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# Impact of disability on different domains of health-related quality of life in the noninstitutionalized general population

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**Abstract:** The relationship between disability and health related quality of life (HRQL) is complex because of the role that function plays in the measurement, and certain points need to be dealt with in greater detail when the analysis is applied to the different dimensions of HRQL. The purpose of this study was to assess the impact of disability on different domains of quality of life. Variables were drawn from the 2002 Basque Country Health Survey. Logistic regression models were constructed to measure the adjusted effect of disability on quality of life as determined by the SF-36 questionnaire. The models were adjusted for sociodemographic variables and the presence of comorbidity. The greatest difference between disabled and nondisabled subjects was found in the physical components of the questionnaire. Odds Ratios (ORs) for a suboptimal level of quality of life as determined by functional status were much higher for the physical than for the mental dimensions. Adjustment for different variables showed a decrease in ORs in the physical, mental, and social dimensions. This study establishes a significant relationship between disability and the loss of quality of life in both physical and mental dimensions of SF-36, irrespective of the associated disease.

**Keywords:** quality of life, disability, health status, SF-36

## Introduction

The impact of disease in a population has traditionally been measured by its effect on the mortality rate and thus on the decrease in life expectancy. This approach has been adequate in an epidemiologic context characterized by acute diseases with high mortality rates.[1] However, the determinants of health in developed countries, such as population aging, have changed, resulting in an increased prevalence of diseases causing disability. The list of diseases according to their burden is evidence of this new scenario,[2,3] and stroke and dementia are among the leading conditions because of their great impact in terms of disability.[4] However, society and the medical community still have not made its care a social priority, and research for those diseases that generate disability does not receive funds according to the burden imposed.[5] The lack of knowledge often fosters the tacit assumption that there is no problem, especially when compared to the information available about life lost due to premature mortality.[4]

Therefore, the evaluation of diseases, besides mortality, should include measurement of long-term consequences such as disability and, at a broader level, health related quality of life (HRQL). The term "HRQL" refers to the physical, psychological, and social domains of health, which are distinct areas that are influenced by a person's experiences, beliefs, expectations, and perceptions.[6] The World Health Organization defines 'disability' as a restriction or lack of ability to perform an activity in the manner

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or within the range considered normal for a human being.[7] This term does not include the subjective perceptions that determine the HRQL of a person. In the field of outcome research both concepts are used separately, and impairments appear to be better reflected in disability measures than in HRQL instruments.[8,9] Nevertheless, the differentiation of both concepts is complex because of the role played by function in the measurement of health and disability.[9] Some authors have noted that new measures of perceived health status are needed to avoid the confusion between function and health.[9] This approach needs to deal with certain points in greater detail when the analysis is applied to the different dimensions of HRQL. Physical scales are scored according to the performance of activities of daily living, but items that produce mental and social scales are less closely related to the functional status.[10,11] The new framework for the analysis of functioning, disability, and health proposed by the World Health Organization differentiates the concepts of disability and health and assumes that a disabled can be a healthy person. [7]

Given the parallel use of the two concepts, it would be important to ascertain the relationship of disability separately within the physical, mental, and social domains of HRQL. From this perspective we aimed to check the theoretical model by assessing the influence of disability in the different domains of HRQL in the noninstitutionalized general population of the Basque Country.

# Methods

Data from a noninstitutionalized population were used to conduct a descriptive study of the HRQL as perceived by a disabled population subset, versus the HRQL perceived by a nondisabled subset. The disabled population was defined as subjects with any disability that resulted from a process of gradual change from diseases and lesions first affecting organ function and ultimately the individual. Disability may thus be defined as the inability to independently perform activities of daily living within a given environment.[12] Disabled people depend on their families or the community to carry out basic or instrumental activities of daily living. Questionnaires that evaluate the level of autonomy in different daily tasks estimate the degree of disability.[13]

## Sample (Basque Country Health Survey)

The 2002 Basque Country Health Survey (BCHS) served as the information source. This survey is conducted every 5 years to collect information about the health and social characteristics of the noninstitutionalized population of the Basque Country. The surveyed sample consisted of 8415 subjects representative of the Basque Country population. The authors of the survey have provided a more detailed description of their methods elsewhere.[14]

## Variables and measurements

Items related to the limitation of activities of daily living, quality of life (SF-36 questionnaire), and presence of disease were drawn from the BCHS. Social and demographic variables were also processed: sex, age, marital status, educational level, socioeconomic group, confidential support, and affective support. The presence of disease was recorded based on the subjects' self-report, and it was coded according to the International Classification of Diseases (ICD-9-MC). For the analysis, the 9 most relevant disease groups were selected: stroke; ischemic heart disease; cancer; diabetes; respiratory, other circulatory, musculoskeletal, neurological diseases and lesions; and trauma. These groups were included in our analysis because the presence of chronic conditions plays an important role in the relationship between functional status and HRQL.[15,16]

The functional capacity for activities of daily living was assessed by recording 10 basic activities: eating, bathing, using the toilet, getting out of bed, rising from a chair and walking, adequate nutrition, washing, dressing, putting shoes on, and spending the night alone. Individuals were asked if they were able to carry out each activity. Ten points were assigned for complete ability, 5 points for partial autonomy for each activity, and 0 when they were totally unable to carry out the activity. Partial autonomy was that when provided with the choice, the individual would prefer to perform the task with help. The resulting total value ranged from 0 to 100, and subjects with a value of 95 or less were defined as disabled. The same criterion has been used in other studies and means that a person is not capable, totally or partially, to accomplish some activity. Individuals with a score of 100 were defined as nondisabled.[17,18]

The SF-36 Health Survey (SF-36), a standardized questionnaire consisting of 36 items that assess subjects' health, is one of the tools most commonly used internationally to measure HRQL.[10] By running a clustering algorithm, eight scales (dimensions) with values ranging from 0 (minimum health perceived) to 100 (maximum health perceived) are obtained. Two summary variables, a physical component summary (PCS) and a mental component summary (MCS), are calculated from these dimensions. The summary variables are standardized to have a mean of 50 and a standard deviation of 10 in the general population.

## Analysis

The first step in our study was calculating the SF-36 variables (eight dimensions and two summary variables) in disabled subjects and in the nondisabled population. The extent of the difference between disabled and nondisabled was measured by the effect size (the difference between the means divided by the standard deviation from the nondisabled sample).[19,20] Cohen's benchmarks were used to classify the magnitude of effect sizes [25]: below 0.20 was not significant; between 0.20 and 0.50 was small; between 0.50 and 0.80 was moderate; and above 0.80 large. The association between functional status and the presence of different diseases was measured by calculating the crude odds ratios (OR) of the disease declaration in disabled versus nondisabled subjects.[21]

Given the disparity in sex, age, social support variables, and presence of chronic conditions in the nondisabled and disabled populations, we decided to apply a statistical approach to adjust the OR values.[15,22,23] We analyzed the differences in HRQL between disabled and nondisabled subjects by logistic regression models, because linear regression modeling presented a problem of lack of linearity and normality in the scores of SF-36 dimensions that we planned to use as dependent variables.[24] Guallar-Castillón et al used the suboptimal health index to analyze gender differences by recoding the value of each SF-36 dimension, depending on whether it was below the maximum value of 100.[23] In this study, the same method was applied and the mean of the general population was used as a threshold for good quality of life (values below the mean were recorded as suboptimal HRQL and values over the mean as optimal HRQL). Logistic regression models were used to calculate the ORs of being in suboptimal health for the different SF-36 dimensions, and summaries in subjects with disability versus subjects without disability. Crude ORs were calculated first, followed by adjusted ORs. The first model was adjusted for sociodemographic variables (age, sex, and education). In addition to age, sex, and education, the second OR took into account the presence of comorbidity variables (stroke; ischemic heart disease; cancer; diabetes; lesions; trauma; and respiratory, circulatory, musculoskeletal, and neurological diseases). The process of sequential calculation of ORs allowed for assessing the relative contribution of the different groups of variables to the differences between nondisabled and disabled subjects in the different scales of SF-36. We calculated the Nagelkerke $R^2$ to quantify the contribution of the groups of variables to the explanation of the variance of the dependent variable. Nagelkerke $R^2$ is a corrected version of the Cox $R^2$ that covers the range from 0 to 1.

## Results

Table 1 shows the social and demographic characteristics of the sample by level of autonomy. There were more disabled subjects among women, elderly people, widowed people, those in low socioeconomic groups, and those lacking education. When the subjects were classified by the number of declared diseases, the proportion of disabled subjects was seen to increase with the number of diseases. Out of a sample of 8415 people, 303 subjects met the disability criterion, that is, 3.6% of the noninstitutionalized general population said they needed help for at least one basic activity of daily living (Table 1). Table 2 shows the presence of diseases as reported by the subjects themselves, stratified by autonomy level. Stroke and mental disorders exhibited the highest ORs associated with disability (18.54 and 15.70).

Scores and effect sizes in different SF-36 dimensions, with physical and mental summaries, and SF-6D in the nondisabled

**Table 1** Sociodemographic characteristics of the population by functional status (nondisabled/disabled)

| | Nondisabled | | Disabled | |
|---|---|---|---|---|
| | N | % | N | % |
| Total | 8112 | 96.4 | 303 | 3.6 |
| **Sex***** | | | | |
| Males | 3824 | 47.1 | 112 | 37.0 |
| Females | 4288 | 52.9 | 191 | 63.0 |
| **Age***** | | | | |
| 0–24 | 1155 | 14.2 | 3 | 1.0 |
| 25–44 | 2555 | 31.5 | 22 | 7.3 |
| 45–64 | 2673 | 33.0 | 63 | 20.8 |
| 65–69 | 597 | 7.4 | 31 | 10.2 |
| 70 y+ | 1132 | 14.0 | 184 | 60.7 |
| **Marital status***** | | | | |
| Single | 2663 | 32.8 | 47 | 15.5 |
| Married or with couple | 4674 | 57.6 | 137 | 45.2 |
| Separated, divorced | 178 | 2.2 | 5 | 1.7 |
| Widow/er | 597 | 7.4 | 114 | 37.6 |
| **Education***** | | | | |
| No schooling | 299 | 3.7 | 55 | 18.2 |
| Primary education | 5877 | 72.4 | 228 | 75.2 |
| Graduate education | 1936 | 23.9 | 20 | 6.6 |
| **Socioeconomic group*** | | | | |
| I–II | 1878 | 23.2 | 52 | 17.2 |
| III | 1243 | 15.3 | 48 | 15.8 |
| IV–V | 4991 | 61.5 | 203 | 67.0 |
| **Number of diseases***** | | | | |
| 0 | 4315 | 53.2 | 29 | 9.6 |
| 1 | 1966 | 24.2 | 64 | 21.1 |
| 2 | 974 | 12.0 | 66 | 21.8 |
| 3 | 441 | 5.4 | 57 | 18.8 |
| 4 | 220 | 2.7 | 33 | 10.9 |
| 5 | 120 | 1.5 | 22 | 7.3 |
| 6 | 76 | 0.9 | 32 | 10.6 |

**Notes:** *$P < 0.05$; ***$P < 0.0001$.

**Table 2** Presence of chronic diseases by functional status and odds ratios of disease in disabled versus nondisabled

| Disease | Nondisabled N = 8112 | Disabled N = 303 | Total 8415 | OR (95% CI) |
|---|---|---|---|---|
| Stroke | 66 | 40 | 106 | 18.54 (12.29–27.98) |
| Ischemic heart disease | 333 | 65 | 398 | 6.38 (4.75–8.57) |
| Cancer | 55 | 18 | 73 | 9.25 (5.36–15.96) |
| Diabetes | 261 | 53 | 314 | 6.38 (4.63–8.79) |
| Respiratory diseases | 607 | 27 | 634 | 1.21 (0.81–1.81) |
| Other circulatory diseases | 1300 | 128 | 1428 | 3.83 (3.03–4.85) |
| Musculoskeletal diseases | 1286 | 155 | 1441 | 5.56 (4.40–7.02) |
| Neurological diseases | 315 | 69 | 384 | 7.30 (5.46–9.77) |
| Mental problems | 495 | 153 | 648 | 15.70 (12.31–20.01) |
| Other diseases | 2238 | 197 | 2435 | 4.88 (3.83–6.21) |

**Abbreviations:** OR, odds ratio; CI, confidence intervals.

and disabled populations, are given in Table 3. The greatest difference between disabled and nondisabled subjects was found in the physical components of the questionnaire.

The second and third columns of Table 4 show the percentage of subjects in each sample (nondisabled and disabled) that scored lower than the mean of the general population in each domain. ORs by functional status meant how many times higher the probability was of a disabled individual being in a suboptimal level of quality of life compared with nondisabled, and this was much higher for the physical than for the mental dimensions. Adjustment for different variables showed a decrease in ORs in all cases. Nevertheless, ORs continued to be very high for physical functioning (15.6) and PCS (13.2). The MCS showed the lowest OR (1.5), and its difference from the crude OR (1.7) was small. Adjusted ORs for the other physical dimensions were approximately 5, whereas ORs for mental dimensions were between 2 and 3. The percentages of change in the ORs produced by both models were relevant. The combined effect of the sociodemographic variables (sex, age, and education) had a negative effect in the dimension role-emotional and MCS. Table 4 also shows the percentage of explanation of the variance of the probability of being in suboptimal health by the two models. These different results by dimension receive the same comments as the figures of ORs.

**Table 3** Scores in the SF-36 dimensions of the nondisabled population (N = 8112) and the disabled population (N = 303), score differences, and effect sizes

| | Nondisabled mean (SD) | Disabled mean (SD) | Difference | Effect size |
|---|---|---|---|---|
| Physical functioning | 88.8 (17.7) | 36.0 (30.5) | 52.8* | 3.0 |
| Role-physical | 88.1 (29.0) | 39.5 (45.5) | 48.6* | 1.7 |
| Pain | 78.5 (24.3) | 45.7 (31.4) | 32.8* | 1.3 |
| Perceived health | 66.7 (18.3) | 37.7 (21.6) | 29.0* | 1.6 |
| Vitality | 66.3 (19.1) | 42.9 (23.6) | 23.3* | 1.2 |
| Social functioning | 89.9 (18.0) | 57.5 (33.5) | 32.4* | 1.8 |
| Role-emotional | 92.0 (24.2) | 72.9 (43.3) | 19.1* | 0.8 |
| Mental health | 73.3 (17.2) | 57.6 (23.0) | 15.8* | 0.9 |
| Physical component summary | 50.2 (9.2) | 26.8 (12.7) | 23.5* | 2.5 |
| Mental component summary | 50.1 (9.8) | 45.9 (15.7) | 4.2* | 0.4 |

**Notes:** *Significance level of the difference <0.001; SD, standard difference.

## Discussion

Our understanding of the relationship between health and disability changed after the publication in 2001 of the International Classification of Function, Disability, and Health (ICF) that introduced the idea that a disabled person can live in a healthy condition.[7] However, in this sample of the noninstitutionalized general population, disability had a significant impact on subjects' HRQL, which is seen as a decrease in the eight dimensions of SF-36, irrespective of the associated disease. The main finding is that the effect of disability persisted in both physical and mental scales, despite adjustment for sociodemographic and social support variables, and the presence of diseases. As ICF notes, contextual factors play a key role in the manifestation of chronicle conditions.[7] Environmental and personal factors determine how disabled people cope with their limitation in the performance of daily-living activities. In the Basque Country, the family has played a predominant role as the main support network to cover the needs of disabled people. However, this situation is changing and future health surveys in the Basque Country will show if the perceived health of disabled Basque people worsens. Therefore, a traditional strength that could be defined as the psychological resilience to disability is probably going to disappear. Resilience is defined as a dynamic process where individuals exhibit positive behavioral adaptation when they

**Table 4** Percent of population with suboptimal health (worse than mean health of the population) by functional status in each dimension of the SF-36, summary indices, crude and adjusted odds ratios, and $R^2$ for poor health related quality of life in disabled vs nondisabled subjects

| Dimension | Nondisabled % | Disabled % | Crude ORs (95% CI) (disabled vs nondisabled) | Model 1* | | Model 2** | |
|---|---|---|---|---|---|---|---|
| | | | | OR (95% CI) | $R^2$ | OR (95% CI) | $R^2$ |
| Physical functioning | 27.2 | 94.7 | 47.9 (28.9–79.4) | 26.5 (15.5–45.2) | 0.509 | 15.6 (9.0–26.8) | 0.413 |
| Role-physical | 17.6 | 68.4 | 10.1 (7.9–13.0) | 8.3 (6.3–10.7) | 0.094 | 5.4 (4.1–7.2) | 0.186 |
| Bodily pain | 44.1 | 81.2 | 5.4 (4.1–7.3) | 4.2 (3.1–5.6) | 0.062 | 2.7 (2.0–3.8) | 0.151 |
| General health | 41.2 | 89.0 | 11.6 (8.1–16.7) | 7.2 (5.0–10.5) | 0.118 | 4.5 (3.1–6.6) | 0.175 |
| Vitality | 49.7 | 83.1 | 5.0 (3.7–6.7) | 3.8 (2.8–5.2) | 0.050 | 2.7 (1.9–3.7) | 0.096 |
| Social functioning | 33.5 | 79.2 | 7.6 (5.7–10.0) | 6.4 (4.8–8.5) | 0.056 | 4.5 (3.3–6.1) | 0.129 |
| Role-emotional | 11.5 | 29.7 | 3.3 (2.5–4.2) | 3.5 (2.7–4.6) | 0.033 | 2.3 (1.7–3.1) | 0.098 |
| Mental health | 45.9 | 73.1 | 3.1 (2.5–4.1) | 2.7 (2.0–3.5) | 0.040 | 2.0 (1.5–2.6) | 0.092 |
| Physical component summary | 32.7 | 94.9 | 38.6 (22.9–65.0) | 22.2 (13.0–37.7) | 0.206 | 13.2 (7.7–22.7) | 0.294 |
| Mental component summary | 37.0 | 50.3 | 1.7 (1.3–2.1) | 1.9 (1.5–2.4) | 0.022 | 1.5 (1.2–2.0) | 0.070 |

**Abbreviations/notes:** OR, odds ratio; CI, confidence interval; $R^2$, Nagelkerke $R^2$. *Model 1: Ors adjusted for sociodemographic variables (age, sex, education). **Model 2: OR adjusted for sociodemographic variables and comorbidity variables (stroke, ischemic heart diseases, cancer, diabetes, respiratory diseases, circulatory diseases, musculoskeletal diseases, neurological diseases, lesions, and trauma).

encounter significant adversity, trauma, tragedy, threats, or even significant sources of stress.[25]

These results need a different judgment for the physical, mental, and social dimensions of HRQL. As it was expected, the effect sizes and ORs associated with the physical dimensions were higher. It is especially noteworthy that the association with physical functioning can be described as huge. Nevertheless, the notable coincidence of the items used to assess disability and the questions of SF-36 that generate this scale compels us to qualify the association as partially misleading. In this sense, a detailed analysis of SF-36 items of physical functioning shows that they record the presence of a range of nine physical limitations (such as walking or climbing stairs) and only one self-care item (bathing or dressing). In this study the variable disability is based on the lack of autonomy to perform 10 activities of daily living such as eating, walking, bathing, or using the toilet. Whereas the disability score relies on the performance of some activities, HRQL is based mainly on the individual's perception of their disability.[8] The multidimensional approach to the measure of HRQL raises the difficulty of defining the boundary between both concepts, because in practice there is partial overlap. Therefore, this huge OR cannot be alleged to be evidence of association, because the assumption of content independence is partially broken. However, this limitation does not apply to the three other physical dimensions. Because these dimensions measure different issues, we can accept a highly significant level of association with disability. Moreover, the concept of self-care that is at the basis of the concept of disability doesn't overlap with pain, health self-perception, or work activities that constitute the origin of the scales of role-physical, bodily pain, and general health. Even when adjusted by covariates, disabled people living in the community have a risk of pain three to five times higher than that of nondisabled people, a self-perception of poor health, and problems performing work activities. Disabled people also have worse mental health than the nondisabled population, but the impact measured by ORs and effect sizes is lower than that on physical scales. Nevertheless, when compared with the nondisabled population, the disabled are at a significantly higher risk (between 2.0 and 4.5) of perceiving poor vitality, social functioning, role-emotional, or mental health. Of these scales, social functioning shows the highest adjusted OR (4.5). This elevated figure reflects frequent interference with social activities because of physical or emotional problems. The scales related to individuals' mood perception as a level of vitality, and mental health appears less affected (adjusted ORs of 2.0 and 2.7), but they show that the disabled feel tired and depressed more often than the nondisabled group.

The SF-36 summary measures originate from the eight scales and consequently share the features described previously. The high weight of physical functioning in the PCS warns of the same association of partial lack of independence with the huge OR obtained by PCS in the logistic regression models. It is well known that the highest value on the scale for physical functioning correlates with the PCS. Our results corroborate this feature by showing that the disabled, with an adjusted OR of 13.2, have a worse score on the PCS. The disabled population's risk of a perception of poor global mental health is higher (1.5 times) than the risk in the nondisabled

population, and this difference is not only statistically significant but also epidemiologically relevant because it underscores the psychological effect of disability. Wilson and Cleary proposed a theoretical framework for understanding the relationship between the biological and physiological determinants of health, their impact in terms of functional status, and their effect on the loss of HRQL. These authors suggested that functional status has a mediating role between disease and HRQL, in what usually is referred to as 'physical domains'.[16] Our results also support the application of this model to the psychological and social scales of SF-36. The analysis of the percentage of the perceived health explained by the two models corroborates the previous statement. They fluctuate between 10% for mental dimensions and 40% for physical functioning. The models including comorbidity as an independent variable (model 2) produced higher levels of explanation.

Various ways to interpret differences in the scores on quality-of-life questionnaires have been proposed in the literature.[19] Some authors have proposed that a 10% difference should be interpreted as clinically relevant.[26] Accordingly, crude differences between nondisabled and disabled subjects in our study were greater than the threshold for all dimensions and the two component summaries. The effect size is an alternative way to assess impact.[19,20] Effect size for crude differences in our study was large (>0.8) for PCS and the eight dimensions of SF-36, and small for MCS (0.43). Assessment of HRQL is based on the subjects' perception of their own health status, as determined by questionnaires such as SF-36. However, HRQL consists of different factors that are, in turn, related to each other. The challenge lies in quantifying the role of disability and separating it from the role of other determinants of HRQL, ie, whether disability is a factor associated with the loss of HRQL itself or only accompanies the negative effect of the presence of disease. Logistic regression models have been used in our study for this purpose. The conclusion is that disability is independently associated with HRQL deficit, notwithstanding the methodological reservations already expressed for the physical functioning. The adjusted ORs range between 2.0 and 5.4, except for those of the PCS and physical functioning, which are much higher.

The contribution of the different groups of variables for suboptimal health to differences in ORs between nondisabled and disabled subjects had a slightly different pattern. The first group of sociodemographic variables (age, sex, and educational level) roughly reduced the crude ORs of physical dimensions in a fourth and the ORs of the mental dimensions in an eighth. Significantly, the presence of diseases produced a similar decrease in all dimensions. The final adjusted ORs of the physical scales became halved, and those of the mental scales were reduced to a third, which indicates a slightly higher association of those groups of variables with physical health. The analysis of the relative presence of those diseases in disabled people indicates that stroke and mental problems are the groups most frequently associated with disability. The probability of being disabled is 18.54 and 15.70 times higher for people declaring stroke and mental problems, respectively.

The prevalence of disability in the noninstitutionalized general population of the Basque Country was 3.6%, and it rose to 11.1% in the population more than 65 years of age. A study to assess disability in the noninstitutionalized Spanish population found that 19.1% of the subjects reported some limitation of activities of daily living.[22] Freedmann et al reported similar differences after measuring limitations for activities of daily living in different surveys of the American population more than 65 years of age.[12] In the National Health Interview Survey, disability increased from 6.4% to 8.4% from 1982 through 1993.[27,28] Higher rates were, however, reported in the National Long Term Care Survey, with values changing from 13% to 11% during the same period.[29] The lack of a standard framework to assess disability made comparison with other studies difficult. Besides, we had no figures for disabled populations residing in nursing homes in Spain. Under these conditions, no conclusions could be drawn from the various results. Therefore, we emphasize the importance of the development of standardized formulas that help to evaluate geographic and temporal differences in measuring disability.

Some limitations of this study should be discussed. The first has already been discussed and applies to the physical functioning scales. The second is that the BCHS does not include the institutionalized population because it is aimed at assessing the health status of the general population rather than the specific characteristics of the disabled population. The level of information available was therefore lower than in surveys designed for a more specific purpose, and the population with greater dependence levels was excluded, since these people are cared for in nursing homes. In addition, the cross-sectional design of the study did not allow for establishing a causal relationship between HRQL and disability, but only for relating both factors and quantifying the effect size.

## Conclusions

This study establishes a significant relationship between disability and the loss of quality of life in both physical and mental dimensions of SF-36, irrespective of the associated disease.

The effect in the mental dimensions was lower, but still relevant. The consequence for public health is that care of disabled must include not only the physical performance of activities of daily living but also the mental aspects and social activities.

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## Disclosure

The authors report no conflicts of interest in this work.

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