

Life satisfaction of disabled and non-disabled elderly 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 scarce 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 wellbeing¹ 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?

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 were 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		Disabled		Sig.	Test method
	Mean	Std. Dev.	Mean	Std. Dev.		
Years of education	11.181	4.446	10.172	4.267	***	T-test
Age 50-55	0.199	0.399	0.113	0.317	***	Chi ² 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	***	Chi ² test
Unemployed	0.632	0.482	0.837	0.369	***	Chi ² test
Female	0.532	0.499	0.586	0.493	***	Chi ² test
Living with partner	0.738	0.440	0.658	0.474	***	Chi ² test
Living separated	0.013	0.113	0.012	0.108	**	
Never married	0.056	0.230	0.054	0.226		Chi ² test
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	***	Chi ² 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		Chi ² 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	***	Chi ² 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		Chi ² 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 $p \leq 0,01$ 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 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 were significantly higher for non-disabled elderly than 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 were ‘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 R²-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, compared 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 R ² : 0.038		

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 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, compared 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 compared 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 having at least one 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 complements 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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