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Life satisfaction of disabled and non-disabled elderly in Europe

Jelle Zoetemeijer

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Author: Jelle Zoetemeijer 404049
Supervisor: Dr. Pieter Bakx
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Summary

Considering the fact that frail and disabled elderly are an important and growing group of long-term care users, the use of broader outcome measures, such as wellbeing, may provide additional information necessary to optimally allocate elderly care. This because long-term care intervention, like for example a walking frame, can contribute to additional benefits beyond health, such as independence, freedom and autonomy. These additional benefits aim to increase wellbeing of the care recipients, in this manner a long-term care intervention affects the relation between an older person's disability and his or her life satisfaction.

The use wellbeing outcome measures requires the knowledge and understanding of what constitutes life satisfaction for elderly and in particular about the relationship between disability and life satisfaction. This because disability is identified as one of the main characteristics of long-term care use. Once the relationship between disability and life satisfaction has made insightful, it allows us to see which additional benefits can or cannot be achieved with long-term care services, that elderly would not be able to achieve themselves. The contribution of this study to the literature is an increase in the understanding if being disabled is associated with the self-reported level of life satisfaction among the elderly in Europe.

The results showed that almost all of the background characteristics are significantly different in their mean between the groups of disabled and non-disabled elderly. On average disabled elderly were less educated, older, more likely to be unemployed, had less assets/income and had more chronic diseases than non-disabled elderly. The thesis also investigated the correlation between the background characteristics (control variables) and the self-reported level of life satisfaction among elderly people in Europe. All of the control variables included in the regression model were significantly correlated with the individuals' level of life satisfaction. The results show that all the background characteristics are important confounders in the relation between disability and life satisfaction, which means that it is important to control for these variables.

The main result is that disability is negatively related to the self-reported level of life satisfaction for elderly in Europe, ceteris paribus, while controlling for other background characteristics. Meaning that disabled elderly in Europe are significantly less satisfied with their lives than non-disabled elderly. We can conclude as well that both disability and the background characteristics are important in determining the self-reported level of life satisfaction for elderly people in Europe.

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1. Introduction

Becoming older increases the likelihood of being in poor health, as a result the majority of elderly suffers from chronic and multi-morbid conditions (Marengoni et al., 2011; United Nations, 2013). This makes the group of frail and disabled elderly an important and growing group of healthcare users. The number of elderly is expected to grow even further in the coming decades, which will cause an increased pressure on health care professionals and health budgets (Makai, 2014). The total expenditures on long-term care for elderly per capita are expected to increase substantially over the next decades (Bakx, 2015). The ageing of the population and its impact on long term care expenditures are widely known. But many countries have not yet adopted policy reforms to address the consequences of population ageing.

Health care resources and budgets are limited, therefore difficult trade-offs in policy decision making on reimbursement have to be made. Usually, policymakers make use of cost-utility analysis (CUA) within the curative sector, to assist them with the optimal allocation of scare health resources. The benefits of a healthcare intervention are commonly expressed in quality-adjusted-life-years (QALYs), this is a utility-based health measure which consists of both length of life and health-related quality of life (HRQOL) (Raisch, 2000). In the curative part of healthcare, with the aim to improve health, such QALY outcome measures are suitable. However, within the long-term care sector for elderly the use of QALYs is less appropriate, because health improvement may not be the main or only goal of the elderly care services provided (Makai, 2014). Elderly care may (also) seek to improve wellbeing of elderly individuals and aims at making their current condition more bearable (Martins & de la Maisonneuve, 2006). The use of QALY health outcome instruments may therefore underestimate the benefits of care interventions, and do not capture all relevant outcomes that might be necessary to support policy makers to optimally allocate healthcare. For example, the long term care expenditures in the Netherlands are much higher than in all other OECD countries (OECD, 2011). According to Bakx (2015) we can question whether these additional expenditures also yield additional benefits in terms of an increase in wellbeing of the care recipients. If we would be capable of measuring all relevant outcomes, it could reveal whether high public long-term care expenditures are justifiable and how long-term care financing may be improved. Therefore, the use of broader outcome measures, such as wellbeing, may provide additional information that is relevant for the decision on how to distribute all forms of health and social care, and capture all socially relevant benefits of elderly care interventions.

Literature shows that wellbeing[1] measures are often able to capture additional benefits beyond health (Malley, 2012; Al-Janabi, 2012; Makai, 2014). The research of Makai (2014) suggest that there are some wellbeing instruments being developed for the general adult population. However, a still interesting area

[1] The concepts 'wellbeing', 'life satisfaction' and 'happiness' are often used interchangeably with the same meaning (Veenhoven 1991). In this thesis 'wellbeing' is used throughout the thesis.

of research is whether such measures adequately capture all dimensions relevant for elderly using long-term care (Makai 2014). Despite the relevance of wellbeing measures beyond health for elderly, related evidence to this subject is sparse. Research focusing on the relation between age or living conditions and life satisfaction (as a wellbeing measure) of elderly people, found that one of the main determinants that is negatively related with the impact on life satisfaction is health problems (Angelini et al., 2011; Deindl, 2013; Gaymu et al., 2010). Most of these studies only provide an insight in the very broad measure 'health problems', rather than focusing on disability. This while disability is identified as one of the main characteristics of long-term care use (Luppa et al., 2009; De Meijer et al., 2009; Bakx, 2010).

This thesis aims to increase our understanding whether being disabled or not is associated with the self-reported level of life satisfaction among the elderly in Europe. This association is interesting to study because a disability will persist throughout a person's entire lifetime, long-term care can only partly "solve" disability problems by making elderly's current condition more bearable. For example, a walking frame is a tool for disabled elderly who need additional support while walking. A walking frame does not improve health, but it does maintain balance or improve stability so someone is better capable of dealing with his or her disability and is still able to move around. A long-term care intervention, like a walking frame, can therefore contribute to additional benefits beyond health, such as independence, freedom and autonomy. These additional benefits aim to increase wellbeing of the care recipients, in this manner a long-term care intervention affects the relation between an older person's disability and his or her life satisfaction. Given the increasing interest in wellbeing as an outcome measure in health care, it is important to improve the understanding of what constitutes life satisfaction for elderly and in particular about the relationship between disability and life satisfaction. Once the relationship between disability and life satisfaction has been made clear, we will be able to see which additional benefits can or cannot be achieved with long-term care services, that elderly would not be able to achieve themselves.

The main research questions addressed in this thesis is as follows: *"Are disabled elderly in Europe less satisfied with their lives than non-disabled elderly in Europe, after controlling for background characteristics?"*

The thesis question is divided into a number of sub-questions:

a. What is the correlation between background characteristics and disability status among elderly people in Europe?
b. What is the correlation between disability and life satisfaction among elderly in Europe, without controlling for background characteristics?
c. What is the correlation between background characteristics and self-reported level of life satisfaction among elderly people in Europe?

Answering these questions cannot only supplement available studies, but is also relevant from a policy making perspective. Given the increase of the care sector due to the aging population, there will be a greater need for measures that capture the expected wellbeing of disabled elderly. In order to develop future new outcome measures and tailor policies towards improved quality of life of disabled elderly individuals, there is a need for information about the association between disability and life satisfaction among elderly.

This thesis starts with a literature review of related theoretical literature (chapter 2). In the next chapter (3) the methodology is discussed, which gives a description of the data sample, the used variables in the study and the used statistical models. In chapter 4 the results will be presented, beginning with descriptive statistics for the data sample, then the results of the sub questions will be presented and finally the results of the main research question will be shown. Chapter 5 shall deal with the discussion and conclusion, where the results will be linked to the thesis question.

2. Literature review

This chapter will first focus on wellbeing measures aiming to capture the benefits beyond health outcomes and how this relates to long-term care for elderly people. Secondly, this chapter will focus on which determinants determine life satisfaction among elderly according to earlier research. Thirdly, it addresses different disability domains and indicators.

2.1 Wellbeing measures beyond health

In the research of Makai (2014) it becomes clear that within economic evaluations of interventions for elderly care, especially long-term care, it is important that an outcome measure captures all relevant benefits that are brought about by an intervention. This is because long-term care interventions may aim at improving non-health aspects, such as improving wellbeing and making elderly's current condition (unwell) more bearable (Martins & de la Maisonneuve, 2006). Individuals need long-term care when recovery is not possible due to disability, chronic condition, trauma, or illness, which limit their ability to carry out activities of their daily living (Martins & de la Maisonneuve, 2006). Most long-term care interventions are therefore not medical care, but rather assistance with the basic personal tasks of everyday life. For example, a walking frame does not improve health, but such an intervention aims to restore freedom of movement, dignity, and control, outcomes that transcend health. In this way long-term care services allow individuals to achieve outcomes that they would not be able to achieve themselves (Makai, 2014). With the use of wellbeing measures it is possible to capture additional benefits beyond health of frail and disabled elderly, such additional benefits can be: autonomy, purpose in life, independence, freedom or focusing on what an individual can do (Malley, 2012; Al-Janabi, 2012; Makai, 2014).

Wellbeing instruments that currently exist often focus on different wellbeing domains, such as psychological wellbeing or capability wellbeing. The form of wellbeing that is most familiar to economists is called 'subjective wellbeing' (Kahneman, 2006). A widely recognized methodology, used to collect data on subjective wellbeing, is to directly ask individuals to self-report their level of life satisfaction on an ordered scale (Angelini et al., 2011). Life satisfaction, contrary to other measures of wellbeing, is seen as a relatively stable measure that is not dramatically affected by positive or negative life events (Brickman et al., 1978; George, 2010). Therefore the self-reported level of life satisfaction on an ordered scale from 0 to 10 will be used to measure wellbeing of elderly in this research.

An alternative instrument that aims explicitly at capturing wellbeing outcomes for older people, which focuses on quality of life rather than health or other influences on quality of life, is the multi-attribute instruments ICEpop CAPability measure for Older people (ICECAP-O) (Makai, 2014). This capability measure for older people was intended as an outcome measure for economic evaluation, and covers attributes of wellbeing that were found to be important to older people in the UK (Coast et al., 2008). In some development papers the ability of the ICECAP-O to differentiate between various health states of people and the ability to measure wellbeing has been established (Coast et al., 2008; Makai, 2014). Another instrument used in economic evaluations is the Adult Social Care Outcomes Toolkit (ASCOT), which is designed to capture information about those aspects of people's quality of life that are relevant to social care interventions (Malley et al., 2012). However, Makai (2014) states that both instruments have their limitations, firstly health dimensions may be captured only partially and secondly the instruments require further validation.

2.2 Life satisfaction determinants among elderly

Angelini et al. (2011) investigated how age affects the self-reported level of life satisfaction among older people in Europe, using data from the Survey of Health, Ageing and Retirement in Europe (SHARE). The main evidence Angelini et al. (2011) find is that age does influences life satisfaction in two different ways. On the one hand, while controlling for all other variables, the individual level of life satisfaction increases with age; but on the other hand, the individual thresholds are shifted up with age. These thresholds determine whether a respondent is ‘‘satisfied’’ with his or her life. Given the same true level of life satisfaction, Angelini et al. (2011) state that older respondents are more likely to rank themselves as ‘‘dissatisfied’’ with their life than younger individuals. Therefore, the two effects work in opposite directions. Besides, Angelini et al. describes that men seem to be less satisfied than women, and that being married is associated with a higher level of life satisfaction. Also elderly with a higher socio-economic status (e.g. higher level of education and being employed) are happier than others. And Angelini et al. states that respondents who are still working are more satisfied with their lives than those who do not currently work (because of retirement or because they are out the labour force for other reasons). The research of Angelini et al. (2011) also highlight that life satisfaction is strongly and negatively related to the presence of health problems. And that, ceteris paribus, having limitations with instrumental activities of daily living (e.g. driving, cooking or managing medication) is associated with lower levels of life satisfaction for all age groups.

A different study interviewed 100 disabled people, both middle-aged and elderly, an average of 20 years after their disability occurred (Schulz & Decker 1985). They found that the reported levels of wellbeing of the disabled participants were only slightly lower than those of age-matched non-disabled people on scales of psychological wellbeing, life satisfaction, and depression. Something to note in regard to this study is that the sample size is small and the participants were selected because of their disability. A more recent study performed by Lucas (2007) examined the life satisfaction of people who became disabled. This study was based on two nationally representative panel studies of over 39,000 households in Germany and 27,000 households in Britain. Lucas (2007) found lower levels of life satisfaction in people after they became disabled. Even though Lucas' analysis was more rigorous, due to a large sample size and no selection because of disability, the study did not focus entirely on our field of interest (elderly people).

Another study, performed by Deindl (2013), examines the influence of early life living conditions on life satisfaction among elderly in eleven different Western European countries, using SHARE data. The multilevel models of Deindl's (2013) study show that early life circumstances matter, but the current social position and circumstances are even more important. The conditions in later life, like income or health, have a much greater positively linked impact on life satisfaction of elderly people. Also, he finds that higher levels of life satisfaction are reported by respondents living together with a partner. Futhermore, Deindl (2013) notes that life satisfaction is unequally distributed over Western Europe. He assumes that being born in a country with a higher developed welfare state and more financial capacities has shown a positive influence on life satisfaction until old age (e.g. Northern Europe).

The research of Gaymu & Springer (2010) took a gender and cross-national perspective with the data of the SHARE project of ten different European countries. They found that having a high level of education, income and, most important, no health limitations are among the major determinants of life satisfaction of older people that live alone. Also, the existence of a child influenced the life satisfaction for elderly, but only for men. They also show that different factors that have influence on life satisfaction are not the same among elderly men and women. Gaymu & Springer (2010) also state that engaging in leisure activities is nearly always positively correlated with social wellbeing of elderly, irrespective of gender. There are more studies that suggest that daily activities are also among the important factors driving the life satisfaction for older Europeans (Fernández-Ballesteros et al., 2001; Mannell & Dupuis, 1996).

2.3 Disability indicators

The previous section has shown that there is evidence that health conditions have an effect on the life satisfaction of elderly people (Angelini, 2011; Deindl, 2013; Gaymu et al., 2010). However, most of these studies do not specifically focus on disability in relation to life satisfaction, although disability is identified as one of the main characteristics of long-term care use (Luppa et al., 2009; De Meijer et al., 2009; Bakx, 2010). Problems with some studies that did research disability in relation to life satisfaction is that they had a rather small sample size, selection bias or did not focus entirely on our field of interest (elderly people) (Schulz & Decker, 1985; Lucas, 2007). In order to answer the question whether disabled elderly in Europe are less satisfied with their lives than non-disabled elderly, measurement of disability needs to be clarified.

Literature shows that disability can have different domains, usually it is measured using self-reports of basic activities of daily living or called ADL (e.g. washing, getting (un)dressed, feeding, getting in and out of bed, etc.), instrumental activities of daily living, which is IADL, (e.g. meal preparation, using the telephone, shopping and taking medication) and mobility (limitations daily activities) (De Meijer et al. 2009). These three disability domains are to some extent overlapping and to some extent complementary (Bakx, 2010).

Another disability indicator is the global activities limitation indicator (GALI), a single-item survey instrument which measures to what extent respondents were hampered in usual activities by health disorders and conditions: not at all, mildly or severely (van Oyen et al., 2006; Berger et al., 2015). The question asked to the respondent is "For at least the past six months, to what extent have you been limited because of a health problem in activities people usually do?". The question indicates general restrictions in activity, without specifying the type of activity concerned (e.g. household chores, work, personal care, leisure, etc.). A study of Berger et al. (2015) found that the GALI was significantly associated with measures of activities of daily living, instrumental activity of daily living, and functional limitations ($P < 0.001$ in all cases). The GALI appeared to be a good indicator of disability in the European population, for each country separately or all combined (Jagger, 2010; Berger et al., 2015). However, according to Berger et al. (2015) there were cross-country differences in terms of how the GALI reflected each of the three disability measures. Which has to do with the perception of limitations and functioning. Because the GALI appeared to be a good indicator of disability in Europe, both across Europe and in a similar way between countries, the GALI measure will be used in this thesis in order to measure disability within the European population.

Several studies show that physical disability results from chronic diseases and that majority of elderly suffers from these chronic diseases (Friend et al., 1997; Verbrugge et al., 1989). Suffering from multi-morbidity and chronic conditions can result in various limitations on the ability to perform in daily activities, this can be an important factor determining how an individual experiences his or her ageing. It can for example affect the loss of social life and friends due to decreased mobility (De Vries et al., 2011), or it can result in a functional decline (Beswick et al., 2008). Therefore we will control in this study for chronic diseases as an indicator of health, because chronic diseases are related to both disability and life satisfaction and confounding may occur in the relation between disability and life satisfaction.

3. Methodology

This chapter will address the study design. The first section describes the data from the SHARE-project which is used to answer the thesis question and sub-questions. Secondly, the different variables used in the regression are introduced. In the third section the complete setup of the study will be presented, including how the data is analysed and how the results should be interpreted. Finally, some advantages and limitations of the study design will be discussed.

3.1 Data

The data that will be used for this thesis research originates from the Survey of Health, Ageing and Retirement in Europe (SHARE). This is a multidisciplinary and cross-national panel database of micro data on health, socio-economic status and social and family networks of approximately 123,000 individuals from 20 European countries (including Israel), who are aged 50 or older. A person is excluded if he or she is incarcerated, hospitalized or out of the country during the entire survey period, unable to speak the country's language(s) or has moved to an unknown address. If physical and/or cognitive limitations make it too difficult for a respondent to complete the interview her-/himself it is possible that the sample respondent is assisted by a so-called proxy respondent to complete the interview. SHARE has collected more than 220,000 interviews in four panel waves on current living circumstances. The SHARE project did re-interviewing the respondents who participated in previous waves, and respondents who dropped out from the survey over time were replaced. SHARE data collection is based on computer-assisted personal interviewing (CAPI). The interviewers conduct face-to-face interviews using a computer, supplemented by interviews with the self-completion of a paper & pencil questionnaire, which collects additional questions on e.g. mental and physical health, health care and social networks.

Only three of the four panel waves are used in this research, because these three waves make use of the same numerical life satisfaction scale measured from 0 to 10. These are the waves of 2006/2007, wave of 2010 and the wave of 2013. All observations were included regardless of a respondent participated in one wave or in multiple waves. Up to the present 20 countries participated in SHARE, the thesis includes 19 of these countries, only Israel was excluded because this country fell outside the thesis scope (Europe). The included European countries range from the North (Sweden, Denmark and Estonia) through Central Europe (The Netherlands, Belgium, Luxembourg, Germany, France, Austria, Switzerland and Ireland) to Eastern Europe (Czech Republic, Poland, Hungary and Slovenia) and to the South of Europe (Spain, Portugal, Italy and Greece). Only the respondents with complete information on the variable of interest where included, this is 93% of original sample. The final sample is composed of 139,580 observations.

3.2 Variables

The variables included in the model are based on important factors identified in the literature review. In order to rely on prior knowledge and make sure that no important variables will be missed a directed acyclic graph (DAG) has been made, the DAG is shown in figure 1. Drawing a DAG can also provide insight in the existence of any reverse causal pathways (A leads to B or B leads to A?). In the DAG the exposure variable is disability with a direct arrow to the variable life satisfaction, because the main research question is if disability has an influence on life satisfaction. All observed confounders are put in the model, which are the variables associated with both the exposure and outcome variable. The study will control for confounders in order to achieve exchangeability, namely: Age, Gender, Education level, County, Ethnicity, Income, Assets, Chronic diseases, Employment status, Marital status and Parental status. In this research there is an interest in the full effect of X (disability) on Y (life satisfaction) that is not mediated through some intermediate variable, therefore things as "Social activity status' and 'Living status', which are intermediate variables, must not be included in the model. For example, due to the persistence of a disability people can be assigned to nursing homes. Not being able to live at home (change in living status) may reduce peoples life satisfaction, which is not due to the disability itself. The full effect of disability on life satisfaction cannot be measured in this way due to the intermediate variable 'living status'.

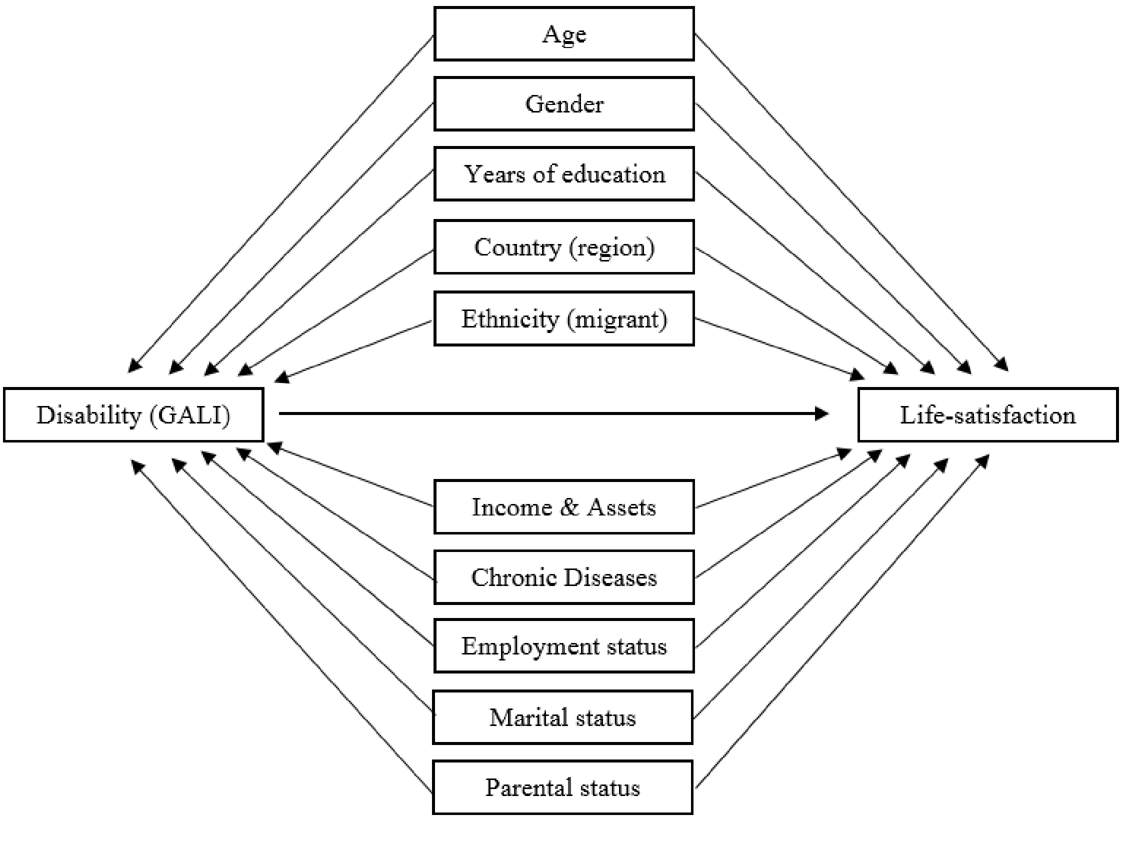

Figure 1: Directed Acyclic Graph

The different variables used in the regression will be described in the remainder of this section, a detailed overview of the all the variables is presented in table 1 in the coming section "4.1 Descriptive analysis".

Outcome variable

A widely recognized methodology, used to collect data on subjective wellbeing, is to directly ask individuals to self-report their level of life satisfaction on an ordered scale (Angelini et al., 2011). The dependent variable of the study is therefore life satisfaction, an ordinal variable obtained by the question: "*On a scale from 0 to 10 where 0 means completely dissatisfied and 10 means completely satisfied, how satisfied are you with your life?*"

Explanatory variable

The explanatory variable is disability indicated by GALI, which appeared to be a good indicator of disability in the European population, as discussed in section '2.3 Disability indicators'. GALI is a single-item survey instrument, which measures to what extent respondents were hampered in usual activities by health disorders and conditions. It has three categories: (1) severely limited; (2) limited, but not severely; & (3) not limited. Because of the low numbers elderly reporting themselves as severely limited, '*severely limited*' and '*limited, but not severely*' were merged into one category (limited), as commonly done in other studies (Jagger, 2010; Berger et al., 2015). This will increase the comparability with other studies. A dummy variable is created for disability were 1 is being disabled. A disadvantage of merging these two categories together is losing the individual effect of each category, no distinctions can be made between mildly or severely limited. The study will not control for other disability measures (ADL and IADL), because it is very likely that the GALI measure overlaps these other measures to some extent (Bakx, 2010).

Control variables

The study will control for confounders, when multiple background variables are included, the analysis gives an estimate of the association between the explanatory variable (disability) and the dependent variable (life satisfaction), while holding other variables constant. There will be controlled for the number of years of education of a respondent and put in the model as a continuous variables, because people with higher level of education tend to be happier than others (Gaymu et al., 2010; Angelini, 2011).

The study will also control for age in five different categories (55 or less, 56-60, 61-65, 66-75, 76 or more), in which dummy variables are generated from the underlying age class. Using age classes give a more flexible interpretation in the relationship between age and life satisfaction. The disadvantage of making this categorical variables and coded to dummy variables is the loss of detailed information about the distance between age years as a continuous variables.

The variable gender is a dummy variable where female is 1. The variable migrant is also a dummy variable where 1 means the person is born abroad. The continuous variables income is transformed in a natural logarithm, with the advantage that income is more normally distributed. The disadvantage of the use of a natural logarithm is that interpretation of actual values is no longer possible.

The continuous variables assets is rescaled for a more flexible interpretation, where 1 represents 10.000 euro. Angelini et al. (2011) shown that respondents who are still employed experience more life satisfaction than those who do not currently work (because of retirement or because they are out the labour force for other reasons). Therefore the variable unemployment is transformed to a dummy variable, where 1 means a person is retired or out the labour force for other reasons. To account for the number of children a respondent has, a dummy variable is made where 1 means that the respondent has at least one child. The variable country is transformed in regions, because some literature (Deindl, 2013) shown that life satisfaction is higher in countries with a higher developed welfare state and more financial capacities (e.g. Northern Europe). Also, four regions have more flexible interpretability than all the countries separate, but the disadvantage is losing country specific information. The four regions range from the North (Sweden, Denmark and Estonia) through Central Europe (Netherlands, Belgium, Luxembourg, Germany, France, Austria, Switzerland and Ireland) to Eastern Europe (Czech Republic, Poland, Hungary and Slovenia) and to the South of Europe (Spain, Portugal, Italy and Greece).

For marital status five dummy categories have been made: married and living together with spouse or a registered partnership, married but living separated, never married, divorced and widowed. The categorical variable number of chronic diseases is divided into three dummies, to differentiate between none, one or two, or three or more chronic diseases. Also, because persons are interviewed in different years there will be a dummy variable for each of the interview years, because some literature suggests that an economic crisis or recession can have a significant impact on wellbeing (Majmundar, 2011).

3.3 Analysis

The basis of this study will be a quantitative study in which a regression model will used by means of statistical software STATA version 14. The data of three SHARE waves (2006/2007, 2011 and 2013) is pooled and treated as one cross section with interview year dummies. This observational study involves the analysis over a short and specific period of time (period of 2006 until 2013) to make inferences on the relation between disability and life satisfaction.

In order to analyse and understand the data correctly, three steps will be conducted to study the data:

1. First, a univariate analysis will be performed to examine the variables and data precisely and in detail. With the use of univariate analysis there is a possibility to look at the variables one by one (range, mean, median, variance, distribution). This will help to visually inspect the data (outliers and missing values). Also it is about getting to know the data and give a better overview of the sample respondents.

2. Secondly, a bivariate analysis will be performed, which consists of looking at the correlation between the background characteristics and explanatory variable, and the correlation between the background characteristics and the dependent variable.

   Each analysis will be performed to answer the three sub questions, and to see if and how much the different control variables are correlated with the score of a life satisfaction, and correlated with disability. When variables appear to be associated with both exposure and outcome, confounding may occur in the relation between disability and life satisfaction. In such a case it is important that there will be controlled in the study for each of these background characteristics.

3. Finally the multivariate analysis will be conducted, to understand the effect of more than one explanatory variable on the dependent variable, in order to answer the main research question.

   Since the dependent variable 'life satisfaction' is an ordinal variable, an ordered logistic regression (OLR) model will be used. Ordinal logistic regression is an extension of the logistic regression which is appropriate when the outcome variable is ordered categorical (Kirkwood & Sterne, 2003). The most commonly used type of model is the proportional odds model, whose parameters represent the exposure odds ratios for being in the highest j categories comparted to the lowest (k-j) categories (Kirkwood & Sterne, 2003) . For example, if there were four outcome categories and a single exposure variable, then the exposure odds ratio would represent the combined comparison of outcome: category 4 with categories 3, 2 and 1, categories 4 and 3 with categories 2 and 1, and categories 4, 2 and 2 with category 1.

3.4 Advantages and limitations of the study design.

The advantages and possible drawbacks of the study model will be discussed, as well as the validity and reliability of the outcomes. The chosen study type is cross sectional, which involves the analysis of pooled data collected by a large sample of the European population at a specific period in time. The advantage of this cross-sectional studies is that it provides a 'snapshot' of the life satisfaction of elderly and the characteristics associated with it, at the period of 2006 untill 2013. The cross sectional study lends itself to increase our understanding of the life satisfaction of disabled and non-disabled elderly, and it is useful at identifying associations, which can be more rigorously studied in the future studies.

However, because the panel data is pooled and treated as a cross sectional data there are some limitations of the study. Important is that the associations from this cross-sectional study do not equal causation. With the chosen study design in this thesis it is impossible to infer causality when looking at one time point, it gives no indication of the sequence of events, whether life satisfaction was influenced before, after or during a disability. Reverse causality can occur, which means that a correlation between two variables does not imply that one causes the other. The DAG is used to overcome the problem of reversed causality, there appeared to be no reverse causal pathways. Because of the reverse causality problem the thesis only lends itself to see whether there is correlation instead of causation.

Another endogeneity problem, omitted variables, can occur as well, this is incorrectly leaving out one or more important factors in the analysis. This "bias" is created when the model compensates for the missing factor by overestimating or underestimating the effect of one of the other factors. The DAG is used to overcome this problem, the variables selected for the analysis rely on prior knowledge to make sure that no important variables are missed. This study controlled for each of the background characteristics, in order to measure the full associations between disability and life satisfaction, while taking into account other factors that might confuse the relationship between both.

Another endogeneity problem is measurement errors, which can be miss-match of the data, or data of bad quality. This risk is minimal since the SHARE data has been evaluated and is obtained from several established questionnaires. Furthermore, the interviews were conducted by a trained interviewer who used the CAPI instrument. And the data was visually inspected to see if there were outliers or missing values. In this research extrapolating beyond the data cannot be done, the results are only valid in similar samples.

4. Results

This chapter presents the results, beginning with descriptive statistics for the data sample, then in the next sections the results for each of the sub questions are shown and finally in the last section the results to answer the main research question will be presented.

4.1 Descriptive analysis

A summary of main characteristics of 139,580 observations are presented in table 1, including the variable definitions. Respondents are prevalently females (56%) and the overall average age is 66 years old. About 70% of the respondents are married and living together with their spouse, or has a registered partnership. While 14% of the respondents are widowed, 6% of the respondents were never married. Most of the respondents have at least one child (91%). The average total years of education for each respondent was around 11 years, and 27% of the respondents was still employed or self-employed. The mean income of the respondents was 30.724 euro per year (not shown in table 1), and the mean assets for respondents was 252.500 euro. Almost half of the respondents lived in Central Europe (43%), while North, East and South Europe represented around 20% each region. The amount of respondents who were migrant, which can be understood as any person who lives temporarily or permanently in the country of interview where he or she was not born (foreign-born), was around 9%. Most of the observations were interviewed in the year 2013 which was 42%.

Overall 51% of the respondents suffered from 1 or 2 chronic diseases, and 23% had no chronic diseases. Bad health conditions are, as expected, more frequent among older age groups (results not shown). In particular the percentage of respondents who have more than two chronic diseases is four times higher among the 66+ elderly than the respondents younger than 56 years. Which confirms that becoming older increases the likelihood of being in poor health (Marengoni et al., 2011; United Nations, 2013). The percentage of respondents suffering from a disability who are younger than age 56 is 33%, compared to 65% of the 76+ elderly who suffer from a disability. Almost half of the respondents (46%) were disabled, because they were mildly or severely limited with their usual activities by health disorders and conditions. Which shows that the group of disabled elderly is an important group of healthcare users.

Life satisfaction is used to measure subjective wellbeing, which is obtained by the question: ''On a scale from 0 to 10 where 0 means completely dissatisfied and 10 means completely satisfied, how satisfied are you with your life?''. The mean life satisfaction score is 7.6 for all respondents, slightly lower than the mean life satisfaction of score 7.7 Deindl's study (2013) reported, which was measured by 13 countries of second and third wave of SHARE. The mean life satisfaction for non-disabled elderly is 8.0 while disabled elderly score a mean life satisfaction of 7.1. T-tests (not shown) showed that this difference in life satisfaction between disabled and non-disabled was statistically significant.

Table 1: Description of the variables included in the regressions of the 139,580 observations

Variable	Description	Mean	SD
Life satisfaction	"On a scale from 0 to 10 where 0 means completely dissatisfied and 10 means completely satisfied, how satisfied are you with your life?" (ordered scale 0-10)	7.547	1.840
Disability	Dummy = 1 if the person is mildly or severely limited	0.461	0.498
Years of education	Number of years of education	10.715	4.393
Age 50-55	Dummy = 1 if the person is aged 50-55 **(baseline)**	0.159	0.366
Age 56-60	Dummy = 1 if the person is aged 56–60	0.177	0.381
Age 61-65	Dummy = 1 if the person is aged 61–65	0.179	0.383
Age 66-75	Dummy = 1 if the person is aged 66–75	0.287	0.452
Age 76 or more	Dummy = 1 if the person is aged 76 or more	0.196	0.397
Migrant	Dummy = 1 if the person is born abroad	0.091	0.287
Unemployed	Dummy = 1 if the person retired, unemployed, homemaker, permanently sick or disabled	0.726	0.445
Female	Dummy = 1 if the person is female	0.556	0.496
Living with partner	Dummy = 1 if the person is married and living together with spouse, or has a registered partnership **(baseline)**	0.700	0.457
Living separated	Dummy = 1 if the person is married, but living separated from spouse	0.012	0.110
Never married	Dummy = 1 if the person is never married	0.055	0.228
Divorced	Dummy = 1 if the person is divorced	0.086	0.281
Widowed	Dummy = 1 if the person is widowed	0.144	0.351
Central Europe	Dummy = 1 if the person lives in Central Europe (Netherlands, Belgium, Luxembourg, Germany, France, Austria, Switzerland or Ireland) **(baseline)**	0.430	0.495
South Europe	Dummy = 1 if the person lives in South Europe (Spain, Portugal, Italy or Greece)	0.180	0.384
North Europe	Dummy = 1 if the person lives in North Europe (Sweden, Denmark or Estonia)	0.201	0.401
Eastern Europe	Dummy = 1 if the person lives in Eastern Europe (Czech Republic, Poland, Hungary or Slovenia)	0.187	0.389
At least one child	Dummy = 1 if the person has at least one child	0.905	0.292
Assets	Amount of assets. (rescaled where 1 = €10.000.-)	25.255	48.915
lnIncome	A natural logarithm for variable income, showing for each percentage change in income the unit increase in life satisfaction	9.301	2.260
Chronic 0	Dummy = 1 if the person does not suffer from a chronic disease **(baseline)**	0.231	0.422
Chronic 1-2	Dummy = 1 if the person suffers from 1 – 2 chronic diseases	0.509	0.499
Chronic 3 or more	Dummy = 1 if the person suffers from at least 3 chronic diseases (out of max 14)	0.258	0.437
Int. year 2006	Dummy = 1 if the person 2006	0.046	0.211
Int. year 2007	Dummy = 1 if the person 2007	0.157	0.363
Int. year 2010	Dummy = 1 if the person 2010	0.011	0.104
Int. year 2011	Dummy = 1 if the person 2011	0.358	0.479
Int. year 2012	Dummy = 1 if the person 2012	0.011	0.104
Int. year 2013	Dummy = 1 if the person 2013 **(baseline)**	0.415	0.492

4.2 Correlation between background characteristics and disability status

In table 1 of the previous section the descriptive statistics for the full panel sample where shown, while additional descriptive statistics from the subsamples disabled and non-disabled elderly are presented in table 2. These statistics make a comparison between the two groups, disabled and non-disabled elderly, and provide information whether the group means are significantly different. Chi Square Tests (for categorical variables) and T-tests (for interval dependent variables) are used to see if there is a relationship between each of the background characteristics and the disability status among elderly people in Europe.

Table 2: Chi-square and T-test results, relationship between background characteristics and disability

Control variables	**Non-disabled Mean**	**Std. Dev.**	**Disabled Mean**	**Std. Dev.**	**Sig.**	**Test method**
Years of education	11.181	4.446	10.172	4.267	***	T-test
Age 50-55	0.199	0.399	0.113	0.317	***	Chi² test
Age 56-60	0.202	0.401	0.148	0.355	***	
Age 61-65	0.195	0.396	0.161	0.368	***	
Age 66-75	0.276	0.447	0.301	0.459	***	
Age 76 or more	0.128	0.334	0.276	0.447	***	
Migrant	0.084	0.277	0.100	0.287	***	Chi² test
Unemployed	0.632	0.482	0.837	0.369	***	Chi² test
Female	0.532	0.499	0.586	0.493	***	Chi² test
Living with partner	0.738	0.440	0.658	0.474	***	Chi² test
Living separated	0.013	0.113	0.012	0.108	**	
Never married	0.056	0.230	0.054	0.226		
Divorced	0.084	0.278	0.089	0.285	***	
Widowed	0.109	0.311	0.187	0.390	***	
Central Europe	0.440	0.496	0.419	0.493	***	Chi² test
South Europe	0.205	0.404	0.152	0.359	***	
North Europe	0.197	0.398	0.207	0.405	***	
Eastern Europe	0.158	0.364	0.221	0.415	***	
At least one child	0.907	0.291	0.905	0.294		Chi² test
Assets	30.017	54.559	19.700	40.6719	***	T-test
lnIncome	9.551	2.186	9.010	2.310	***	T-test
Chronic 0	0.372	0.483	0.068	0.252	***	Chi² test
Chronic 1-2	0.512	0.500	0.506	0.500	*	
Chronic 3 or more	0.116	0.320	0.259	0.438	***	
Int. year 2006	0.048	0.213	0.046	0.210		Chi² test
Int. year 2007	0.168	0.373	0.145	0.352	***	
Int. year 2010	0.009	0.093	0.014	0.117	***	
Int. year 2011	0.343	0.475	0.376	0.484	***	
Int. year 2012	0.009	0.093	0.014	0.118	***	
Int. year 2013	0.424	0.494	0.405	0.491	***	
Number of observations non-disabled: 75,155						
Number of observations disabled: 64,425						

Indication of statistical significant levels: *** indicates p≤0,01 significance level, ** indicates 0,01<p≤0,05 significance level and * indicates 0,05<p≤0,1 significance level.

The results indicate that there is a statistically significant difference between the mean years of education for non-disabled and disabled. In other words, non-disabled have a statistically significantly higher mean on number of years of education (11.2 years) than disabled (10.2 years). The results for age indicate that there is a statistically significant relationship between the age categories of elderly and their disability status. Non-disabled elderly have a statistically significantly overall lower mean age (64 years), than disabled elderly (69 years) (not shown in table 2). In the age categories 55-or-less, 56-60 and 61-65 non-disabled occur more frequently, while disabled elderly occur more frequently in the age categories 66-75 and 76-or-more. There is also a statistically significant relationship between being a migrant and disability. The group of non-disabled elderly had statistically significantly lower proportion of migrants (8.4%) than disabled elderly (10%).

The groups of disabled and non-disabled elderly are significantly different for employment status. In the group of non-disabled elderly 63.2% is unemployed, while in the group of disabled elderly 83.7% is unemployed. Also gender appears to be statistically significant in the differences between males and females. In the group of non-disabled elderly 53.2% is female, while among the disabled elderly 58.6% is female. When looking at the five different categories in marital status only 'never married' appeared to be not significantly different between the groups of non-disabled and disabled elderly. The remaining four categories did appear to be significantly different. When looking at elderly living with a partner 73.8% where non-disabled, compared to 65.8% of the disabled elderly who still lived with their partner. Living separated from their partner was in both groups non-disabled and disabled around the same level, 1.3% for non-disabled and 1.2% for disabled elderly. Also the group of divorced non-disabled elderly (8.4%) is almost identical to the group of disabled elderly who are divorced (8.9%). The difference between the group non-disabled (10.9%) and disabled (19.9%) being widowed is much larger.

The results show that the group of disabled and non-disabled elderly are significantly different in mean for the region where they live. The regions with the biggest differences were Eastern and South Europe. The percentage of elderly living in Eastern Europe of the group non-disabled is 15.8%, compared to 22.1% of the group disabled elderly. In Southern Europe lived 20.5% of the non-disabled group and 15.2% of the disabled group. There was no statistically significant relationship between having children and disability status. Both assets and income where significantly higher for non-disabled elderly then disabled elderly. The non-disabled mean assets were €300,170 while the mean assets for disabled elderly were €197,000. The relation between the number of chronic diseases and disability status also appeared to be statistically significant. The percentage of non-disabled elderly with non-chronic diseases was 37.2%, compared to 6.8% disabled elderly with non-chronic conditions. Lastly, the year in which a respondent was interviewed appeared to be significantly different in means across non-disabled and disabled elderly with exception of interview year 2006.

Almost all of the control variables showed a highly significant difference in their mean between the groups of disabled and non-disabled elderly. The only exceptions that did not appear to be significantly different where 'never married', having 'at least one child' and 'interview year 2006'. The literature review has shown that the control variables were found to be related to life satisfaction, while the Chi-square and T-test results indicate that each of these control variables are also related to disability. Which means that the background characteristics are associated with exposure and outcome, and confounding may occur in the relation between disability and life satisfaction. Therefore it is important that there will be controlled in the study for each of these background characteristics. There will also be controlled for the variables 'never married' and 'interview year 2006', because they are both part of a set of categories which are found to be statistically significant different. Also, the study will control for having 'at least one child' because literature showed that the existence of a child influenced the life satisfaction of elderly individuals (Gaymu & Springer, 2010).

4.3 Effect of disability on life satisfaction without background characteristics

With the use of an ordered logit model the correlation between disability and life satisfaction among elderly in Europe has been made insightful, without controlling for other background characteristics. It shows the direction and the strength of the associations between disability and life satisfaction, while not taking into account other factors that might confuse the relationship between both. When answering the main research question there will be controlled for several background characteristics. By running the regression with and without the background characteristics it can reveal how the model reacts to the addition of the set of background characteristics. This is helpful to investigate if there is a change in the proportional odds ratio for disability, to see whether and how the background characteristics influence the relationship between disability and life satisfaction.

Table 3: Ordered logit model results, effect of disability on life satisfaction

Explanatory variable	**Odds Ratio**	**Std. Err.**
Disability	0.416***	0.004
Number of observations: 139,580		
Pseudo R^2: 0.016		

Indication of statistical significant levels: *** indicates $p \leq 0{,}01$ significance level, ** indicates $0{,}01 < p \leq 0{,}05$ significance level and * indicates $0{,}05 < p \leq 0{,}1$ significance level.

For a one unit increase in disability, i.e. going from non-disabled to disabled, the odds of scoring a 10 (completely satisfied) on the life satisfaction scale versus the combined 0 to 9 scores are 0.416 lower, given that all of the other variables in the model are held constant (not included in this model). Likewise, the odds of the combined categories of 1 to 10 life satisfaction scores versus 0 (completely dissatisfied) is 0.4164 times lower for disabled compared to non-disabled elderly, given the other variables are held constant in the model. The null hypothesis (no association) can be rejected and conclude that the proportional odds ratio for disability has been found to be statistically different from zero in estimating life satisfaction, given that no other background characteristics are in the model. No R^2-scores are reported for an ordered logistic regression in Stata. The pseudo R-squared for this ordered logistic regression was 0.016.

4.4 Correlation between background characteristics and life satisfaction

In order to investigate the correlation between the background characteristics (control variables) and the self-reported level of life satisfaction among elderly people in Europe an ordered logit model is used. It shows the direction and the strength of the associations between each control variable and life satisfaction, while taking into account the other control variables. By running the regression with and without the explanatory variable it can reveal how the model reacts to the variable disability.

Table 4: Ordered logit model results, effect of control variables on life satisfaction

Control variables	**Odds Ratio**	**Std. Err.**
Years of education	1.015***	0.001
Age 56-60	1.099***	0.018
Age 61-65	1.426***	0.025
Age 66-75	1.692***	0.031
Age 76 or more	1.752***	0.036
Migrant	0.731***	0.012
Unemployed	0.720***	0.010
Female	1.033***	0.010
Living separated	0.564***	0.024
Never married	0.647***	0.016
Divorced	0.605***	0.011
Widowed	0.641***	0.010
South Europe	0.741***	0.010
North Europe	1.154***	0.016
Eastern Europe	0.806***	0.013
At least one child	1.104***	0.021
Assets	1.003***	0.000
LnIncome	1.121***	0.003
Chronic 1-2	0.677***	0.008
Chronic 3 or more	0.410***	0.006
Int. year 2006	0.934***	0.022
Int. year 2007	1.026*	0.014
Int. year 2010	0.569***	0.028
Int. year 2011	1.261***	0.014
Int. year 2012	1.478***	0.072
Number of observations: 139,580		
Pseudo R^2: 0.031		

Indication of statistical significant levels: *** indicates $p \leq 0,01$ significance level, ** indicates $0,01 < p \leq 0,05$ significance level and * indicates $0,05 < p \leq 0,1$ significance level.

The results indicate that number of years of education are positively related to the self-reported level of life satisfaction among elderly in Europe. For a one unit increase in years of educations the odds of scoring a 10 (completely satisfied) on the life satisfaction scale versus the combined 0 to 9 scores are 1.015 times greater, given that all of the other variables in the model are held constant. Also the respondents who do not currently work (both because of retirement or other out of labour force reasons) were more likely to report lower levels of life satisfaction than those who are still employed. And both having a higher income or more assets are positively related to the self-reported level of life satisfaction. In other words, elderly with a high socio-economic status have a higher probability of scoring higher levels of life satisfaction than others. All the results are in line with the conclusions of Gaymu & Springer (2010), Angelini et al. (2011) and Deindl (2013).

Women seem to be more satisfied with their lives than men, as well living together with a partner is associated with reporting higher levels of life satisfaction, comparted to the other marital status categories. Furthermore, the existence of a child influenced the life satisfaction for elderly, elderly with one or more children report significant higher levels of life satisfaction. All these findings were consistent with the earlier findings in the section 'literature review'.

The overall levels of life satisfaction increase with age. With each higher age category the odds of scoring higher on the life satisfaction scale increase compared to the youngest age category 50 to 55 years, ceteris paribus. This finding is significant and in line with the conclusions of Angelini et al. (2011). Life satisfaction is strongly and negatively related to the presence of chronic diseases. Not surprisingly, elderly suffering from three or more chronic diseases reported the lowest levels of life satisfaction compared to the elderly with non-chronic diseases or having one or two chronic diseases.

For elderly living in North Europe the odds of scoring a 10 (completely satisfied) on the life satisfaction scale versus the combined 0 to 9 scores are 1.15 greater, compared to elderly living in Central Europe and given that all of the other variables in the model are held constant. Both living in South or Eastern Europe is negatively related to the self-reported level of life satisfaction, compared to those who live in Central Europe. And being born abroad is negatively related to the self-reported level of life satisfaction. Respondents who were interviewed in years 2007, 2011 and 2012 were more likely to report higher levels of life satisfaction than those who were interviewed in the year 2013. While the opposite is true for the respondents interviewed in the years 2006 and 2010.

All of the control variables included in the regression model are significantly correlated with the individual level of life satisfaction. Also these findings on the relationship between background characteristics and life satisfaction in this section are not in contrast with the literature. The results show that all the background characteristics are important confounders in the relation between disability and life satisfaction. Which means that it is important to control for each of these variables when investigating the relation between disability and life satisfaction. The pseudo R-squared for this ordered logistic regression was 0.031, which is larger than the previous regression.

4.5 Are disabled elderly less satisfied with their lives than non-disabled elderly

With the use of an ordered logit model the correlation between disability and life satisfaction among elderly in Europe has been made clear, while controlling for background characteristics. It shows the direction and the strength of the associations between disability and life satisfaction, while taking into account other factors that might confuse the relationship between both.

Table 5: Ordered logit model results, effect of disability and control variables on life satisfaction

Explanatory variable	**Odds Ratio**	**Std. Err.**
Disability	0.511***	.0055
Control variables		
Years of education	1.012***	0.001
Age 56-60	1.097***	0.018
Age 61-65	1.391***	0.025
Age 66-75	1.648***	0.030
Age 76 or more	1.828***	0.037
Migrant	0.736***	0.013
Unemployed	0.775***	0.011
Female	1.045***	0.010
Living separated	0.557***	0.024
Never married	0.650***	0.016
Divorced	0.607***	0.011
Widowed	0.643***	0.010
South Europe	0.682***	0.010
North Europe	1.147***	0.016
Eastern Europe	0.810***	0.013
At least one child	1.106***	0.021
Assets	1.003***	0.000
LnIncome	1.115***	0.003
Chronic 1-2	0.812***	0.010
Chronic 3 or more	0.583***	0.009
Int. year 2006	0.928***	0.022
Int. year 2007	1.028*	0.014
Int. year 2010	0.580***	0.028
Int. year 2011	1.279***	0.015
Int. year 2012	1.510***	0.074
Number of observations: 139,580		
Pseudo R²: 0.038		

Indication of statistical significant levels: *** indicates p≤0,01 significance level, ** indicates 0,01<p≤0,05 significance level and * indicates 0,05<p≤0,1 significance level.

The main result is that disability is negatively related to the self-reported level of life satisfaction, ceteris paribus, while controlling for other background characteristics. Meaning that a change in disability status from non-disabled to disabled, the odds of scoring a 10 (completely satisfied) on the life satisfaction scale versus the combined 0 to 9 scores are 0.511 lower, given that all other variables in the model are held constant. This finding is in line with the results of Schulz & Decker (1985) who found that the reported levels of wellbeing of the disabled participants were lower than those of age-matched non-disabled people. In this model the proportional odds ratio for disability appears to be smaller than the previous model, which did not account for the background characteristics that might confuse the relationship between disability and life satisfaction. This means that the background characteristics explain a part of the effect in the relation between disability and life satisfaction.

Each of the background characteristics included in the regression are still significantly correlated with individuals level of life satisfaction, while controlling for disability and other background characteristics. The result in this model indicate that number of years of education are positively related to the self-reported level of life satisfaction among elderly in Europe, this is in line with the findings of Angelini et al. (2011). Also, the respondents who do not currently work (both because of retirement or other out of labour force reasons) were more likely to report lower levels of life satisfaction than those who are still employed. Furthermore, both having a higher income or more assets are positively related to the self-reported level of life satisfaction. Also this model shows that elderly with a high socio-economic status have a higher probability of scoring higher levels of life satisfaction than others. All the results are line with the conclusions of Gaymu & Springer (2010), Angelini et al. (2011) and Deindl (2013).

The overall levels of life satisfaction increase with age, with each higher age category the odds of scoring higher on the life satisfaction scale increase compared to the youngest age category, ceteris paribus. This finding is significant and in line with the conclusions of Angelini et al. (2011). Life satisfaction is strongly and negatively related to the presence of chronic diseases, this is also in line with the findings about health limitations of Deindl's (2013), Gaymu & Springer (2010) and Angelini et al. (2011).

Living in North Europe associated with reporting higher levels of life satisfaction compared to elderly living in Central Europe, as well elderly who were not born abroad. This is what the study of Deindl (2013) also concluded. Women seem to be more satisfied with their lives than men, as well living together with a partner is associated with reporting higher levels of life satisfaction, comparted to the other marital status categories. These findings were also in line with Gaymu & Springer (2010). The existence of a child influenced the life satisfaction for elderly, elderly with one or more children report significant higher levels of life satisfaction. This finding is also consistent with the earlier findings in the section 'literature review'. The last finding is that being interviewed in the year 2006 or 2010 is associated with reporting higher levels of life satisfaction comparted to be interviewed in 2013.

It can be concluded that both disability and the background characteristics are important in determining the self-reported level of life satisfaction for elderly people in Europe. And that all findings were statistically significant and consistent with the findings in earlier research. The pseudo R-squared for this ordered logistic regression was 0.038, which is larger than the previous two regressions.

5. Discussion and conclusion

Considering the fact that frail and disabled elderly are an important and growing group of long-term care users, the use of broader outcome measures, such as wellbeing, may provide additional information necessary to optimally allocate elderly care. The use wellbeing outcome measures requires the knowledge and understanding of what constitutes life satisfaction for elderly and in particular about the relationship between disability and life satisfaction. This is because disability is identified as one of the main characteristics of long-term care use. Once the relationship between disability and life satisfaction has been made clear, it will allow us to see which additional benefits can or cannot be achieved with long-term care services that elderly would not be able to achieve themselves. The contribution of this study to the literature is an increase in the understanding in if being disabled is associated with the self-reported level of life satisfaction among the elderly in Europe.

The thesis first examined the correlation between the background characteristics and disability. The results showed that almost all of the background characteristics are significantly different in their mean between the groups of disabled and non-disabled elderly. On average disabled elderly were less educated, older, more likely to be unemployed, had less assets/income and had more chronic diseases than non-disabled elderly. It appeared that it is important that one controls for each of these background characteristics, since the background characteristics are associated with disability and life satisfaction (shown by literature). Meaning that due to these background characteristics confounding may occur in the relation between disability and life satisfaction.

Second, the correlation between disability and life satisfaction among elderly in Europe has been made clear, without controlling for other background characteristics. The main result is that disability is an important determinant for the self-reported level of life satisfaction, without controlling for other background characteristics. Disabled elderly reported significantly lower levels of life satisfaction than those who are non-disabled.

Third, the thesis investigated the correlation between the background characteristics (control variables) and the self-reported level of life satisfaction among elderly people in Europe. All of the control variables included in the regression model were significantly correlated with the individuals' level of life satisfaction. Elderly with a high socio-economic status, e.g. higher income, assets, education and being employed, have a higher probability of scoring higher levels of life satisfaction than others, which was in line with the conclusions of Gaymu & Springer (2010), Angelini et al. (2011) and Deindl (2013). The overall levels of life satisfaction increase with age, with each higher age category the odds of scoring higher on the life satisfaction scale increase compared to the youngest age category 50 to 55 years, ceteris paribus. This finding is significant and in line with the conclusions of Angelini et al. (2011). Furthermore, being female, living with a partner, being employed and heaving at least on child is associated with reporting higher levels of life satisfaction. Also living in Northern Europe was associated with reporting higher levels of life satisfaction compared to elderly living in Central Europe, which was in line with the research of Deindl (2013). Suffering from one or more chronic diseases was associated with reporting lower levels of life satisfaction. All of the results were expected and in line with the literature. The results show that all the background characteristics are important confounders in the relation between disability and life satisfaction, which means that it is important to control for these variables.

Finally, the main result is that disability is negatively related to the self-reported level of life satisfaction for elderly in Europe, ceteris paribus, while controlling for other background characteristics. Meaning that disabled elderly in Europe are significantly less satisfied with their lives than non-disabled elderly. This finding complement the earlier research of Schulz & Decker (1985) showing the same result but for a much larger sample with randomly selected participants. Also, the results are not contrary to the more recent study performed by Lucas (2007). Lucas found lower levels of life satisfaction in people after they became disabled, the thesis complements this finding by showing that this is also true for elderly within nineteen different European countries.

Although the study has notable strengths, because it is based on a large survey of individuals not selected because of disability and there is controlled for confounding, there are many ways in which this study may be improved. Important is that the associations from this cross-sectional study does not equal causation. With the chosen study design it is impossible to infer causality when looking at one time point, it gives no indication of the sequence of events whether life-satisfaction was influenced before, after or during a disability. Therefore, it is also not possible to see if and how adaptation plays a role to disability elderly. If elderly would be able to adapt to their disabilities and return to higher levels of life satisfaction in the course of time, the results of the negative effect of disability on life satisfaction could be overestimated. The study does not differentiate between the type or the cause of disability, therefore disability is described in a broad term. It could be possible that elderly suffering for a disability due to terminal illness experience greater decreases in their life-satisfaction than elderly who developed a disability independent of another condition. One should be careful that individuals living in different countries may adopt different reporting styles in life satisfaction self-assessments (Angelini et al. 2008). The external validity of this study would be enhanced if weights would be applied to compensate for differences reporting behaviour. Another improvement of the study could be its design. In an ordered logistic regression it is assumed that the effect of exposure is the same for all such splits of the categories of the outcome variable, this is the so called parallel regression assumption. A Brant test of parallel regression assumption showed that parallel regression assumption has been violated and probably a more flexible model is required.

Further research is required to confirm the current findings and is necessary to establish a causal relationship between disability and life-satisfaction for elderly. Further research is especially encouraged in more homogeneous elderly population which is characterized by a single form of disability. It is also recommended to explore ways in which long-term care interventions contribute to additional benefits beyond health in terms of life-satisfaction for disabled elderly. Besides that, it is recommended to investigate if adaptation plays a role to disabled elderly.

Considering wellbeing as a broader outcome measure seems relevant for policy makers, in order to support their difficult trade-offs on reimbursement within the long-term care sector. Because it appears that having a disability is associated with reporting lower levels of life satisfaction, it is interesting to see which additional benefits can or cannot be achieved for disabled elderly with the use of long-term care. However, it is important for policymakers to realize that disability is only one determinant of life satisfaction, and that there are many other determinants that determine one's life satisfaction. Therefore, policymakers should be aware of correcting for endogeneity bias.

The thesis conclude that disabled elderly in Europe are on average less satisfied with their lives than non-disabled elderly.

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