed by selected items from the Life Extension Questionnaire and by the Refined Aging Semantic Differential (refined-ASD):

#### 4.2.1 Life Extension Questionnaire

Life Extension Questionnaire is a recently developed instrument by Kogan, Tucker & Porter (2011), which is composed by 35 concrete attitudinal statements distributed by seven categories. It was developed from expository texts of bioethical debates about life extension and covers 15 pro-longevity and 20 anti-longevity items grouped into 7 categories. The 1st category encloses items that relate life extension with prolonging disease, disability, and other drawbacks for individuals; the 2nd is about life extension as improving an individuals' quality and satisfaction with life; the 3th is related with the impact of life extension on intergenerational relationships; the 4th is correlated with the potential fruitfulness of pro- longevity research; the 5th is linked to disruption vs. enhancement of an individuals' life goal; the 6th is related to the effects of life extension on society, including work, retirement and the economy. Finally, the 7th category is the individual acceptance vs. rejection of a lower quality of life in the pursuit of life extension. Respondents express their opinion about each statement of the questionnaire with one of the following positions: disagree; slightly disagree; slightly agree and agree (ranging from 1 to 4). In pro-longevity's statements, higher scores represent increasing positive attitudes concerning life extension and a lower score represents increasing negative attitudes; in anti-longevity's statements, a higher score reflects increasing negative attitudes toward life extension and a lower score is associated with increasing positive attitudes. In this study we only considered categories 1, 2 and 7 composing a total of 15 attitudinal statements balanced in the sense of containing both pro-longevity and anti-longevity items (8 and 7 respectively). The LEQ was translated into Portuguese with the author's authorization.

#### 4.2.2 Refined Aging Semantic Differential

The Refined Aging Semantic Differential (Polizzi & Steitz, 2003) is an instrument originally developed by Rosencranz & McNevin (1969) to assess attitudes toward the elderly. The original form has a list of 32 polar opposite adjective pairs on a 7-point scale with a neutral middle block. In this study we used the refined version developed by Polizzi & Steitz (2003), which includes a shorter (24 pairs) and more contemporary list of adjectives to describe older adults and comprises a single latent factor – attitude – which corresponds to the original instrument's personal acceptability-unacceptability (Gonzales, Tan & Morrow-Howell, 2010; Polizzi, 2003). The items are summed for an overall attitude score with a theoretical range of 24-168, with a midpoint of 96: less than 96 indicate a positive attitudinal score and a total greater than 96 indicates a negative attitudinal score (Polizzi & Millikin, 2002). In this study we modified the instrument's

original attitudinal target from “men 70-85 years of age” or “women 70-85 years of age” to “individuals aged 100 and over”.

#### 4.2.3 Perceived Health Status and Perceived Quality of Life

The perception of the respondent’s health in general (perceived health status) was assessed through a standard health-rated question: “In general, how would you rate your health status?” with 5 options – excellent, very good, good, fair and bad. Participants were then asked to rate their own quality of life considering people their own age “In general, how would you rate your quality of life?” with the same answering options. Self-assessed health status and quality of life have proved to be very useful in others studies (e.g. Barofsky, 2012).

#### 4.2.4 Willingness to live to age 100

A final question about the wish to achieve 100 years of age was considered as a measure of length of desired lifetime. This question has been used in several other studies focusing on the explicit age of 100 (e.g. Huohvanaine, Strandberg, Pitkala, Karppnen & Tilvis, 2012).

### 4.3 Procedures

A pilot study was conducted in order to test the comprehensibleness of the questionnaire and to check wording and the range of responses. Minor adjustments were made before the final version. Each participant signed an informed consent before integrating the study and permission was obtained from the institutions to recruit clients (e.g. senior centers). For those situations regarding outpatients from the regional hospital, an official approval was obtained from the hospital’s ethical committee. Major ethical issues were by these means contemplated. The questionnaires were distributed between March and April 2013 and a total of 141 individuals acceded to participate in the study. All instruments were fulfilled anonymously using a paper-and-pencil format and in most cases self-administered. Completion time took on average 15 minutes.

### 4.4 Data analysis

Descriptive analyses (mean and standard deviation for continuous variables, frequencies for categorical variables) were performed to profile the participants' characteristics (see table 1). According to the participant's global score on LEQ's items, they were divided into two major groups: those to be considered mainly pro-longevity and those to be considered mainly anti-longevity. A binary logistic regression model was then conducted to determine which variables better explained an overall positive attitude toward life extension analyzing the Nagelkerke R Square. In order to obtain a simplest interpretation of the covariates, all of these were considered as dichotomous. The process of dichotomization of the covariates were based on: the characteristics of the variables (e.g. single vs. married/living together); the creation of two subgroups with similar number of elements (e.g. less 9th grade vs. 9th grade or more; less than 70 years old vs. aged 70 or more) and separating positive choices of the remaining (e.g. excellent/very good/good health vs. fair/poor health; willingness to live to 100 years old vs. unwillingness/don´t now).

Attitudes toward centenarians were obtained through the refined-ASD overall score (positive attitude vs. negative attitude). In a first step, univariable binary logistic regression models were performed in order to identify significant factors associated with an overall pro-longevity attitude. There were considered as covariates for the multivariable binary regression model all significant covariates in the previous univariable models. A second binary logistic regression analysis was conducted in order to better understand the variables that better explained the willingness to live to age the age of 100. All analyses were performed with Statistical Package for the Social Sciences (SPSS) software, version 20 and considering a significance level $\alpha=0.05$.

## 5. Results

### 5.1 Characteristics of Study Participants

As shown in table 1, study participants were mostly female (57.6%) with a mean age of 71.5 (range = 60-90; SD =8.7). Regarding marital status, 61.9% were married, 30.9% widowed, 43% single and 29% divorced/ separated. On the educational level, 32.4% had up to four years schooling, 15.1% concluded high school grade, 9.4% had 9 years schooling and 5.8% never attended school. On average, respondents have studied 7.96 years (SD = 4.8). Most respondents had one or more children (96%) and

grandchildren (70.5%). As for the participants' perceived health status, approximately 55% revealed a positive perception, 34.5% considered it "fair" and the remaining 10.8% considered to have a "poor" health condition. When asked about their quality of life, about 70.5% responded positively, 26.6% considered it "fair" and 2.9% reported it as being "poor". When asked about their willingness to live to age 100, 53.2% said that they would wish to reach such age and 23% would not; 23.7% reported not knowing.

### 5.2 Findings

A first finding reveals that there is a great distribution of participants in respect to attitudes toward human life extension: 41.8% of the sample was found to be against it (antilongevists) and 54.1% in favour (prolongevists). As it is possible to observe in the table 1, antilongevists are mostly female (66.1%), with a mean age of 73 years old (SD=9.1), married (49.2%) or widowed (42.4%) and with 6.58 years on average of school education (SD=4.8). More than half of this subsample considered their health status as "fair" (39%) or "poor" (20.3%) and perceived their quality of life in a positive manner (64.4%). About 51% held negative attitudes toward centenarians and 58% referred not knowing or not having the willingness to live to age 100. Prolongevists, on the other hand, were slightly younger (mean age of 69.8; SD=7.8) and mostly married (74%). Their average educational level was of approximately 9 years. Most respondents in this subgroup considered their health status as being positive (65%) and their quality of live as "excellent", "very good" or "good" (75.4%). Approximately 60% held negative attitudes toward centenarians and 63.6% expressed their willingness to live to age 100. In comparison to the antilongevist group, the prolongevists participants are mostly male, younger, included a higher number of married elements, and presented an overall higher educational level and better health status perception. They also expressed more negative attitudes toward centenarians but a greater desire to live to age 100.

The unadjusted odds ratio for attitudes towards human life extension, as explained in table 2, showed that the marital status (married/living together), the educational level (9th grade or more), the self-assessed health status (excellent, very good or good) and the willingness to live to age 100 are positively associated with a prolongevist position. After adjustment of all the variables present in this study, the only variables that remained associated with such positioning were marital status (OR 2.5, 95% CI 1.1-6.4) and willingness to live to age 100 (OR 3.1, 95% CI 1.4-6.8). The unadjusted odds

ratio for willingness to live to age 100 was calculated but none of the variables considered in this study presented statistically significant results.

**Table 1 - Sample's characteristics, total and by subgroups.**

| | Total | Antilongevists n (%) | Prolongevist n (%) |
|---|---|---|---|
| | **141** | **59 (41.84%)** | **77 (54.61%)** |
| **Gender** | | | |
| Female | 80 (57.6%) | 39 (66.1%) | 38 (49.4%) |
| Male | 59 (42.4%) | 20 (33.9%) | 39 (50.6%) |
| **Age (years)** | | | |
| Mean (SD) | 71,5 (8.7) | 73.1 (9.1) | 69,8 (7.8) |
| Less 70 | 68 (48.9%) | 25 (42.4%) | 42 (54.5%) |
| 70 or more | 71 (51.1%) | 34 (57.6%) | 35 (45.5%) |
| **Marital Status** | | | |
| Single | 6 (4.3%) | 2 (3.4%) | 3 (3,9%) |
| Married/ Living together | 86 (61.9%) | 29 (49.2%) | 57 (74.0%) |
| Divorced/ Separated | 4 (2.9%) | 3 (5.1%) | 0 (0.0%) |
| Widowed | 43 (30.9%) | 25 (42.4%) | 17 (22.1%) |
| **Children** | | | |
| Yes | 133 (95.7%) | 57 (96.6%) | 74 (96,1%) |
| No | 6 (4.3%) | 2 (3.4%) | 3 (3.9%) |
| **Grandchildren** | | | |
| Yes | 98 (70.5%) | 46 (78.0%) | 51 (66.2%) |
| No | 41 (29.5%) | 13 (22.0%) | 26 (33.8%) |
| **Educational Level** | | | |
| Mean (SD) | 7.96 (4.8) | 6.58 (4.8) | 8.99 (4.3) |
| Less 9$^{th}$ grade | 71 (51.4%) | 39 (66.1%) | 31 (40.3%) |
| 9$^{th}$ grade or more | 67 (48.6%) | 20 (33.9%) | 46 (59.7%) |
| **Perceived Health Status** | | | |
| Excellent | 4 (2.9%) | 2 (3.4%) | 2 (2.6%) |
| Very good | 11 (7.9%) | 3 (5.1%) | 7 (9.1%) |
| Good | 61 (43.9%) | 19 (32.2%) | 41 (53.2%) |
| Fair | 48 (34.5%) | 23 (39.0%) | 24 (31.2%) |
| Poor | 15 (10.8%) | 12 (20.3%) | 3 (3.9%) |
| **Perceived Quality of Life** | | | |
| Excellent | 8 (5.8%) | 3 (5.1%) | 5 (6.5%) |
| Very good | 31 (22.3%) | 11 (18.6%) | 19 (24.7%) |
| Good | 59 (42.2%) | 24 (40.7%) | 34 (44.2%) |
| Fair | 37 (26.6%) | 19 (32.2%) | 17 (22.1%) |
| Poor | 4 (2.9%) | 2 (3.4%) | 2 (2.6%) |
| **Attitudes toward centenarians** | | | |
| Negative attitudes | 79 (56%) | 30 (50.8%) | 46 (59.7%) |
| Positive attitudes | 62 (44%) | 29 (49.2%) | 31 (40.3%) |
| **Willingness to live to age 100** | | | |
| Yes | 74 (53.2%) | 25 (42.4%) | 49 (63.6%) |
| No | 32 (23.0%) | 19 (32.2%) | 12 (15.6%) |
| Don't Know | 33 (23.7%) | 15 (25.4%) | 16 (20.8%) |

**Table 2 - Summary of multiple regression analysis predicting supportive attitudes toward life extension.**

| | N | Prolongevist sample | Unadjusted odds ratio (95%CI) | Adjusted odds ratio (95% CI) |
|---|---|---|---|---|
| **Gender** | | | | |
| Female | 80 | 38 (49.4%) | 1 | |
| Male | 59 | 39 (50.6%) | 2.0 (1.0-4.0) | |
| **Age (years)** | | | | |
| 70 or more | 71 | 35 (45,5%) | 1 | |
| Less 70 | 68 | 42 (54,5%) | 1.6 (0.8-3.2) | |
| **Marital Status** | | | | |
| Singles | 53 | 20 (25.97%) | 1 | 1 |
| Married/living together | 86 | 57 (74.0%) | 3.0 (1.4-6.1)* | 2.5 (1.1-5.7)* |
| **Children** | | | | |
| Yes | 133 | 74 (96.1%) | 1 | |
| No | 6 | 3 (3.9%) | 1.2 (0.2-7.1) | |
| **Grandchildren** | | | | |
| Yes | 98 | 51 (66.2%) | 1 | |
| No | 41 | 26 (33.8%) | 1.8 (0.9-3.9) | |
| **Educational Level** | | | | |
| Less 9$^{th}$ grade | 71 | 31 (40.3%) | 1 | 1 |
| 9$^{th}$ grade or more | 67 | 46 (59.7%) | 2.9 (1.4-5.9)* | 2.3 (1.0-5.2) |
| **Perceived Health Status** | | | | |
| Fair/Poor | 63 | 27 (35.06%) | 1 | 1 |
| Excellent/Very good/Good | 76 | 50 (64.94%) | 2.7 (1.3-5.4)* | 2.0 (0.1-4.3) |
| **Perceived Quality of Life** | | | | |
| Fair/Poor | 41 | 19 (24.68%) | 1 | |
| Excellent/Very good/Good | 98 | 58 (75.32%) | 1.7 (0.8-3.5) | |
| **Attitudes toward Centenarians** | | | | |
| Positive attitudes | 62 | 31 (40.3%) | 1 | |
| Negative attitudes | 79 | 46 (59.7%) | 1.0 (0.5-2.0) | |
| **Willingness to live to age 100** | | | | |
| No / Don't Know | 65 | 28 (36.36%) | 1 | 1 |
| Yes | 74 | 49 (63.6%) | 2.4 (1.2-4.8)* | 3.1 (1.4-6.8)** |

## 6. Discussion

In this study more than half of the sample proved to be prolongevist, a finding that goes in line with some available evidence that suggests that individuals tend to be optimistic with regards to the length of lifespan or with the possibility of aging without disability (Font & Font, 2011). Nevertheless, the number of antilongevists was found also to be high, almost 42%. This result is similar to the one obtained in Partridge, Lucke, Bartlett and Hall's survey (2009) where public attitudes toward life extension were neither overwhelmingly "pro" or "cons", although there was a significant polarization in their findings with some participants strongly supporting life extension and others opposing with the same intensity. It is important to refer, however, that the contrast found between overall pro- and anti-longevity attitudes in the present study refers to attitudes toward deliberate interventions to alter the "natural" aging process in a selected

number of items from the original LEQ instrument. In this study there were only considered items taping into the biology of aging, specifically on the inevitability of age-associated diseases as a basis of opposing life extension (category 1), items relating to life extension as enhancing individual's quality and satisfaction with life (category 2) and items relating to an individual acceptance or rejection of a lower quality of life in the pursuit of life extension (category 7). Such selection, although considered to reflect prominent discussions in the geropsychology literature are only part of the authors original conceptualization of the Life Extension Questionnaire (cf. Kogan, 2011) and therefore must be recognized when further interpreting this study's findings on the relationship found between an overall pro- and anti-longevity attitudes and the conceptually-linked constructs we have considered.

Bearing the above mentioned considerations in mind, when we take a look at the subgroup of those participants who present an overall prolongevist attitude, although several health, psychological and contextual variables were considered for analyses on their potential predictive value, only marital status, educational level, perceived health and willingness to live to age 100 were found to significantly affect such attitude. On the first variable, marital status, being married or having a partner was found to be predictor of an overall prolongevist attitude. According with previous studies all non-married conditions were associated with a significant greater risk of death (Berntsen, 2011). However, the increase in risk was slightly higher for divorced/separated persons rather than widowed. The psychological aspects related to marital satisfaction seem to be the most plausible explanation (Manzoli, Villari, Pirone & Boccia, 2007). Married persons are likely to benefit from various types of support. A spouse may exert control on behavior, offer help, add to the pool of knowledge, and help in interpreting important information beyond economics' benefits (Berntsen, 2011). In this sense, marriage shows a significant protective effect (Manzoli, Villari, Pirone & Boccia, 2007). A decrease in social interaction result in an increase in sadness, fear or loneliness for some older individuals, in opposite, emotional support could decrease the occurrence of negative emotions and favours likelihood with which positive emotions are reported (Gruhn, Gruhn & Rocke 2010). It is comprehensible that someone who has an emotional support would like to live to age 100 and support human life extension.

The educational level was another variable associated with the life extension support. Lower educated people tend to have jobs with worse working conditions than higher

educated people and are less able to compensate or reduce unhealthy conditions (Monden, 2005). People with a higher education could have a better understanding on the subject and realize they can benefit from human life extension.

Perceived health status has revealed to contribute to a prolongevist position in this study, a finding that is in tune with Font and Font's recent research (2001) where perception of life expectancy and self-reported health status were statistically the most significant variables. According to these authors, individuals who see themselves as healthy expect to live longer than those who have a worse self-reported health (Font & Font, 2011). In the same research, gender, household size and education were not statistically significant. In Dragojlovic's study (2013) on Canadians' support for radical extension resulting from advances in regenerative medicine, authors evidenced that the predictors were gender (males being more supportive), bio-literacy and general health; age and educational level were not statistically significant (Dragojlovic, 2013).

Finally, the willingness to reach age 100 was found to be associated with supporting life extension. In this subject Huohvanaine, Strandberg, Pitkala, Karppnen and Tilvis (2012) have recently tried to analyse which factors affected older men's attitudes toward living an extremely long life and found that age (being older), good financial status, better functional capacity and current happiness increased the likelihood of wanting to be a centenarian. In this study, this willingness to become a centenarian was associated with a prolongevity overall attitude and this may be related with hope to live more years to improve quality and life satisfaction (Kogan, Tucker & Porter, 2011).

In this study gender was not statistically meaningful but others studies have concluded that women's life course is linked with involvement in caregiving. Therefore it is comprehensible that women are less likely to be interested in life-prolonging medical technologies for themselves, particularly because of worries about being a burden on others and the guilt associated with this. Men, on the other side, tend to be more connected with their own desires to live as long as possible. Men have a greater faith in the success of medical technologies (Arber, Vandrevala, Daly & Hampson, 2008).

An important finding to be considered concerns this sample's attitudes towards centenarians, i.e., the beliefs and feelings that individuals have towards those

individuals who have reached 100 years old. In our study it was interesting to note that although participants tend to show an overall negative image of centenarians, they seem to support life extension and want to live to age 100. Therefore the participants probably do not identify themselves with the current cohort of centenarians. This finding may be understandable because the feeling of being old is not simply a product of continued existence, but a result of contextual and biological factors that need not be strongly related to the passage of chronological time (Wareham, 2012).

Presently, there's a lack of information about personal arguments supporting public opinion and ethical issues surrounding life-extension, which justifies the need for further research on this topic. An investigation including individuals with a higher educational level could bring significant information to this discussion. Furthermore, although living longer may improve lives in many respects, such as more time to achieve goals and the possibility to live more enjoyable experiences, a decision to extend lifespan depends of the social conditions that make a good life achievable (Wareham, 2012). In this sense, socio-economic characteristics are to be included in future research on this topic. Similarly, those who hold a negative perception on life-extension are often accused of possessing a conservative outlook, being unnecessarily reluctant to embrace social change and being constrained by rigid religious conceptions of the human-life span (Dumas & Turner, 2007). By these means, personal religious options, as well as other conceptually-linked constructs (e.g. future time perspective) may also be important variables for understanding public attitudes toward life extension.

A final reflection is to be made in what regards the main instrument we have used to assess life-extension attitudes, the Life Extension Questionnaire (LEQ). As a recent instrument focusing on a selection of arguments relating to pro and anti-longevity positioning, it has revealed to be a promising research tool, namely in examining how attitudes towards life extension are related to several psychological variables as pro-life beliefs, death anxiety and time perspective (e.g. Halpin & Kogan, 2012). Nevertheless, further studies must reflect potentially additional items that may be important for this controversial scientific topic. The present study was the first attempt to bring to discussion life-extension attitudes using part of LEQ's questionnaire but further studies should be focused on using the entire instrument, improve the available translation of remaining items and assess its psychometric properties.

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# ANEXOS

# Protocolo de Avaliação
# Atitudes pró e antilongevidade das pessoas idosas e as suas imagens em relação aos centenários

**Janeiro 2013**

| (a preencher pela investigadora) | |
|---|---|
| Data da recolha: | Código da recolha: |
| Contexto: | |
| Hospitalizado residente em lar ☐ | Residente em lar ☐ |
| Hospitalizado residente na comunidade ☐ | Residente na comunidade ☐ |

# QUESTIONÁRIO

Com este questionário pretende-se conhecer o que pensa em relação às pessoas mais velhas. Leia atentamente as questões e responda de acordo com a sua opinião pessoal. Caso surja alguma dúvida, poderá solicitar o esclarecimento junto da investigadora. Por favor, preencha o questionário pela ordem apresentada e registe com clareza a sua opinião.

**A.** Dados de Identificação

A1. Sexo: 1. Feminino ☐ 2. Masculino ☐

A2. Idade _____ anos

A3. Estado Civil: 1. Solteira(o) ☐ 4. Separada(o) / Divorciada(o) ☐
2. Casada(o) ☐ 5. União de facto ☐
3. Viúva(o) ☐

A4. Tem filhos? 1. Sim ☐ 2. Não ☐

A5. Tem netos? 1. Sim ☐ 2. Não ☐

A6. Escolaridade.

N.º de anos que andou na escola: _____

**B.** Agora gostaríamos de saber um pouco sobre a sua saúde. No geral, pensando na sua saúde, considera que ela é...

1. Excelente ☐
2. Muito boa ☐
3. Boa ☐
4. Aceitável ☐
5. Má ☐

**C.** E como considera ser, no geral, a sua qualidade de vida? (comparando com pessoas da sua idade)

1. Excelente ☐
2. Muito boa ☐
3. Boa ☐
4. Aceitável ☐
5. Má ☐

**D.** Questionário da Longevidade Humana

*Life Extension Questionnaire* (Halpin & Kogan, 2011; trad. adap. de Canedo et al, 2013)

Em seguida está uma lista de frases sobre a duração da vida humana e sobre as possibilidades de a prolongar. Gostaríamos que indicasse a sua opinião em relação a cada uma delas de acordo com a escala abaixo apresentada.

| 1 | 2 | 3 | 4 |
|---|---|---|---|
| Discordo | Discordo ligeiramente | Concordo ligeiramente | Concordo |

| | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| 1. Prolongar a vida humana apenas aumentará a fragilidade e a incapacidade na velhice. | | | | |
| 2. Uma vida longa valeria a pena mesmo que eu não fosse capaz de ter relações sexuais durante grande parte da velhice. | | | | |
| 3. Hipoteticamente falando, a minha satisfação com a vida será maior se eu viver até aos 110 anos do eu se viver até aos 75 anos. | | | | |
| 4. Não se deve prolongar a vida humana uma vez que é contra a nossa natureza biológica. | | | | |
| 5. Os riscos de perda de memória e de identidade, como os que ocorrem na demência, superam os potenciais benefícios de uma vida prolongada. | | | | |
| 6. Prolongar a vida humana permitirá que a sociedade beneficie ainda mais da sabedoria e da experiência acumuladas pelas gerações mais velhas. | | | | |
| 7. Devemos procurar prolongar a vida, mesmo que isso prolongue as doenças crónicas na velhice. | | | | |
| 8. Seria irresponsável concentrarmo-nos em prolongar a vida humana antes de saber como curar as doenças associadas ao envelhecimento. | | | | |
| 9. Se me fosse dado um elixir que comprovadamente prolongasse a vida mas com efeitos secundários desconhecidos, ainda assim escolheria bebê-lo. | | | | |
| 10. A variedade de doenças que afetam as pessoas mais velhas aponta para o facto de que os seres humanos não estão destinados a viver vidas extremamente longas. | | | | |
| 11. Prolongar a duração da vida daria mais prestígio e credibilidade à velhice. | | | | |
| 12. Preferiria que a minha vida fosse caracterizada por uma saúde melhor do que por mais anos de vida. | | | | |
| 13. Uma pessoa irá sempre desejar uma vida mais longa, independentemente da sua qualidade. | | | | |
| 14. Há tantas desvantagens na velhice que seria inútil estender a vida para além dos limites atuais. | | | | |
| 15. Eu estaria disposto a privar-me dos meus alimentos favoritos mais calóricos a fim de garantir uma vida mais longa. | | | | |

**E.** Perspetiva acerca das pessoas muito idosas – centenários

*Refined Aging Semantic Differential* (Polizzi, 2003; trad. Adap. de Nascimento et al., 2013)

Agora gostaríamos que pensasse um pouco nas pessoas com 100 e mais anos de idade (centenários) e, à semelhança do que fez há pouco, que nos indique o pensa de um modo geral sobre essas pessoas. Assim, coloque uma marca nos postos que melhor representam a sua opinião.

Pense em pessoas centenárias. Para si, de um modo geral, elas são...

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1. Alegres | | | | | | | | Mal-humoradas |
| 2. Agradáveis | | | | | | | | Desagradáveis |
| 3. Amigáveis | | | | | | | | Hostis |
| 4. Bondosas | | | | | | | | Cruéis |
| 5. Doces | | | | | | | | Amargas |
| 6. Amáveis | | | | | | | | Maldosas |
| 7. Tolerantes | | | | | | | | Intolerantes |
| 8. Prestáveis | | | | | | | | Pouco prestáveis |
| 9. Justas | | | | | | | | Injustas |
| 10. Gratas | | | | | | | | Ingratas |
| 11. Altruístas | | | | | | | | Egoístas |
| 12. Atenciosas | | | | | | | | Descuidados |
| 13. Pacientes | | | | | | | | Impacientes |
| 14. Positivas | | | | | | | | Negativas |
| 15. Calmas | | | | | | | | Inquietas |
| 16. Pensativas | | | | | | | | Irrefletidas |
| 17. Humildes | | | | | | | | Arrogantes |
| 18. Frugais | | | | | | | | Gastadoras |
| 19. Flexíveis | | | | | | | | Inflexíveis |
| 20. Boas | | | | | | | | Más |
| 21. Esperançosas | | | | | | | | Sem esperança |
| 22. Otimistas | | | | | | | | Pessimistas |
| 23. Confiantes | | | | | | | | De pouca confiança |
| 24. Seguras | | | | | | | | Perigosas |

**F.** Pessoalmente, gostaria de chegar aos 100 anos?

1. Sim ☐ 2. Não ☐ 3. Não sei ☐

Obrigado pela sua colaboração.