2016•2017
FACULTEIT GENEESKUNDE EN LEVENSWETENSCHAPPEN
master in de revalidatiewetenschappen en de kinesitherapie

Masterproef deel 1

Longitudinal observation of quality of life and domain-specific impairments in persons with neurological conditions

Promotor :
Prof. dr. Peter FEYS

Wim Moelans , Yannick Douwen
Eerste deel van het scriptie ingediend tot het behalen van de graad van master in de revalidatiewetenschappen en de kinesitherapie

universiteit hasselt
KNOWLEDGE IN ACTION

Universiteit Hasselt | Campus Hasselt | Martelarenlaan 42 | BE-3500 Hasselt
Universiteit Hasselt | Campus Diepenbeek | Agoralaan Gebouw D | BE-3590 Diepenbeek

universiteit hasselt
KNOWLEDGE IN ACTION

2016•2017
FACULTEIT GENEESKUNDE EN LEVENSWETENSCHAPPEN
master in de revalidatiewetenschappen en de kinesitherapie

Masterproef deel 1

Longitudinal observation of quality of life and domain-specific impairments in persons with neurological conditions

Promotor :
Prof. dr. Peter FEYS

Wim Moelans , Yannick Douwen

Eerste deel van het scriptie ingediend tot het behalen van de graad van master in de revalidatiewetenschappen en de kinesitherapie

universiteit hasselt
KNOWLEDGE IN ACTION

Longitudinal observation of quality of life and domain-specific impairments in persons with neurological conditions

OUTLINE

Research question: “How does quality of life (QoL) evolve in patients with neurological disorders (stroke, spinal cord injury, traumatic brain injury, multiple sclerosis and Parkinson’s disease) in a longitudinal perspective?” The secondary aim of the literature search was ‘’to identify the most important factors influencing QoL in a longitudinal perspective in persons with neurological conditions.’’

The most important findings of this literature review (n=29) are the following:

- The quality of life of persons with neurological disorders was significantly lower, compared to healthy individuals.
- The course of quality of life in the long term showed a clear distinction between acute and chronic disorders. In chronic disorders such as multiple sclerosis and Parkinson’s disease, the quality of life deteriorated over time. The quality of life of acute neurological events as stroke, spinal cord injury and traumatic brain injury, on the contrary, remained stable or even improved.
- Various factors influenced the longitudinal course of quality of life. Disease severity, age, gender, the presence of pain, depression, functional impairments, level of participation and exercise behaviour were found to be the most important ones.
- In neurological disorders, it remains critical to encourage consistent exercise behaviour. Exercise inhibites the progression of functional impairments, leading to an improved participation. On top of that, exercise can be important to reduce anxiety and depression in patients with neurological disorders by engaging these persons in the process of resuming enjoyable and meaningful activities.
- Further research on this topic is necessary in a mondial context. At this moment, studies of good quality are only available in industrialized countries with middle- or high incomes. Whereas data concerning the course of quality of life in neurological conditions in developing countries with low incomes, is lacking.

Students: Yannick Douwen, Wim Moelans

Promotor: Prof. Dr. P. Feys

CONTEXT OF THE MASTER'S THESIS

The topic of this thesis can be categorized in the research domain of neurological rehabilitation. Patients suffering from neurological disorders are confronted with various physical and mental consequences. Motor impairments, sensory anomalies and cognitive deterioration lead to different degrees of disability. These disabilities profoundly affect the lives of patients in different ways. The way patients with neurological disorders cope with these consequences, influences the quality they attribute to their own life.

Insight in the course of self-perceived quality of life in patients with neurological disorders can be useful for healthcare providers. In this manner, it becomes possible to identify specific groups of patients in need for additional support from the health care system. Furthermore, knowledge of influencing factors can be useful to adapt rehabilitation to the patient individually.

More specifically, the literature search for this thesis was based on the following research question: "How does QoL evolve in patients with neurological disorders in a longitudinal perspective?" The secondary aim of the literature search was ''to identify the most important factors influencing QoL in a longitudinal perspective in persons with neurological conditions.''

This Master's thesis part 1 is done as a part of the first master year at the UHasselt in Diepenbeek. Part 2 will be done in Ziekenhuis Oost-Limburg (ZOL), as a part of a broader research project evaluating the effectiveness of a new care-pathway 'acute stroke' in ZOL. This evaluation will be performed under the supervision of Prof. Dr. Peter Feys, Dr. Alain Wibail and dr. Ilse Lamers.

For this thesis, the central format was applied.

This thesis was a duo Master's thesis. The search strategy and the screening for relevant articles were performed together. The data extraction was executed by Yannick Douwen for the most part. The academic writing was done by Wim Moelans, after a joint reflection on the results.

The final research question and literature search was developed in co-operation with Prof. Dr. Peter Feys and the World Health Organisation. Further analysis of relevant articles found through the search strategy was supervised by Prof. Dr. Peter Feys.

Regarding the protocol of the second part of this Master's thesis, the task of the students will be to assess the QoL of patients in a new care-pathway for acute stroke in ZOL, and to compare the QoL between patients who received different interventions 1.5 to 2 years earlier. From January 2016 to October 2016, the data of patients examined according to the new care-pathway 'acute stroke' in ZOL Genk were collected. The 150 patients examined and treated in this pathway will be included in this retrospective study.

We would like to express our gratitude to Prof. Dr. Peter Feys for his critical and constructive guidance during the progression of this thesis.

TABLE OF CONTENTS

PART 1: OVERVIEW OF THE LITERATURE

PART 2: RESEARCH PROTOCOL

PART 1: OVERVIEW OF THE LITERATURE

1 Abstract

Background: Neurological disorders have a profound impact on the lives of patients. Various physical impairments and decline in mental functions may interfere with daily activities. As a result, the overall quality these patients attribute to their own lives may decrease. This literature review focused on this quality of life in the years after the diagnosis with a neurological disorder. More specifically, the following research question was answered: “How does QoL evolve in patients with neurological disorders in a longitudinal perspective?”

Objective: The primary aim of this literature review was to investigate the longitudinal course of QoL in patients with neurological disorders. The secondary aim was to identify factors associated with this possible change in QoL over time.

Methods: An electronic literature search was employed to screen for published longitudinal studies concerning the quality of life in five main neurological disorders: stroke, spinal cord injury (SCI), traumatic brain injury (TBI), Parkinson’s disease (PD), multiple sclerosis (MS). Two databases were consulted: PubMed (n=284) and Web of Knowledge (n=272). Further screening and analysis of the obtained studies led to the inclusion of 29 relevant articles.

Results: In the long term (>3 years), QoL deteriorated in the chronic neurological disorders (PD, MS), while it remained stable or even improved in the acute neurological events (stroke, SCI, TBI). Factors influencing the longitudinal course of QoL were numerous and differed in degree of impact: event/disease severity, disease duration, age, gender, cognitive impairment, comorbidities, anxiety, depression, fatigue, marital status, family satisfaction, level of education, employment, insomnia, level of participation, functional impairment and exercise behaviour.

Conclusion: The QoL in patients with chronic neurologic disorders deteriorates, while QoL in acute neurological events remains stable or even improves when approached in a longitudinal perspective.

Most important key words: quality of life, longitudinal studies, Parkinson’s disease, multiple sclerosis, traumatic brain injury, spinal cord injury, stroke

2 Introduction

Neurological disorders are characterised by a wide spectrum of symptoms and impairments. Due to the medical improvements in the past decades, the lives of patients suffering from neurological is significantly prolonged. However, there is general agreement that effects should be measured in terms of quality as well as quantity of survival. Medical development may prolong life, but it is important to have insight in the nature of this life as well. The World Health Organization (WHO) defined “quality of life” as the individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards, and concerns (Development and Psychometric Properties of the World Health Organization Quality of Life Assessment Instrument (WHOQOL-100) in Portugal).

For healthcare providers, it’s essential to identify factors in the early stage of neurological diseases that predict long-term quality of life (QoL), especially those that are modifiable. This enables the early identification of patients who might be at risk of decreased participation and QoL.

This review focused on five main neurological disorders, both of acute and chronic nature: stroke, Parkinson’s disease, multiple sclerosis, spinal cord injuries and traumatic brain injuries.

- With its prevalence of 30.700.000 (WHO, 2004), stroke is one of the leading causes of long-term disability worldwide. Poor blood flow in the brain results in the typical hemiplegic image. The onset of stroke is sudden, leaving the patient and his environment unprepared (Patel, McKevitt, Lawrence, Rudd, & Wolfe, 2007). The physical, cognitive and psychological impairments can lead to activity and participation restrictions, resulting in a possible decrease in QoL.
- For spinal cord injuries (SCI), no reliable estimation of global prevalence is available, but annual incidence around the world ranges from 250.000 to 500.000 (WHO, 2013). In 90% of the cases, damage of the spinal cord has a traumatic cause (e.g. fall, car accident). However, the amount of non-traumatic SCI’s is growing (e.g. cancer). The severity of symptoms depends on the location of the injury on the spinal cord. Loss of motor control and sensory function is possible in legs, arms and/or body.
- Specific global numbers on incidence and prevalence of traumatic brain injury (TBI) were not available. Traumatic brain injury is the leading cause of disability in people under 40 years of age (WHO, 2006). If an external mechanical force (e.g. fall, accident) is applied to the head, the brain moves inside the skull. Acceleration or deceleration of neural tissue may cause disruption of neural tissue and/or blood vessels. TBI results in physical, cognitive, social, emotional, and behavioural symptoms. Outcome after TBI can range from complete recovery to severe disability or death.

- Prevalence for Multiple sclerosis (MS) has been estimated at 2.300.000 (MSIF, 2013). Demyelination of cells in the central nervous system results in various signs and symptoms: muscle weakness, paralysis, double vision, blindness, impairments in gait and balance, trouble with sensation, impaired speech and cognitive dysfunctions are common. Depending on the disease course, MS can be divided in a relapse remitting (RR), a primary progressive and a secondary progressive form.
- Parkinson's disease (PD) has a worldwide prevalence of 5.200.000 (WHO, 2004). The cause of this neurodegenerative disease is generally unknown, but believed to involve both genetic and environmental factors. The motor system is mainly affected. However, greater emphasis has been placed on the total influence of the disease on the patient's life: mood, social functioning, sleep, fatigue and depression (Karlsen, Tandberg, Arsland, & Larsen, 2000).

Due to the degenerative characteristics of chronic neurological disorders, the QoL is expected to decline over time. The existing evidence on multiple sclerosis and Parkinson's disease confirm this assumption. In multiple sclerosis, several studies (Chuzander et al. 2014; Wynia, van Wijlen, Middel, Reijneveld, & Meilof, 2012; Khan, Amatya, & Kesselring, 2013) found a significant gradual deterioration in disability and loss of QoL in the long term. In general, the same course was seen in patients with Parkinson's disease (Karlsen et al., 2000; Forsaa, Larsen, Wentzel-Larsen, Herlofson, & Alves, 2008). In neurological disorders of an acute nature, the longitudinal course of QoL is less homogenous. Evidence regarding the course and clinical determinants of QoL differ in stroke, TBI and SCI.

By combining the results of longitudinal studies concerning the QoL in these five neurological disorders, this Master's thesis attempted to transcend the divide in different pathologies. In this manner, the following research question was answered: "How does QoL evolve in patients with neurological disorders in a longitudinal perspective?" Secondary aims were: to identify influencing factors of QoL, to compare the longitudinal course of acute and chronic disorders, to receive insight into the different questionnaires used to assess QoLs and to identify possible recommendations for further research.

3 Methods

3.1 Research question

The primary research question for this literature research is: “How does QoL evolve in patients with neurological disorders in a longitudinal perspective?” The secondary aim of the literature search was ‘’to identify the most important factors influencing QoL in a longitudinal perspective in persons with neurological conditions’’.

3.2 Literature search

An electronic literature search was employed to screen for published longitudinal studies concerning the quality of life in five main neurological disorders. Two databases were consulted: PubMed and Web of Knowledge.

The following combination of Medical Subject Headings (MeSH) terms was used in PubMed:

1. “Stroke” AND “Quality of life” AND “Longitudinal studies”
2. “Spinal cord Injury” AND “Quality of life” AND “Longitudinal studies”
3. “Traumatic brain injury AND “Quality of life” AND “Longitudinal studies”
4. “Multiple sclerosis” AND “Quality of life” AND “Longitudinal studies”
5. “Parkinson’s disease” AND “Quality of life” AND “Longitudinal studies”

The following combination of keywords were used in Web of Knowledge:

1. “Stroke” (topic) AND “Quality of life” (topic) AND “Longitudinal studies” (topic) NOT “children” (topic) NOT “1900-1999” (publication date) REFINED BY “clinical neurology”
2. “Spinal cord Injury” (topic) AND “Quality of life” (topic) AND “Longitudinal studies” (topic) NOT “children” (topic) NOT “1900-1999” (publication date) REFINED BY “clinical neurology”
3. “Traumatic brain injury’’ (topic) AND “Quality of life” (topic) AND “Longitudinal studies” (topic) NOT “children” (topic) NOT “1900-1999” (publication date) REFINED BY “clinical neurology”
4. “Multiple sclerosis” (topic) AND “Quality of life” (topic) AND “Longitudinal studies” (topic) NOT “children” (topic) NOT “1900-1999” (publication date) REFINED BY “clinical neurology”
5. “Parkinson’s disease” (topic) AND “Quality of life” (topic) AND “Longitudinal studies” (topic) NOT “children” (topic) NOT “1900-1999” (publication date) REFINED BY “clinical neurology”

An overview of the different search strategies and outcomes (table1) and the included articles (table 2) are provided in the appendix.

3.3 Selection criteria

The following selection criteria were used for the further screening of the different articles:

- Longitudinal time window: ≥ 3 years with multiple assessments
- Adults (≥ 18 years) with neurological pathologies (the big five)
    - Stroke
    - Spinal cord injury
    - Traumatic brain injury
    - Multiple sclerosis
    - Parkinson's disease
- Inclusion of a specific outcome measure of QoL
- Number of participants ≥ 50 in all time points

Exclusion criteria:

- Year of publication: before 2000
- Primary aim of the study is investigation of specific interventions
- No explicit comparison between baseline and follow-up
- Methodological evaluation of an assessment tool

3.4 Quality assessment

A quality assessment, based on the Dutch Cochrane checklist for cohort studies, was performed for the included articles.

3.5 Data extraction

From the included articles, the following data were extracted: population, aims of the study, number of measurements, outcome measures, results, discussion and conclusion. All of which were extensively discussed in table 5 of the appendix.

4 Results

4.1 Results study selection

After the removal of 57 duplicates, the combination of 284 PubMed and 272 Web of Knowledge articles (table 2 in the appendix) were screened on the basis of the selection criteria, making use of the title and/or the abstract. In the majority of the studies, the abstract provided enough information for in- or exclusion. If this was not the case, the full text was searched for the criteria mentioned above. Details on the (number of) excluded are available in the flowchart in figure 1 of the appendix.

(1) Most articles were excluded, by far, due to the criterium of the longitudinal time window of data over at least three years.

(2) A reasonable number of articles was excluded due to the studied population. For example, studies including children or people suffering from other than the five neurological disorders under study.

(3) The primary aim of other articles was to investigate a specific intervention, whereas this review aimed to describe the natural course of QoL in neurological disorders.

(4) Despite the inclusion of 'longitudinal studies' in the search strategy, several reviews and cross-sectional studies had to be excluded (WoK).

(5) Some studies did not include a specific QoL outcome measure.

(6) Other studies were limited to the evaluation of psychometric properties of a specific assessment tool or questionnaire.

(7) Some studies with an adequate time window but without multiple assessments were excluded.

(8) A few studies were excluded on the basis of not including enough patients (<50) at all time points.

(9) Finally, dated studies (publication date before 2000) were excluded

For a small number of articles, the full text was not available. The authors were contacted through Research gate. Given that no response was received, these articles were excluded.

This selection resulted in 22 articles from the PubMed database and seven articles from the WoK search. These 29 articles were analysed in full detail.

4.2 Results quality assessment

The quality assessment of the included articles, based in table 3 in the appendix, gave the following results.

The included groups of patients were clearly described in all studies. However, not all groups were composed in at an equal moment in the disease-course. Eight studies included patients with large differences in disease duration, seven of them did mention the average disease-duration.

The assessment of the quality of longitudinal follow-up was divided in two questions: ‘’was the follow-up complete?’’ and ‘’was the follow-up available for an adequate proportion of the originally included patients?’’. In four studies, the measurements of outcome measures were incomplete over time (no continuous data collection at each subsequent time period). The second question referred to the lost to follow-up. In 12 studies the lost-to follow up was mentioned as a limitation, possibly influencing the results. In one study, the lost to follow-up wasn’t mentioned.

In both the outcome measures and the prognostic factors, common validated questionnaires and scales were used. The psychometric properties of these measurement tools had already been extensively studied and approved. Only three studies were not found to be valid and reliable. These studies used a single question for the assessment of a key prognostic factor and/or an outcome measure.

The identical performance of measurements, associated with the objectivity, was found to be satisfactory in 16 studies.

The generalisability of the findings was questionable in 12 studies.

4.3 Results data extraction

The studied **population** were always patients with one of the following neurological conditions: stroke, multiple sclerosis, Parkinson’s disease, TBI or SCI. Five articles included stroke patients, nine articles included patients with multiple sclerosis, five studied patients with Parkinson’s disease, five articles followed patients after TBI and five included patients with SCI. The number of patients had to be above 50 at all time points, as mentioned above. The number of patients at final follow-up ranged from 61 (Erro et al., 2016) to 10761 (Hubbard, Vo, Forder, &Byles, 2016). The **primary aim** of all included articles (n=29) was to evaluate the QoL in a longitudinal perspective. Most articles also investigated the influencing factors of the change in QoL over time. In all articles, multiple measurements were implemented over a period of at least three years. The exact moment and **number of measurements** of the included articles are presented in table 1 below.

Table 1: Overview of measurements of QoL (in months)

Stroke	**MDD**	**1st measure**	**3**	**6**	**9**	**12**	**18**	**24**	**36**	**48**	**60**	**72**	**84**	**96**	**108**	**120**	**132**	**144**	**+**	**ΔQoL**
(Luengo-Fernandez et al.)		<1																		↑ =
(Patel et al.)																				=
(Ayerbe et al)																				/
(van de Port et al.)																				/
(Hubbard et al.)																				/
Spinal cord injury	**MDD**	**1st measure**	**3**	**6**	**9**	**12**	**18**	**24**	**36**	**48**	**60**	**72**	**84**	**96**	**108**	**120**	**132**	**144**	**+**	**ΔQoL**
(Charlifue et al.)																				↓
(van Koppenhagen et al.)		<1																		↑
(Erosa et al.)																				/
(Krause et al.)	9.3 y																		15,20,25,30 ,35	↓
(van Leeuwen et al.)		<1																		= /↑
Traumatic brain injury	**MDD**	**1st measure**	**3**	**6**	**9**	**12**	**18**	**24**	**36**	**48**	**60**	**72**	**84**	**96**	**108**	**120**	**132**	**144**	**+**	**ΔQoL**
(Juengst et al.)																				↑
(Williamson et al.)																				/
(Resch et al.)																				=
(Underhill et al.)																				=
(Andelic et al.)		<1																		↑
Multiple sclerosis	**MDD**	**1st measure**	**3**	**6**	**9**	**12**	**18**	**24**	**36**	**48**	**60**	**72**	**84**	**96**	**108**	**120**	**132**	**144**	**+**	**ΔQoL**
(Chruzander et al.)	18.0 y																			↓
(Solari et al.)	16.7 y																			↓
(Wynia et al.)	13.0 y																			↓
(Khan et al.)	16.5 y																			↓
(de Groot et al.)	< 6,0 m																			/
(Ruet et al.)	< 6,0m																			↓
(Stuifbergen et al.)	13.5 y																			/
(de Groot et al.)	< 6.0 m																			/
(Giordano et al.)	/																			↓
Parkinson's disease	**MDD**	**1st measure**	**3**	**6**	**9**	**12**	**18**	**24**	**36**	**48**	**60**	**72**	**84**	**96**	**108**	**120**	**132**	**144**	**+**	**ΔQoL**
(Klotsche et al.)	9.3 y																			↓
(Karlsen et al.)	8.5 y																			↓
(Erro et al.)	< 2 y																			=
(Forsaa et al.)	8.6 y																			↓
(Lawson et al.)	Recently																			↓

The 29 different articles applied different questionnaires to assess the **primary outcome measure** (change in QoL). The questionnaires used in the included articles have been extensively studied and were found to be valid and reliable in almost all articles. Figure 1 illustrates these questionnaires. **Secondary outcome measures** (influencing factors) varied greatly between articles. The changes in QoL over time and the influencing factors are further discussed in the results below.

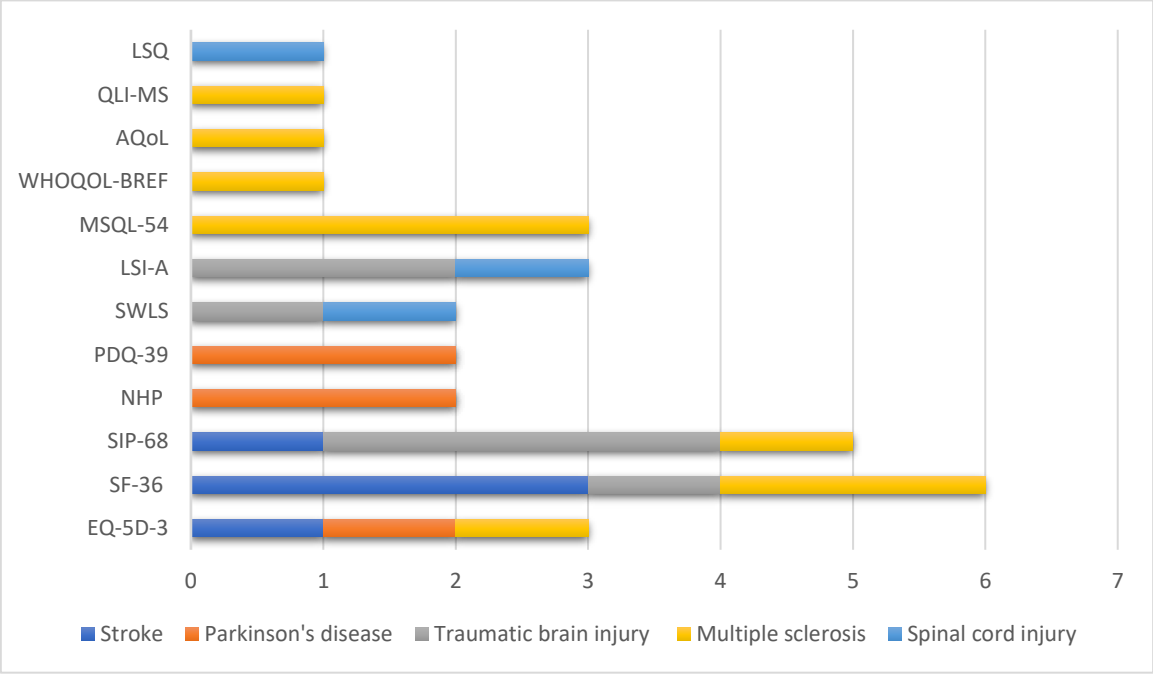


Figure 1: Questionnaires used for assessment of QoL across pathologies

Changes over time

In stroke patients, the QoL is lower compared with matched healthy controls. Significant differences on EQ-5D were found at one month (stroke: 0.61, control: 0.85) and remained stable in the following five years (stroke: 0.68, control: 0.86). Post-stroke, improvement of QoL between one and six months remained throughout the remaining five years (Luengo-Fernandez et al., 2013).

In spinal cord injury, the trajectories of QoL showed great variety. In a study by van Leeuwen et al (2011) five different trajectories over a five-year period were distinguished: three groups showed relatively stable QoL outcomes (high satisfaction: 16.5%, intermediate satisfaction: 30.6%, low satisfaction: 27.2%), one group showed recovery (low satisfaction at the beginning, high satisfaction at the end of the study: 23.3%) and one small group deteriorated (from high- to low satisfaction during the study: 2.4%). Thus, the QoL of the majority of the patients in this study remained stable. On the other hand, other studies counter these results by stating that QoL deteriorates in persons who live longer with SCI (Charlifue, Lammertse, & Adkins, 2004; Krause, Clark, & Saunders, 2015).

Patients with TBI scored lower in all four physical dimensions of the SF-36 when compared with the general population (Andelic et al., 2015). QoL post-TBI can decline, but in most individuals, it improves or remains stable over time. This was confirmed by a study following trajectories of QoL in patients with TBI, using the Satisfaction with Life Scale (SWLS). 44.5% reported stable satisfaction and 19.8% were initially dissatisfied but improved over time, whereas only 20.9% reported stable dissatisfaction and 14.8% were initially satisfied but declined (Juengst et al., 2015).

The QoL of patients suffering from Parkinson's disease is reduced greatly, despite treatment there's a significant deterioration over time. This mainly occurred in the following NHP-scores: physical mobility, pain, social isolation and emotional reactions (Karlsen, Tandberg, Arsland, & Larsen, 2000a). However, in a study by Klotsche et al (2011), using the EQ-5D, PD patients were divided in a stable group and a group in which the QoL declined over a period of 3 years. The major part of the patients showed no significant deterioration of QoL (73%). Only 23% experienced a significant decline in EQ-5D scores. The total EQ-5D, however, declined (0.81 at baseline, 0.77 at three years).

Compared to healthy controls, the QoL of MS-patients is lower. Physical functioning, cognitive function, sexual function and overall QoL-scales deteriorated significantly over a 7-year period (Ruet et al., 2013). In MS, the physical domain of QoL tends to get worse, whereas the psychosocial domain remains stable or even tends to improve. The physical domain of the SIP-68 worsened from 21 to 26 over a ten-year period, while the psychosocial domain remained stable with scores ranging from 14 to 15. However, the total QoL declined with EQ-5D scores ranging from 0.66 to 0.59 in this 10-year period. (Chruzander et al., 2014; Solari, Ferrari, & Radice, 2006). Additionally, Wynia et al. (2012) stated that the prominent increase in disability and loss in QoL occurred in early stages of MS in particular (subgroup EDSS: 0-4.5). As an example of this worsening in disability, Giordano et al (2012) found that the proportion of severely disabled increased from 16% to 32% and those requiring daily home care increased from 19% to 30% over an 11-year period.

Factors associated with QoL

At five-year follow-up, lower QoL is associated with lower age left education, unmarried, older age at onset, event severity and more recurrent strokes (Luengo-Fernandez et al., 2013). Comorbidities such as hypertension, urinary incontinence, cognitive impairment, depression, diabetes mellitus, obesity and heart disease interfere with QoL in a significant manner (Hubbard, Vo, Forder, & Byles, 2016; Patel, McKevitt, Lawrence, Rudd, & Wolfe, 2007). Furthermore, anxiety three months after stroke was significantly associated with lower scores in the mental domain of QoL in one, three and five years (Ayerbe, Ayis, Crichton, Wolfe, & Rudd, 2014). Fatigue was also found to be an independent factor associated with QoL at all time points (van de Port, Kwakkel, Schepers, Heinemans, & Lindeman, 2007).

Older age at injury, male gender, unmarried and poorer perception of health in the past influence QoL in a negative way (Charlifue et al., 2004; Krause et al., 2015). Also, a positive correlation was found between exercise participation and QoL in patients with SCI: POpeak and VO2peak were significantly associated with life satisfaction. Patients with SCI are capable of improving their peak oxygen uptake and peak power up to 20% after active rehabilitation. The following improvement in life satisfaction is

comparable to positive major life events such as marriage (van Koppenhagen et al., 2014). According to Erosa et al. (2013), higher functional independence (higher FIM), less pain and higher family satisfaction lead to higher mobility and social integration which in turn lead to higher life satisfaction and self-rated health status. Finally, van Leeuwen et al. (2012) compared patients with high life satisfaction trajectories to patients with low life satisfaction trajectories. Distinctive factors in favour to the high life satisfaction group were: younger age, paraplegia, higher functional independence (FIM), less pain and more everyday social support.

After TBI, patients with persistent pain were at a significant higher risk for development of depressive symptoms and post-traumatic stress disorder, both of which lead to a poorer QoL (Williamson et al., 2013). Higher levels of cognitive (lower FIMcog) and motor (low FIMmotor) impairments result in a decline of QoL (Resch et al., 2009). Middle age groups with low levels of participation are a high-risk group for lower QoL (Juengst et al., 2015). Furthermore, a higher level of education, the male gender, employment at time of injury and shorter length of post-traumatic amnesia lead to improvement of QoL in TBI (Andelic et al., 2015).

Disease severity (UPDRS, H&Y), disease duration and higher age are the leading factors influencing QoL in patients with Parkinson's disease (Karlsen et al., 2000a; Klotsche et al., 2011). However, the impact of non-motor symptoms increases over time and significantly affects QoL as well (Erro et al., 2016). Depression (higher MADRS), presence of insomnia at baseline, fewer years in education, female, higher baseline motor severity and higher LED (levodopa equivalent) result in a decline of QoL (Forsaa, Larsen, Wentzel-Larsen, Herlofson, & Alves, 2008). Cognitive impairment determines QoL greatly: decreasing MoCA scores and declining attention lead to worse QoL in Lawson et al (2016).

Lower QoL is associated with duration (>12 years), type of MS (progressive), higher degree of disability (EDSS) and cognitive impairment (SDMT) in a longitudinal study by Chruzander et al., (2014). Khan et al (2013) found that the prevalence of chronic pain increases by 15% in a MS community over a seven-year period. In addition, a positive correlation was found between pain intensity and following subscales of the AQoL: independent living and psychosocial wellbeing. The total AQoL correlated positively with this pain as well. Furthermore, functional limitations correlate negatively with both exercise behaviour and QoL. Exercise behaviour correlates positively with QoL. The negative correlation between change in functional limitations and the change in QoL may reflect how difficult it may be for person with MS to adapt to uncertain and unpredictable changes in their functional status (Stuifbergen, Blozis, Harrison, & Becker, 2006).

Table 2: Results of included articles

Article	QoL measure	First measurement	Follow-up measurement	Factors associated with QoL	Conclusion
(Luengo-Fernandez et al.) Stroke	- EQ-5D-3 levels questionnaire - Quality-adjusted life years (QALY's)	TIA = 0.77 EQ-5D Stroke = 0.61 EQ-5D Control group = 0.85 EQ-5D	TIA = 0.80 EQ-5D and lost 1.68 QALY's Stroke = 0.68 EQ-5D and lost 1.68 QALY's Control group = 0.86 EQ-5D	Lower QoL: - Event severity, more recurrent strokes and stroke versus TIA - Lower age left education, unmarried and older at onset	- Qol for TIA and stroke patients was lower than for matched controls - Improvement of QoL between 1 and 6 months was remained throughout the remaining 5 years
(Patel et al.) Stroke	- SF-36 PHSS = physical health MHSS = mental health	PHSS = 37.07 MHSS = 46.60	PHSS = 37.91 MHSS = 47.68	PHSS: - Hypertension, urinary incontinence and cognitive impairment => worse PHSS - Age (>75) and Carribean/African => better PHSS MHSS: - Hypertension => worse MHSS	- Qol remains low up to 3 years after stroke
(Ayerbe et al.) Stroke	- SF-36 PHSS = physical health MHSS = mental health	No data available	No data available	- Anxiety 3 months after stroke was significantly associated with lower scores in the MHSS in year 1,3 and 5 (-4.76, -4,71 and -6.40)	- Anxiety is associated with depression and leads to lower Qol in the long term after stroke
(Van de Port et al.) Stroke	- SIP 68 (sickness impact profile)	SIP 68 = 29.78	No data available	- Fatigue and depression => lower QoL	- Fatigue is associated with IADL and QoL, but not with basic ADLs between 6 and 36 months
(Hubbard et al.) Stroke	- SF-36 PHSS = physical health	No data available	No data available	Poor PHSS: - Not partnered and obese - Diabetes, heart disease and hypertension	- Many women who experience stroke, survive many years with poor PF - Many women who had poor PF at baseline had poor PF at the last follow up, indicating little recovery
(Klotsche et al.) Parkinson disease	- EQ-5D-3	Total EQ-5D = 0.81 Class 1 = 0.99/ class 2 = 0.79 Class 3 = 0.88/ class 4 = 0.66	Total EQ-5D = 0.77 Class 1 = 0.91/ Class 2 = 0.77 Class 3 = 0.83/ Class 4 = 0.59	- High UPDRS (II-IV), long disease duration and older age => worse QoL	- PD patients were split into patients with a decline in QOL (class 3 and 4) and those with a stable QoL (class 1 and 2)
(Karlsen et al.) Parkinson disease	- Nottingham health profile (NHP, part I)	Total NHP = 120.0	Total NHP = 176.0	- No association between any demographic or clinical variables and QoL - Increased progression of the disease (UPDRS and H&Y) => => worse QoL	- PD has an impact on HRQOL and despite treatment there is a significant deterioration over time especially in physical mobility, pain, social isolation and emotional reactions
(Erro et al.) Parkinson disease	- PD-questionnaire-39 (PDQ-39)	Total PDQ-39 = 197.3	Total PDQ-39 = 205.3	- Total NMS-score and female gender => worse QoL - There were no associations between NMSs and motor disability	- NMSs significantly increase over time and affect QOL of patients with PD.
(Forsaa, Larsen et al.) Parkinson disease	- Nottingham health profile (NHP)	Total NHP = 149.9	Total NHP = 197.9	- Higher MADRS-scores, higher H&Y, Presence of insomnia at baseline => poorer overall QoL	- PD has an increasing impact on QOL, deterioration in physical mobility was the most important single factor contributing to decline in QOL.
(Lawson, Yarnall et al.) Parkinson disease	- PD-questionnaire (PDQ-39)	Total PDQ-39 = 18.39	Total PDQ-39 = 22.01	- Fewer years in education, being younger, female, higher baseline motor severity, higher baseline depression and higher LED (levodopa equivalent) => worse QoL - Decreasing MoCA scores and declining attention over time => worse QoL	- PDQ-39 significantly increased over time in participants with PD-MCI at baseline - Cognitive impairment had a significant role in determining QOL
(Juengst et al.) Traumatic brain injury	- Satisfaction with life scale (SWLS)	Total SWLS = 22.3	Total SWLS = 22.8 => stable satisfaction (44.5 %), stable dissatisfaction (20.9 %), initial dissatisfaction (19.8 %) and initial satisfaction declining (14.8 %)	- Middle age groups, low levels of participation, depressive symptoms and cognitive disability => poorer QoL	- QoL can decline following TBI, but most individuals QoL improve over time. - Loss of life roles and depression after TBI put individuals with TBI at high risk for low or declining QoL

(Williamson et al.) Traumatic brain injury	- SIP 68 (sickness impact profile) - Family satisfaction scale (FFS)	No data available	No data available	- Greater functional impairment, lower family satisfaction at 12 months, presence of pain and depression at 24 months => lower QoL	- QoL following TBI is negatively affected by pain, depression, functional impairment and lower family satisfaction
(Resch et al.) Traumatic brain injury	- The life satisfaction index-A (LSI)	Total LSI = 11.73	Total LSI = 11.64	- Higher FIM (tot), higher FIM (cog) and older age => better QoL	- QoL scores were relatively stable in TBI. - TBI with greater cognitive and motor impairments are more likely to experience declines in QoL
(Underhill et al.) Traumatic brain injury	- The life satisfaction index-A (LSI)	Total LSI = 11.66	Total LSI = 11.33	- Unemployed and depression => poorer QoL	- QoL scores were relatively stable in TBI. - Depression and no-employment were associated with diminished QoL
(Andelic, Perrin et al.) Traumatic brain injury	- Physical SF-36	Total Physical SF-36 = 64.25 - PF = 78 - RP = 47 - BP = 65 - GH = 67	Total Physical SF-36 = 68.75 - PF = 83 - RP = 54 - BP = 71 - GH = 67	- Higher level of education, employed at time of injury, shorter length of PTA => better PF - Men, more severe brain injury => better RP - Men => better BP - Men, employed at time of injury and higher ISS (more severe overall injury) => better GH	- Lower QOL for TBI when compared with the general population - PF scores improved significantly over time whereas RP, BP and GH did not improve over time
(Chruzander et al.) Multiple sclerosis	- SIP-68 - EQ-5D-3	Total SIP 68 = 19 - Physical dimension = 21 - Psychosocial dimension = 14 EQ-5D = 0.66	Total SIP 68 = 22 - Physical dimension = 26 - Psychosocial dimension = 15 EQ-5D = 0.59	- Duration of MS (>12y), type of MS (progressive), higher degree of MS disability (EDSS) and cognitive impairment (SDMT) => lower QoL	- QOL with regard to its physical domain tends to get worse in PwMS - QOL with regard to its psychosocial domain remains stable in PwMS.
(Solari et al.) Multiple sclerosis	- MSQL-54	Total MSQOL = 58	Total qMSQOL = 66,8	- Domains worsened: health status, physical function and general health - Domains improved: social function, mental health and health distress	- QOL with regard to its physical domain tends to get worse. - QOL with regard to its psychosocial domain improved over time.
(Wynia et al.) Multiple sclerosis	- WHOQOL-BREF	Total WHOQOL-BREF = 14.7 - Physical health = 13.9 - Psychological health = 14.4 - Social relations = 15.0 - Environment = 15.5	Total WHOQOL-BREF = 14.4 - Physical health = 13.3 - Psychological health = 14.2 - Social relations = 14.7 - Environment = 15.3	Subgroup EDSS 0 to <4,5 - Small worsening of QoL concerning physical health and autonomy Subgroup EDSS >4,5 to <7 - Mean EDSS increased from 6 to 6,5 - No changes in QoL Subgroup EDSS >7 to <10 - Mean EDSS increased from 8,5 to 9,0 - No change in MSIP disability domains or QoL	- Significant increase in 8/11 MSIP disability domains. - Small significant worsening in QOL (domain physical health and autonomy) - Prominent increases in multiple aspects of disability and loss of QOL occur in early stages in MS in particular
(Khan et al.) Multiple sclerosis	- Assessment of quality of life (AQoL) questionnaire	Total AQoL: 28.8 - Grade I = 37.2 - Grade II = 26.4 - Grade III = 23.7	Total AQoL = 37,4 - Grade I = 30,2 - Grade II = 32,5 - Grade III = 61,5 - Grade IV = 60,0	Positive correlation between pain intensity and AQoL domains: - Independent living, psychosocial wellbeing and total AQoL	- There was a significant deterioration for QOL domains of independent living, psychosocial wellbeing and total AQoL
(de Groot et al.) Multiple sclerosis	- SF-36	No results available	No results available	Normal performance of social roles: - More vitality, Perceived amount of social support and higher T2-weighted supratentorial lesion load Normal physical functioning role: - Fatigue, exacerbations and the amount of social support	- The most pronounced deviation was found for sub-scale SF36rp, followed by SF36sf and SF36re. - Mental health was relatively unaffected, which indicates that mental health cannot explain the reduced performance of social roles
(Ruet et al.) Multiple sclerosis	- SEP-59 scale/MSQoL	No results available	No results avalable	Pedictors of QoLover 7 years: - Not predicted by any of the baseline variables	- The QoL was lower in the MS patiënts than in their matched controls. physical functioning, cognitive function, sexual function and overall HRQoL scales deteriorated significant at 7 years
(Stuifbergen et al.) Multiple sclerosis	- Quality of Life Index-MS version (QLI-MS)	QLI -MS = 20.3	QoL- scores showed no change over the 5 years.	- Functional limitation scores were negatively correlated with both exercise behaviors and QoL. - Exercise behaviors and QOl correlated positively.	- About half of the individuals had scores that increased over time and about half had scores that decreased

(De Groot et al.) Multiple sclerosis	- SF-36	No results availabe	No results available	- The neurological deficits (EDSS), physical functioning (FIMmf) and SF36pf deteriorate significant in the first three years.	- physical functioning, social functioning and general health are markedly affected in PwMS
(Giordano et al.) Multiple sclerosis	- Multiple sclerosis quality of life 54 (MSQOL-54)	Total MSQOL-54 = 61.0	Total MSQOL-54 = 62.4	- Domains worsened: health scale, general health and cognitive function - Domains improved: Emotional well-being and social function High baseline EDSS scores => lower QoL	- Although MSQOL-54 composites remained stable over the decade, individual scores could deteriorate (change in health, general health and cognitive function) or improve (social function and emotional wellbeing).
(Charlifue et al.) Spinal cord injury	- Self-assesed health status - Satisfaction with life scale (SWLS)	Self-assesed health = 2.6 SWLS = 20.3	Self-assesed health = 2.5 SWLS = 22.9	Predictors of change: - Unmarried, poorer perception of health 5 years earlier	- Significant decline in perceived health status as one lives longer with SCI
(van Koppenhagen et al.) Spinal cord injury	- Life Satisfaction Now - Life Satisfaction Comparison - Life Satisfaction Total	Total life satisfaction = 5.7	Total life satisfaction = 7.8	Positive relationship between exercise participation and quality of life: - Both POpeak and VO2peak were significantly associated with life satisfaction	- Patients with SCI demonstrate improvements in wheelchair exercise capacity and life satisfaction through 5 years
(Erosa et al.) Spinal cord injury	- Life Satisfaction Index - A (LSI-A) - Self-rated health status	No results available	No results available	- Higher FiM, less pain and family satsfaction => higher mobility and social integration - Higher mobility and social integration => higher life satisfaction and self-rated health status	- A person who is more functionally independent may experience greater mobility in their surroundings this leads to greater life satisfaction
(Krause et al.) Spinal cord injury	- The Life Situation Questionnaire (LSQ)	Total mean LSQ = 3.63	Total mean LSQ = 3.46	Lower QoL: - Older age at injury and male gender	- Social participation, satisfaction with social activities, sex life and health decreased - Satisfaction with employment and Economic satisfaction improved over time - In general satisfaction declined over time
(van Leeuwen et al.) Spinal cord injury	- 2 questions: “what is your quality of life at the moment” and “Is your quality of life better, equal or worse than before the SCI”	Trajectories: - Low life satisfaction => 27 % - High life satisfaction => 17 % - Recovery => 23 % - Deterioration => 2 % - Intermediate life satisfaction => 31 %	No results available	High life satisfaction compared with persons in the low life satisfaction trajectory: - Younger, paraplegia, higher functional independence, less pain and more everyday social support Low life satisfaction at the beginning and high life satisfaction scores at the end compared with persons in the low life satisfaction trajectory: - Female, higher functional independence and fewer secondary impairments	- Functional independence and pain severity discriminated between the low and high life satisfaction trajectories.

5 Discussion

5.1 Reflection on the quality of the included studies

Based on the Cochrane criteria (table 3 in the appendix), the overall quality of included studies was quite good. The use of validated questionnaires and scales to assess prognostic factors and outcome measures, made an important contribution to this overall rating. Studies with insufficient validity or reliability were scarce (n=3), these studies often used a single question for the assessment of a key prognostic factor and/or an outcome measure. The follow-up was found to be satisfactory in the majority of studies (n=16), even though a large lost to follow-up is inherent to longitudinal studies with a time window over several years. Most studies also gave voice to the possible impact the lost to follow-up might have had on the results. Objectivity in studies concerning quality of life is hard to assess, because of their reliance on self-report questionnaires. We decided to distinguish objective from subjective using the mode of assessment. Only if the assessment was performed by a healthcare professional in a structured interview, the criterium for objectivity was met (n=17). Generalisability of the findings was questionable in several studies (n=12). A relatively small sample size, the limitation of patient inclusion to a specific age or disease severity group, one specific region in which the study was conducted, were all possible factors influencing the degree to which results were generalizable.

5.2 Reflection on the findings in function of the research questions

This review of longitudinal studies showed that the QoL of patients, suffering from the five mentioned neurological disorders, was lower compared to healthy individuals. This difference remained during the observational periods (ranging from three to 35 years) in all included articles, therefore we could conclude that overall, people diagnosed with a neurological disorder will not level with healthy individuals in terms of QoL. However, the course of QoL on the long term did differ among neurological disorders. As expected, the overall QoL deteriorated in chronic, degenerative disorders such as MS and Parkinson's disease. In contrast, the neurological disorders of an acute nature included in this review (stroke, SCI, TBI) showed a stable course or even an improvement of QoL over the years.

Whether it decreased, increased or remained stable, the QoL in neurological disorders was indisputably influenced by several factors. Table 3 summarizes the factors directly related to the overall QoL in the five neurological disorders under study.

Table 3: Factors associated with QoL (change) in different neurological disorders

ICF	Influencing factor	Stroke	Spinal cord injury	Traumatic brain injury	Multiple sclerosis	Parkinson's disease
BODY FUNCTION	Disease severity (↑)	✓ (↑)	✓ (↑)	✓ (↑)	✓ (↑)	✓ (↑)
	Disease duration (↑)				✓ (↓)	✓ (↓)
	Pain (↑)		✓ (↓)	✓ (↓)	✓ (↓)	
	Cognitive impairment (↑)			✓ (↓)	✓ (↓)	✓ (↓)
	Anxiety (↑)	✓ (↓)				
	Depression (↑)	✓ (↓)		✓ (↓)		✓ (↓)
	Fatigue (↑)	✓ (↓)				
	Comorbidities (↑)	✓ (↓)				
	Insomnia					✓ (↓)
	Type (progressive MS)				✓ (↓)	
ACT.	Functional impairment (↑)		✓ (↓)	✓ (↓)		
	Exercise behaviour (↑)		✓ (↑)		✓ (↑)	
PART.	Level of participation (↑)		✓ (↑)	✓ (↑)		
PERS.	Age (↑)	✓ (↓)	✓ (↓)	✓ (↑)	✓ (↓)	✓ (↓)
	Gender (male)		✓ (↓)	✓ (↑)	✓ (↓)	✓ (↑)
	Level of education (↑)	✓ (↑)		✓ (↑)		✓ (↑)
EXT.	Family satisfaction (↑)			✓ (↑)		
	Employment			✓ (↑)		
	Marital status (married)	✓ (↑)	✓ (↑)			

As seen in table 3, the **disease severity** influenced all five neurological disorders in this review. As expected, higher severity led to lower QoL. However, when approaching the disease severity from a 'change over time' point of view, other insights were obtained in the MS-subgroup. Low severity (EDSS < 4.5) led to a decreasing QoL while higher severity (EDSS > 4.5) results in a stable QoL (Wynia, van Wijlen, Middel, Reijneveld, & Meilof, 2012). An explanation for these results might be that the lower-severity group probably consisted of people recently diagnosed with MS. The self-assessed health in recently diagnosed patients might deteriorate by experiencing several 'new' disabilities. These patients most likely hadn't developed the same coping strategies as the high-severity group, who've had to live with MS for a long time. The **presence of pain**, as expected, correlates negatively with QoL in TBI (Williamson et al., 2013), in MS (Khan, Amatya, & Kesselring, 2013) and in SCI (Erosa, Berry, Elliott, Underhill, & Fine, 2014; van Leeuwen et al., 2011). Neuronal hyper-excitability, exaggerated wind-up sensation and hyper-reactivity in neurological disorders contributed to the development of chronic pain syndromes. This persistent pain might interfere with daily activities, thereafter this might lead to a decline of QoL. For this reason, healthcare providers should be encouraged to focus on the assessment and treatment of pain in patients with neurological disorders. **Depressive symptoms** are related to a poorer

QoL in stroke, TBI and Parkinson's disease (Ayerbe et al., 2014; Lawson et al., 2016; Underhill et al., 2003). In our opinion, **anxiety** was an important predictor for the development of depression. The fear of experiencing new disabilities and related participation restrictions could lead to inadequate coping and negative expectations regarding life. Depression and QoL have a reciprocal relationship in which depression leads to a poorer QoL, whereas a poorer QoL might provoke feelings of depression. In this review, **functional impairments** were found to relate directly with QoL in only TBI and SCI (Erosa et al., 2014; Resch et al., 2009; van Leeuwen et al., 2011; Williamson et al., 2013). However, functional independency will automatically result in greater mobility in the patient's surroundings, leading to more social contacts and participation. Hence, we concluded that functional impairments probably played a role in the QoL of all neurological disorders. Only two studies examined the **exercise behaviour** of included patients. Stuifbergen et al (2006) found a positive correlation between a higher level of exercise and QoL in MS patients. Similar results were obtained in patients with SCI by van Koppenhagen et al (2014). This correlation could be explained by the inhibitory effect of consistent exercise on functional impairments (leading to the benefits mentioned above). However, the benefits of exercise are not limited to the physical compartment of QoL. A broad range of other quality of life-related entities are influenced positively by exercise: mood, depression, mental stress and self-perception of capacities. **Age** appeared to be an important influencing factor of the QoL as well. Older age was correlated with a lower QoL in all neurological disorders, except for TBI. The middle age group was found to be at higher risk for poor QoL, while older age results in better QoL post-TBI. (Juengst et al., 2015; Resch et al., 2009). These findings might be explained by the value middle-aged groups attach to the performance of their life roles as part of the total life satisfaction. A contradiction that could serve as an example of a different value attached to a life role, is the career path. Middle aged people were building their careers pre-TBI, while older patients were retired and experienced no extra limitations in this domain after the injury. Another important example might be the role as a parent. The middle-aged group had a greater responsibility regarding the care of their (young) children. This exception regarding age in TBI (why in TBI and not in e.g. SCI or stroke) could not be explained by the obtained evidence. The influence of **gender** on the QoL differs among several neurological disorders: the male gender results in a better QoL in Parkinson's disease and TBI, while men score poorer on QoL in MS and SCI (Andelic et al., 2015; Krause et al., 2015; Lawson et al., 2016; Stuifbergen et al., 2006). For these differences among pathologies, we could not find a complete explanation. Just the fact that a lower QoL in women might be explained by the loss of their socio-cultural role of managing the household. Also, it might be difficult for their male partners to take over this role, hence reducing the QoL of these women even more.

In this literature review, various **questionnaires** were used to assess the QoL (Figure 1, p.14). The SF-36 (in six studies) and the SIP-68 (in five studies) were the assessment tools most frequently used to describe the course of QoL. The EQ-5D was used in three studies. Thus, researchers appear to prefer the use of these generic questionnaires. A possible explanation for this finding could be the fact that generic questionnaires are easy to administer and applicable to different pathologies. We would prefer disease-specific questionnaires based on a generic questionnaire. The disease-specific items insure a holistic approach of the individual's QoL, taking into account all characteristics of the disease under study. At the same time, the possibility of comparison to healthy individuals or to other diseases is

preserved by the generic component. An example of a 'combined' questionnaire is the MSQOL-54 (used in four studies) which combines the generic SF-36 with 18 MS-specific items.

In the context of the generalisability of our findings, we also included the country in which the studies were conducted in our data-extraction. A summary of these countries can be found in figure 2. We found that studies of good quality were only available in industrialized countries with middle- or high incomes. Whereas data concerning the course of QoL in neurological conditions in developing countries with low incomes, is lacking. Therefore, our findings can only be generalized to countries with middle- or high incomes. It could be useful to assess the longitudinal course of QoL in poorer developing as well. In this manner, a global image of QoL after neurological injuries can be obtained.

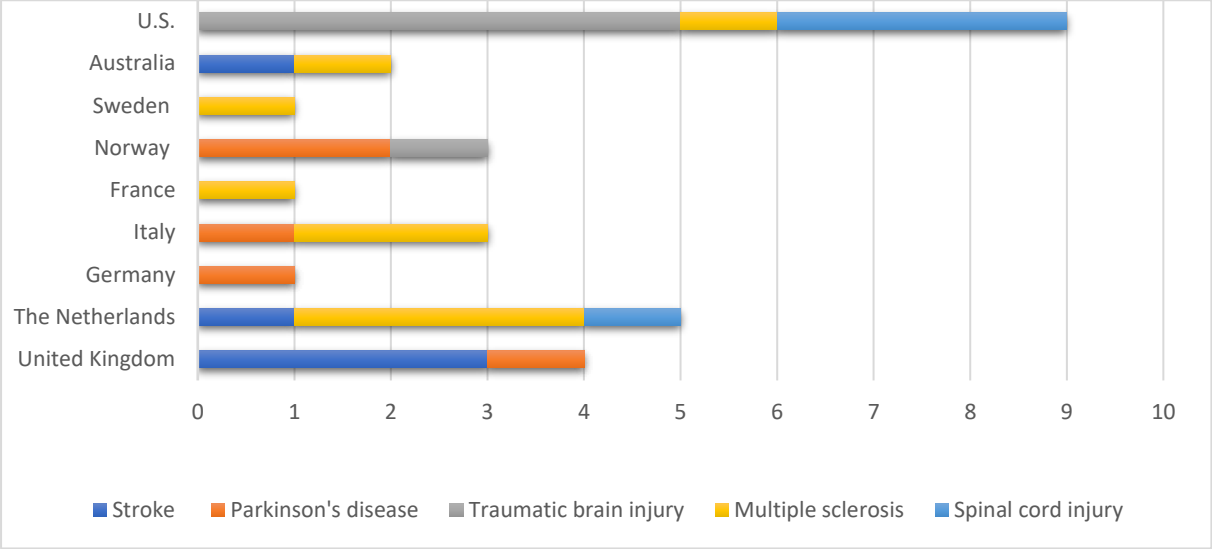


Figure 2: Geographical outline of included studies

After the study of the course of QoL and its associated factors, we attempted to deduce several **take home messages for neurological rehabilitation.** First of all, it remains critical to encourage exercise behaviour in the long term. Exercise inhibits the progression of functional impairments, leading to an improved participation. On top of that, exercise can be important to reduce anxiety and depression in patients with neurological disorders by engaging these persons in the process of resuming enjoyable and meaningful activities. Another influencing factor that may be of importance in the rehabilitation of neurological disorders is pain. A greater understanding of clinical manifestations of pain, leading to improved methods of assessment and appropriate interventions, is necessary. Obviously, healthcare providers should always take into account comorbidities and adjust intervention programs accordingly. Finally, the identification of risk factors (as done in this review) lead to more insight in population groups at higher risk for poorer QoL. This insight should lead to specific prevention and intervention programs addressing the high-risk groups.

5.3 Reflection on the strengths and weaknesses of the literature study

Table 4 in the appendix contains an overview of the strengths and limitations of the included studies.

The most important strengths are the following:

- In all studies, a long follow-up period was ensured by the inclusion criteria (> 3 years).
- The sample sizes across studies ranged from 61 (Erro et al., 2016) to 107961 (Hubbard et al., 2016). Only studies with a sample size larger than 50 were included in this review.
- A comprehensive collection of data concerning the patient's situation at baseline: social-demographics, disease severity measures, disability, pharmacological treatment, smoking habits, employment, presence of pain, …
- The use of validated measurement tools. Almost all studies included questionnaires or scales of which the psychometric properties were extensively examined and were found to be satisfactory to very good. Studies with insufficient validity or reliability were scarce (n=3), these studies often used a single question for the assessment of a key prognostic factor and/or an outcome measure

The most important limitations are the following:

- Loss of data is inherent to longitudinal studies with a time-window of several years. This lost to follow-up was present in all included studies. This might have introduced biases that led to over- or underestimation of results (e.g. people who were too confused or dysphasic to complete the questionnaires led to an under-estimation of poor QoL). In chronic conditions, the attrition rate due to death was large.
- The reliance on self-reported data. QoL is a subjective, multidimensional concept assessed by self-report questionnaires. We could state that this reliance on self-report is inherent to the investigated outcome measure. As mentioned in the quality analysis, the criterium of 'objectivity was based on the mode of assessment. 17 studies were found to be objective enough.
- The use of generic measures (e.g. SF-36) might lead to assessments not sensitive or specific enough to detect disease-specific domains of physical and mental health. However, an advantage of these measures is the ability of comparison with healthy controls or with patient populations of other studies.
- The generalisability was found to be a limitation in 12 included studies. Several reasons were mentioned as possible factors influencing the degree to which results of these studies were generalizable (e.g. limitation of patient inclusion to a specific age or disease severity group).
- A limitation in studies including patients with chronic neurological disorders in particular, was the relatively short follow-up period. Longitudinal time-windows of three to five years provide only a limited glimpse of the disablement process in persons with a disease that often lasts for 40 years or more (de Groot et al., 2008; Stuifbergen et al., 2006).

5.4 Recommendations for further research

- More evidence regarding the effect of exercise behaviour on QoL in neurological patients is recommended. Merely two studies provided information in this field.
- More specific research on interventions assisting in the maintenance of physical functioning over a long period of time in patients with neurological disorders.
- Longitudinal studies of good quality with an observational period exceeding 20 years were scarce. These studies could be useful to assess the lifelong trajectories of QoL in patients with neurological disorders. Only one study including SCI patients followed patients over a period this long (up to 35 years).
- On this topic is, no evidence is available in a mondial context. At this moment, studies of good quality are only available in industrialized countries with middle- or high incomes. Whereas data concerning the course of QoL in neurological conditions in developing countries with low incomes is lacking.
- Possible important factors, not investigated in the included studies, are the type and intensity of care received after the neurological injury.

6 Conclusion

The QoL in patients with chronic neurologic disorders deteriorates, while QoL in acute neurological events remains stable or even improves when approached in a longitudinal perspective.

7 List of references

Andelic, N., Perrin, P. B., Forslund, M. V., Soberg, H. L., Sigurdardottir, S., Sveen, U., . . . Roe, C. (2015). Trajectories of physical health in the first 5 years after traumatic brain injury. *J Neurol, 262*(3), 523-531. doi:10.1007/s00415-014-7595-1

Ayerbe, L., Ayis, S. A., Crichton, S., Wolfe, C. D., & Rudd, A. G. (2014). Natural history, predictors and associated outcomes of anxiety up to 10 years after stroke: the South London Stroke Register. *Age Ageing, 43*(4), 542-547. doi:10.1093/ageing/aft208

Charlifue, S., Lammertse, D. P., & Adkins, R. H. (2004). Aging with spinal cord injury: changes in selected health indices and life satisfaction. *Arch Phys Med Rehabil, 85*(11), 1848-1853.

Chruzander, C., Ytterberg, C., Gottberg, K., Einarsson, U., Holmqvist, L. W., & Johansson, S. (2014). A 10-year follow-up of a population-based study of people with multiple sclerosis in Stockholm, Sweden: Changes in health-related quality of life and the value of different factors in predicting health-related quality of life. *J Neurol Sci, 339*(1-2), 57-63. doi:10.1016/j.jns.2014.01.020

de Groot, V., Beckerman, H., Lankhorst, G. J., Polman, C. H., & Bouter, L. M. (2005). The initial course of daily functioning in multiple sclerosis: a three-year follow-up study. *Multiple Sclerosis, 11*(6), 713-718. doi:10.1191/1352458505ms1238oa

de Groot, V., Beckerman, H., Twisk, J. W., Uitdehaag, B. M., Hintzen, R. Q., Minneboo, A., . . . Bouter, L. M. (2008). Vitality, perceived social support and disease activity determine the performance of social roles in recently diagnosed multiple sclerosis: a longitudinal analysis. *J Rehabil Med, 40*(2), 151-157. doi:10.2340/16501977-0145

Erosa, N. A., Berry, J. W., Elliott, T. R., Underhill, A. T., & Fine, P. R. (2014). Predicting quality of life 5 years after medical discharge for traumatic spinal cord injury. *Br J Health Psychol, 19*(4), 688-700. doi:10.1111/bjhp.12063

Erro, R., Picillo, M., Vitale, C., Amboni, M., Moccia, M., Santangelo, G., . . . Barone, P. (2016). The non-motor side of the honeymoon period of Parkinson's disease and its relationship with quality of life: a 4-year longitudinal study. *Eur J Neurol, 23*(11), 1673-1679. doi:10.1111/ene.13106

Forsaa, E. B., Larsen, J. P., Wentzel-Larsen, T., Herlofson, K., & Alves, G. (2008). Predictors and course of health-related quality of life in Parkinson's disease. *Movement Disorders, 23*(10), 1420-1427. doi:10.1002/mds.22121

Giordano, A., Ferrari, G., Radice, D., Randi, G., Bisanti, L., Solari, A., & Study, P. (2013). Self-assessed health status changes in a community cohort of people with multiple sclerosis: 11years of follow-up. *Eur J Neurol, 20*(4), 681-688. doi:10.1111/ene.12028

Hubbard, I. J., Vo, K., Forder, P. M., & Byles, J. E. (2016). Stroke, Physical Function, and Death Over a 15-Year Period in Older Australian Women. *Stroke, 47*(4), 1060-1067. doi:10.1161/strokeaha.115.011456

Juengst, S. B., Adams, L. M., Bogner, J. A., Arenth, P. M., O'Neil-Pirozzi, T. M., Dreer, L. E., . . . Wagner, A. K. (2015). Trajectories of life satisfaction after traumatic brain injury: Influence of life roles, age, cognitive disability, and depressive symptoms. *Rehabil Psychol, 60*(4), 353-364. doi:10.1037/rep0000056

Karlsen, K. H., Tandberg, E., Arsland, D., & Larsen, J. P. (2000a). Health related quality of life in Parkinson's disease: a prospective longitudinal study. *J Neurol Neurosurg Psychiatry, 69*(5), 584-589.

Karlsen, K. H., Tandberg, E., Arsland, D., & Larsen, J. P. (2000b). Health related quality of life in Parkinson's disease: a prospective longitudinal study. *Journal of Neurology Neurosurgery and Psychiatry, 69*(5), 584-589. doi:10.1136/jnnp.69.5.584

Khan, F., Amatya, B., & Kesselring, J. (2013). Longitudinal 7-year follow-up of chronic pain in persons with multiple sclerosis in the community. *J Neurol, 260*(8), 2005-2015. doi:10.1007/s00415-013-6925-z

Klotsche, J., Reese, J. P., Winter, Y., Oertel, W. H., Irving, H., Wittchen, H. U., . . . Dodel, R. (2011). Trajectory classes of decline in health-related quality of life in Parkinson's disease: a pilot study. *Value Health, 14*(2), 329-338. doi:10.1016/j.jval.2010.10.005

Krause, J. S., Clark, J. M., & Saunders, L. L. (2015). SCI Longitudinal Aging Study: 40 Years of Research. *Top Spinal Cord Inj Rehabil, 21*(3), 189-200. doi:10.1309/sci2103-18910.1310/sci2103-189

Lawson, R. A., Yarnall, A. J., Duncan, G. W., Breen, D. P., Khoo, T. K., Williams-Gray, C. H., . . . Grp, I.-P. S. (2016). Cognitive decline and quality of life in incident Parkinson's disease: The role of attention. *Parkinsonism & Related Disorders, 27*, 47-53. doi:10.1016/j.parkreldis.2016.04.009

Luengo-Fernandez, R., Gray, A. M., Bull, L., Welch, S., Cuthbertson, F., & Rothwell, P. M. (2013). Quality of life after TIA and stroke: ten-year results of the Oxford Vascular Study. *Neurology, 81*(18), 1588-1595. doi:10.1212/WNL.0b013e3182a9f45f

Patel, M. D., McKevitt, C., Lawrence, E., Rudd, A. G., & Wolfe, C. D. (2007). Clinical determinants of long-term quality of life after stroke. *Age Ageing, 36*(3), 316-322. doi:10.1093/ageing/afm014

Resch, J. A., Villarreal, V., Johnson, C. L., Elliott, T. R., Kwok, O. M., Berry, J. W., & Underhill, A. T. (2009). Trajectories of life satisfaction in the first 5 years following traumatic brain injury. *Rehabil Psychol, 54*(1), 51-59.

Ruet, A., Deloire, M., Hamel, D., Ouallet, J. C., Petry, K., & Brochet, B. (2013). Cognitive impairment, health-related quality of life and vocational status at early stages of multiple sclerosis: a 7-year longitudinal study. *J Neurol, 260*(3), 776-784. doi:10.1007/s00415-012-6705-1

Solari, A., Ferrari, G., & Radice, D. (2006). A longitudinal survey of self-assessed health trends in a community cohort of people with multiple sclerosis and their significant others. *J Neurol Sci, 243*(1-2), 13-20. doi:10.1016/j.jns.2005.11.005

Stuifbergen, A. K., Blozis, S. A., Harrison, T. C., & Becker, H. A. (2006). Exercise, functional limitations, and quality of life: A longitudinal study of persons with multiple sclerosis. *Arch Phys Med Rehabil, 87*(7), 935-943. doi:10.1016/j.apmr.2006.04.003

Underhill, A. T., Lobello, S. G., Stroud, T. P., Terry, K. S., Devivo, M. J., & Fine, P. R. (2003). Depression and life satisfaction in patients with traumatic brain injury: a longitudinal study. *Brain Inj, 17*(11), 973-982.

van de Port, I. G., Kwakkel, G., Schepers, V. P., Heinemans, C. T., & Lindeman, E. (2007). Is fatigue an independent factor associated with activities of daily living, instrumental activities of daily living and health-related quality of life in chronic stroke? *Cerebrovasc Dis, 23*(1), 40-45. doi:10.1159/000095757

van Koppenhagen, C. F., Post, M., de Groot, S., van Leeuwen, C., van Asbeck, F., Stolwijk-Swuste, J., . . . Lindeman, E. (2014). Longitudinal relationship between wheelchair exercise capacity and life satisfaction in patients with spinal cord injury: A cohort study in the Netherlands. *Journal of Spinal Cord Medicine, 37*(3), 328-337. doi:10.1179/2045772313y.0000000167

van Leeuwen, C. M., Post, M. W., Hoekstra, T., van der Woude, L. H., de Groot, S., Snoek, G. J., . . . Lindeman, E. (2011). Trajectories in the course of life satisfaction after spinal cord injury: identification and predictors. *Arch Phys Med Rehabil, 92*(2), 207-213. doi:10.1016/j.apmr.2010.10.011

Williamson, M. L., Elliott, T. R., Berry, J. W., Underhill, A. T., Stavrinos, D., & Fine, P. R. (2013). Predictors of health-related quality-of-life following traumatic brain injury. *Brain Inj, 27*(9), 992-999. doi:10.3109/02699052.2013.801512

Wynia, K., van Wijlen, A. T., Middel, B., Reijneveld, S. A., & Meilof, J. F. (2012). Change in disability profile and quality of life in multiple sclerosis patients: a five-year longitudinal study using the Multiple Sclerosis Impact Profile (MSIP). *Mult Scler, 18*(5), 654-661. doi:10.1177/1352458511423935

8 Appendices part 1 – overview of the literature

- Table 1a: Overview of number of hits for different combinations of search terms - PubMed
- Table 1b: Overview of number of hits for different combinations of search terms - WoK
- Table 2: Overview of the in- and excluded articles
- Figure 1: Flowchart of the in- and excluded articles
- Table 3: Cochrane checklist for cohort studies
- Table 4: Strengths and limitations of the included articles
- Table 5: Overview of the included articles: data-extraction
- Table 6: List of Abbreviations

Table 1a: Overview of number of hits for different combinations of search terms – PubMed

1. Stroke

MESH/Keywords	Items found in PubMed
Stroke AND quality of life	1699
Stroke AND quality of life AND longitudinal studies	78

2. Spinal cord injury

MESH/Keywords	Items found in PubMed
Spinal cord injury AND quality of life	960
Spinal Cord Injury AND quality of life AND longitudinal studies	51

3. Traumatic brain injury

MESH/Keywords	Items found in PubMed
Traumatic brain injury AND quality of life	773
Traumatic brain injury AND quality of life AND longitudinal studies	44

4. Multiple sclerosis

MESH/Keywords	Items found in PubMed
Multiple sclerosis AND quality of life	1369
Multiple sclerosis AND quality of life AND longitudinal studies	67

5. Parkinson disease

MESH/Keywords	Items found in PubMed
Parkinson’s disease AND quality of life	1305
Parkinson’s disease AND quality of life AND longitudinal studies	44

Table 1b: Overview of number of hits for different combinations of search terms - Web of Knowledge

1. Stroke

Keywords	Items found in WoK
Stroke AND quality of life AND longitudinal studies	271
NOT children NOT 1900-1999 (year of publication)	243
Refined WoK category: 'clinical neurology'	53

2. Spinal cord injury

Keywords	Items found in WoK
Spinal cord injury AND quality of life AND longitudinal studies	128
NOT children NOT 1900-1999 (year of publication)	115
Refined WoK category: 'clinical neurology'	43

3. Traumatic brain injury

Keywords	Items found in WoK
Traumatic brain injury AND quality of life AND longitudinal studies	110
NOT children NOT 1900-1999 (year of publication)	81
Refined WoK category: 'clinical neurology'	18

4. Multiple sclerosis

Keywords	Items found in WoK
Multiple sclerosis AND quality of life AND longitudinal studies	238
NOT children NOT 1900-1999 (year of publication)	228
Refined WoK category: 'clinical neurology'	101

5. Parkinson's disease

Keywords	Items found in WoK
Parkinson's disease AND quality of life AND longitudinal studies	113
NOT children NOT 1900-1999 (year of publication)	112
Refined WoK category: 'clinical neurology'	57

Table 2: Overview of the in- and excluded articles

1. Stroke	
Article (pubmed)	**Reason for exclusion**
Ahmed, S., Mayo, N. E., Corbiere, M., Wood-Dauphinee, S., Hanley, J., & Cohen, R. (2005). Change in quality of life of people with stroke over time: true change or response shift? *Qual Life Res, 14*(3), 611-627.	Longitudinal time window too short
Argimon, J. M., Limon, E., Vila, J., & Cabezas, C. (2005). Health related quality-of-life of care-givers as a predictor of nursing-home placement of patients with dementia. Alzheimer Dis Assoc Disord, 19(1), 41-44.	No adults with required neurological injuries
Ayerbe, L., Ayis, S. A., Crichton, S., Wolfe, C. D., & Rudd, A. G. (2014). Natural history, predictors and associated outcomes of anxiety up to 10 years after stroke: the South London Stroke Register. Age Ageing, 43(4), 542-547. doi:10.1093/ageing/aft208	**Included**
Barclay-Goddard, R., Lix, L. M., Tate, R., Weinberg, L., & Mayo, N. E. (2011). Health-related quality of life after stroke: does response shift occur in self-perceived physical function? Arch Phys Med Rehabil, 92(11), 1762-1769. doi:10.1016/j.apmr.2011.06.013	Longitudinal time window too short
Barskova, T., & Wilz, G. (2007). Interdependence of stroke survivors' recovery and their relatives' attitudes and health: a contribution to investigating the causal effects. Disabil Rehabil, 29(19), 1481-1491. doi:10.1080/09638280601029399	Longitudinal time window too short
Bendz, M. (2003). The first year of rehabilitation after a stroke - from two perspectives. Scand J Caring Sci, 17(3), 215-222.	Longitudinal time window too short
Bergersen, H., Froslie, K. F., Stibrant Sunnerhagen, K., & Schanke, A. K. (2010). Anxiety, depression, and psychological well-being 2 to 5 years poststroke. J Stroke Cerebrovasc Dis, 19(5), 364-369. doi:10.1016/j.jstrokecerebrovasdis.2009.06.005	Longitudinal time window without multiple assessments
Bottoni, N., Bertaglia, E., Donateo, P., Quartieri, F., Iori, M., Maggi, R., . . . Brignole, M. (2015). Long-term clinical outcome of patients who failed catheter ablation of atrial fibrillation. Europace, 17(3), 403-408. doi:10.1093/europace/euu229	No adults with required neurological injuries
Bourland, E. L., Neville, M. A., & Pickens, N. D. (2011). Loss, gain, and the reframing of perspectives in long-term stroke survivors: a dynamic experience of quality of life. Top Stroke Rehabil, 18(5), 437-449. doi:10.1310/tsr1805-437	Not enough participants at all time points
Bushnell, C. D., Reeves, M. J., Zhao, X., Pan, W., Prvu-Bettger, J., Zimmer, L., . . . Peterson, E. (2014). Sex differences in quality of life after ischemic stroke. Neurology, 82(11), 922-931. doi:10.1212/wnl.0000000000000208	Longitudinal time window too short
Chuang, K. Y., Wu, S. C., Yeh, M. C., Chen, Y. H., & Wu, C. L. (2005). Exploring the associations between long-term care and mortality rates among stroke patients. J Nurs Res, 13(1), 66-74.	Longitudinal time window too short
Chuluunbaatar, E., Chou, Y. J., & Pu, C. (2016). Quality of life of stroke survivors and their informal caregivers: A prospective study. Disabil Health J, 9(2), 306-312. doi:10.1016/j.dhjo.2015.10.007	Longitudinal time window too short
Cieza, A., Bostan, C., Ayuso-Mateos, J. L., Oberhauser, C., Bickenbach, J., Raggi, A., . . . Chatterji, S. (2013). The psychosocial difficulties in brain disorders that explain short term changes in health outcomes. BMC Psychiatry, 13, 78. doi:10.1186/1471-244x-13-78	Longitudinal time window too short
Dadjou, Y., Kermani-Alghoraishi, M., Sadeghi, M., Talaei, M., Yousefy, A., Oveisgharan, S., . . . Sarrafzadegan, N. (2016). The impact of health-related quality of life on the incidence of ischaemic heart disease and stroke; a cohort study in an Iranian population. Acta Cardiol, 71(2), 221-226. doi:10.2143/ac.71.2.3141853	No adults with required neurological injuries
Darlington, A. S., Dippel, D. W., Ribbers, G. M., van Balen, R., Passchier, J., & Busschbach, J. J. (2007). Coping strategies as determinants of quality of life in stroke patients: a longitudinal study. Cerebrovasc Dis, 23(5-6), 401-407. doi:10.1159/000101463	Longitudinal time window too short
de Weerd, L., Luijckx, G. J., Groenier, K. H., & van der Meer, K. (2012). Quality of life of elderly ischaemic stroke patients one year after thrombolytic therapy. A comparison between patients with and without thrombolytic therapy. BMC Neurol, 12, 61. doi:10.1186/1471-2377-12-61	Primary aim is investigation of a specific intervention
Duncan, F., Lewis, S. J., Greig, C. A., Dennis, M. S., Sharpe, M., MacLullich, A. M., & Mead, G. E. (2015). Exploratory longitudinal cohort study of associations of fatigue after stroke. Stroke, 46(4), 1052-1058. doi:10.1161/strokeaha.114.008079	Longitudinal time window too short
Forsberg-Warleby, G., Moller, A., & Blomstrand, C. (2001). Spouses of first-ever stroke patients: psychological well-being in the first phase after stroke. Stroke, 32(7), 1646-1651.	No adults with required neurological injuries
Ghotra, S. K., Johnson, J. A., Qiu, W., Newton, A., Rasmussen, C., & Yager, J. Y. (2015). Age at stroke onset influences the clinical outcome and health-related quality of life in pediatric ischemic stroke survivors. Dev Med Child Neurol, 57(11), 1027-1034. doi:10.1111/dmcn.12870	No adults with required neurological injuries
Gillard, P. J., Sucharew, H., Kleindorfer, D., Belagaje, S., Varon, S., Alwell, K., . . . Kissela, B. (2015). The negative impact of spasticity on the health-related quality of life of stroke survivors: a longitudinal cohort study. Health Qual Life Outcomes, 13, 159. doi:10.1186/s12955-015-0340-3	Longitudinal time window too short
Godwin, K. M., Swank, P. R., Vaeth, P., & Ostwald, S. K. (2013). The longitudinal and dyadic effects of mutuality on perceived stress for stroke survivors and their spousal caregivers. Aging Ment Health, 17(4), 423-431. doi:10.1080/13607863.2012.756457	No adults with required neurological injuries
Goeggel Simonetti, B., Cavelti, A., Arnold, M., Bigi, S., Regenyi, M., Mattle, H. P., . . . Fischer, U. (2015). Long-term outcome after arterial ischemic stroke in children and young adults. Neurology, 84(19), 1941-1947. doi:10.1212/wnl.0000000000001555	No adults with required neurological injuries
Golicki, D., Niewada, M., Karlinska, A., Buczek, J., Kobayashi, A., Janssen, M. F., & Pickard, A. S. (2015). Comparing responsiveness of the EQ-5D-5L, EQ-5D-3L and EQ VAS in stroke patients. Qual Life Res, 24(6), 1555-1563. doi:10.1007/s11136-014-0873-7	Methodological evaluation of an assessment tool
Grigorovich, A., Forde, S., Levinson, D., Bastawrous, M., Cheung, A. M., & Cameron, J. I. (2015). Restricted participation in stroke caregivers: who is at risk? Arch Phys Med Rehabil, 96(7), 1284-	No adults with required neurological injuries

1290. doi:10.1016/j.apmr.2015.03.004	
Grohn, B., Worrall, L. E., Simmons-Mackie, N., & Brown, K. (2012). The first 3-months post-stroke: what facilitates successfully living with aphasia? Int J Speech Lang Pathol, 14(4), 390-400. doi:10.3109/17549507.2012.692813	Longitudinal time window too short
Guidetti, S., Ytterberg, C., Ekstam, L., Johansson, U., & Eriksson, G. (2014). Changes in the impact of stroke between 3 and 12 months post-stroke, assessed with the Stroke Impact Scale. J Rehabil Med, 46(10), 963-968. doi:10.2340/16501977-1865	Longitudinal time window too short
Hadidi, N., Buckwalter, K., Lindquist, R., & Rangen, C. (2012). Lessons learned in recruitment and retention of stroke survivors. J Neurosci Nurs, 44(2), 105-110. doi:10.1097/JNN.0b013e3182478c96	Primary aim is investigation of a specific intervention
Hall, N. C., Chipperfield, J. G., Heckhausen, J., & Perry, R. P. (2010). Control striving in older adults with serious health problems: A 9-year longitudinal study of survival, health, and well-being. Psychol Aging, 25(2), 432-445. doi:10.1037/a0019278	No adults with required neurological injuries
Hamzat, T. K., & Peters, G. O. (2009). Motor function recovery and quality of life among stroke survivors in Ibadan, Nigeria. A 6-month follow-up study. Eur J Phys Rehabil Med, 45(2), 179-183.	Longitudinal time window too short
Howard, G., Safford, M. M., Meschia, J. F., Moy, C. S., Howard, V. J., Pulley, L., . . . Crowther, M. (2007). Stroke symptoms in individuals reporting no prior stroke or transient ischemic attack are associated with a decrease in indices of mental and physical functioning. Stroke, 38(9), 2446-2452. doi:10.1161/strokeaha.106.478032	Longitudinal time window without multiple assessments
Hubbard, I. J., Vo, K., Forder, P. M., & Byles, J. E. (2016). Stroke, Physical Function, and Death Over a 15-Year Period in Older Australian Women. Stroke, 47(4), 1060-1067. doi:10.1161/strokeaha.115.011456	**Included**
Hunger, M., Doring, A., & Holle, R. (2012). Longitudinal beta regression models for analyzing health-related quality of life scores over time. BMC Med Res Methodol, 12, 144. doi:10.1186/1471-2288-12-144	No adults with required neurological injuries
Kim, S. K., Kim, S. H., Jo, M. W., & Lee, S. I. (2015). Estimation of minimally important differences in the EQ-5D and SF-6D indices and their utility in stroke. Health Qual Life Outcomes, 13, 32. doi:10.1186/s12955-015-0227-3	Methodological evaluation of an assessment tool
King, R. B., Hartke, R. J., Lee, J., & Raad, J. (2013). The stroke caregiver unmet resource needs scale: development and psychometric testing. J Neurosci Nurs, 45(6), 320-328. doi:10.1097/JNN.0b013e3182a3ce40	No adults with neurological injuries
Kozlowski, A. J., Singh, R., Victorson, D., Miskovic, A., Lai, J. S., Harvey, R. L., . . . Heinemann, A. W. (2015). Agreement Between Responses From Community-Dwelling Persons With Stroke and Their Proxies on the NIH Neurological Quality of Life (Neuro-QoL) Short Forms. Arch Phys Med Rehabil, 96(11), 1986-1992.e1914. doi:10.1016/j.apmr.2015.07.005	Longitudinal time window too short
Langhammer, B., Lindmark, B., & Stanghelle, J. K. (2014). Physiotherapy and physical functioning post-stroke: exercise habits and functioning 4 years later? Long-term follow-up after a 1-year long-term intervention period: a randomized controlled trial. Brain Inj, 28(11), 1396-1405. doi:10.3109/02699052.2014.919534	Not enough participants at all time points
Langhammer, B., Stanghelle, J. K., & Lindmark, B. (2008). Exercise and health-related quality of life during the first year following acute stroke. A randomized controlled trial. Brain Inj, 22(2), 135-145. doi:10.1080/02699050801895423	Longitudinal time window too short
Larson, J., Franzen-Dahlin, A., Billing, E., Arbin, M., Murray, V., & Wredling, R. (2005). The impact of a nurse-led support and education programme for spouses of stroke patients: a randomized controlled trial. J Clin Nurs, 14(8), 995-1003. doi:10.1111/j.1365-2702.2005.01206.x	No adults with required neurological injuries
Lopez-Espuela, F., Zamorano, J. D., Ramirez-Moreno, J. M., Jimenez-Caballero, P. E., Portilla-Cuenca, J. C., Lavado-Garcia, J. M., & Casado-Naranjo, I. (2015). Determinants of Quality of Life in Stroke Survivors After 6 Months, from a Comprehensive Stroke Unit: A Longitudinal Study. Biol Res Nurs, 17(5), 461-468. doi:10.1177/1099800414553658	Longitudinal time window too short
Luengo-Fernandez, R., Gray, A. M., Bull, L., Welch, S., Cuthbertson, F., & Rothwell, P. M. (2013). Quality of life after TIA and stroke: ten-year results of the Oxford Vascular Study. Neurology, 81(18), 1588-1595. doi:10.1212/WNL.0b013e3182a9f45f	**Included**
Mayo, N. E., Scott, S. C., Bayley, M., Cheung, A., Garland, J., Jutai, J., & Wood-Dauphinee, S. (2015). Modeling health-related quality of life in people recovering from stroke. Qual Life Res, 24(1), 41-53. doi:10.1007/s11136-013-0605-4	Longitudinal time window too short
Mayo, N. E., Scott, S. C., Dendukuri, N., Ahmed, S., & Wood-Dauphinee, S. (2008). Identifying response shift statistically at the individual level. Qual Life Res, 17(4), 627-639. doi:10.1007/s11136-008-9329-2	Longitudinal time window too short
Mayo, N. E., Fellows, L. K., Scott, S. C., Cameron, J., & Wood-Dauphinee, S. (2009). A Longitudinal View of Apathy and Its Impact After Stroke. Stroke, 40(10), 3299-3307. doi:10.1161/strokeaha.109.554410	Longitudinal time window too short
McGrath, C., McMillan, A. S., Zhu, H. W., & Li, L. S. (2009). Agreement between patient and proxy assessments of oral health-related quality of life after stroke: an observational longitudinal study. J Oral Rehabil, 36(4), 264-270. doi:10.1111/j.1365-2842.2009.01941.x	Longitudinal time window too short
Medin, J., Windahl, J., von Arbin, M., Tham, K., & Wredling, R. (2012). Eating difficulties among patients 3 months after stroke in relation to the acute phase. J Adv Nurs, 68(3), 580-589. doi:10.1111/j.1365-2648.2011.05759.x	Longitudinal time window too short
Mumby, K., & Whitworth, A. (2012). Evaluating the effectiveness of intervention in long-term aphasia post-stroke: the experience from CHANT (Communication Hub for Aphasia in North Tyneside). Int J Lang Commun Disord, 47(4), 398-412. doi:10.1111/j.1460-6984.2012.00153.x	Primary aim is investigation of a specific intervention
Mutai, H., Furukawa, T., Nakanishi, K., & Hanihara, T. (2016). Longitudinal functional changes, depression, and health-related quality of life among stroke survivors living at home after inpatient rehabilitation. Psychogeriatrics, 16(3), 185-190. doi:10.1111/psyg.12137	Longitudinal time window without multiple assessments
Nir, Z., Greenberger, C., & Bachner, Y. G. (2009). Profile, Burden, and Quality of Life of Israeli Stroke Survivor Caregivers: A Longitudinal Study. Journal of Neuroscience Nursing, 41(2), 92-105	Longitudinal time window too short

Pan, J. H., Song, X. Y., Lee, S. Y., & Kwok, T. (2008). Longitudinal analysis of quality of life for stroke survivors using latent curve models. Stroke, 39(10), 2795-2802. doi:10.1161/strokeaha.108.515460	Longitudinal time window too short
Patel, M. D., McKevitt, C., Lawrence, E., Rudd, A. G., & Wolfe, C. D. (2007). Clinical determinants of long-term quality of life after stroke. Age Ageing, 36(3), 316-322. doi:10.1093/ageing/afm014	**Included**
Perrier, M. J., Korner-Bitensky, N., & Mayo, N. E. (2010). Patient factors associated with return to driving poststroke: findings from a multicenter cohort study. Arch Phys Med Rehabil, 91(6), 868-873. doi:10.1016/j.apmr.2010.03.009	Longitudinal time window too short
Perry, L. (2004). Eating and dietary intake in communication-impaired stroke survivors: a cohort study from acute-stage hospital admission to 6 months post-stroke. Clin Nutr, 23(6), 1333-1343. doi:10.1016/j.clnu.2004.04.009	Longitudinal time window too short
Pickard, A. S., Johnson, J. A., & Feeny, D. H. (2005). Responsiveness of generic health-related quality of life measures in stroke. Qual Life Res, 14(1), 207-219.	Methodological assessment of an assessment tool
Pickard, A. S., Johnson, J. A., Feeny, D. H., Shuaib, A., Carriere, K. C., & Nasser, A. M. (2004). Agreement between patient and proxy assessments of health-related quality of life after stroke using the EQ-5D and health utilities index. Stroke, 35(2), 607-612. doi:10.1161/01.str.0000110984.91157.bd	Longitudinal time window too short
Pilkington, F. B. (1999). A qualitative study of life after stroke. J Neurosci Nurs, 31(6), 336-347.	Year of publication before 2000
Radman, N., Staub, F., Aboulafia-Brakha, T., Berney, A., Bogousslavsky, J., & Annoni, J. M. (2012). Poststroke fatigue following minor infarcts: a prospective study. Neurology, 79(14), 1422-1427. doi:10.1212/WNL.0b013e31826d5f3a	Longitudinal time window too short
Rochette, A., Desrosiers, J., Bravo, G., Tribble, D. S., & Bourget, A. (2007). Changes in participation level after spouse's first stroke and relationship to burden and depressive symptoms. Cerebrovasc Dis, 24(2-3), 255-260. doi:10.1159/000104487	No adults with required neurological injuries
Sajobi, T. T., Lix, L. M., Singh, G., Lowerison, M., Engbers, J., & Mayo, N. E. (2015). Identifying reprioritization response shift in a stroke caregiver population: a comparison of missing data methods. Qual Life Res, 24(3), 529-540. doi:10.1007/s11136-014-0824-3	No adults with required neurolgical injuries
Savini, S., Buck, H. G., Dickson, V. V., Simeone, S., Pucciarelli, G., Fida, R., . . . Vellone, E. (2015). Quality of life in stroke survivor-caregiver dyads: a new conceptual framework and longitudinal study protocol. J Adv Nurs, 71(3), 676-687. doi:10.1111/jan.12524	No adults with required neurological injuries.
Schaapsmeerders, P., Maaijwee, N. A., van Dijk, E. J., Rutten-Jacobs, L. C., Arntz, R. M., Schoonderwaldt, H. C., . . . de Leeuw, F. E. (2013). Long-term cognitive impairment after first-ever ischemic stroke in young adults. Stroke, 44(6), 1621-1628. doi:10.1161/strokeaha.111.000792	Longitudinal time window without mutiple assessments
Schielke, E., Busch, M. A., Hildenhagen, T., Holtkamp, M., Kuchler, I., Harms, L., & Masuhr, F. (2005). Functional, cognitive and emotional long-term outcome of patients with ischemic stroke requiring mechanical ventilation. J Neurol, 252(6), 648-654. doi:10.1007/s00415-005-0711-5	Longitudinal time window too short
Schiemanck, S. K., Post, M. W., Kwakkel, G., Witkamp, T. D., Kappelle, L. J., & Prevo, A. J. (2005). Ischemic lesion volume correlates with long-term functional outcome and quality of life of middle cerebral artery stroke survivors. Restor Neurol Neurosci, 23(3-4), 257-263.	Longitudinal time window too short
Secrest, J. A., & Zeller, R. (2007). The relationship of continuity and discontinuity, functional ability, depression, and quality of life over time in stroke survivors. Rehabil Nurs, 32(4), 158-164.	Longitudinal time window too short
Skoglund, T. S., Eriksson-Ritzen, C., Sorbo, A., Jensen, C., & Rydenhag, B. (2008). Health status and life satisfaction after decompressive craniectomy for malignant middle cerebral artery infarction. Acta Neurol Scand, 117(5), 305-310. doi:10.1111/j.1600-0404.2007.00967.x	Primary aim is investigation of a specific intervention
Tavener, M., Thijsen, A., Hubbard, I. J., Francis, J. L., Grennall, C., Levi, C., & Byles, J. (2015). Acknowledging How Older Australian Women Experience Life After Stroke: How Does the WHO 18-Item Brief ICF Core Set for Stroke Compare? Health Care Women Int, 36(12), 1311-1326. doi:10.1080/07399332.2015.1055747	No full text available
Teodorczuk, A., O'Brien, J. T., Firbank, M. J., Pantoni, L., Poggesi, A., Erkinjuntti, T., . . . Inzitari, D. (2007). White matter changes and late-life depressive symptoms: longitudinal study. Br J Psychiatry, 191, 212-217. doi:10.1192/bjp.bp.107.036756	No adults with required neurological injuries
Teoh, V., Sims, J., & Milgrom, J. (2009). Psychosocial predictors of quality of life in a sample of community-dwelling stroke survivors: a longitudinal study. Top Stroke Rehabil, 16(2), 157-166. doi:10.1310/tsr1602-157	Longitudinal time window too short
Tramonti, F., Fanciullacci, C., Giunti, G., Rossi, B., & Chisari, C. (2014). Functional status and quality of life of stroke survivors undergoing rehabilitation programmes in a hospital setting. Neurorehabilitation, 35(1), 1-7. doi:10.3233/nre-141092	Not enough participants at all time points
van de Port, I. G., Kwakkel, G., Schepers, V. P., Heinemans, C. T., & Lindeman, E. (2007). Is fatigue an independent factor associated with activities of daily living, instrumental activities of daily living and health-related quality of life in chronic stroke? Cerebrovasc Dis, 23(1), 40-45. doi:10.1159/0000957	**Included**
van Mierlo, M. L., van Heugten, C. M., Post, M. W., Lindeman, E., de Kort, P. L., & Visser-Meily, J. M. (2014). A longitudinal cohort study on quality of life in stroke patients and their partners: Restore4Stroke Cohort. Int J Stroke, 9(1), 148-154. doi:10.1111/j.1747-4949.2012.00882.x	Longitudinal time window too short
(van Mierlo et al., 2016)van Mierlo, M. L., van Heugten, C. M., Post, M. W., Hajos, T. R., Kappelle, L. J., & Visser-Meily, J. M. (2016). Quality of Life during the First Two Years Post Stroke: The Restore4Stroke Cohort Study. Cerebrovasc Dis, 41(1-2), 19-26. doi:10.1159/000441197	Longitudinal time window too short
Van Puymbroeck, M., & Rittman, M. R. (2005). Quality-of-life predictors for caregivers at 1 and 6 months poststroke: Results of path analyses. J Rehabil Res Dev, 42(6), 747-760.	No adults with required neurological injuries
Vincent-Onabajo, G. O., Owolabi, M. O., & Hamzat, T. K. (2014). Sensitivity and responsiveness of the health-related quality of life in stroke patients-40 (HRQOLISP-40) scale. Disabil Rehabil, 36(12), 1014-1019. doi:10.3109/09638288.2013.825652	Methodological evaluation of an assessment tool
Vincent-Onabajo, G. O., Hamzat, T. K., & Owolabi, M. O. (2014). Are there gender differences in	Longitudinal time window too short

longitudinal patterns of functioning in Nigerian stroke survivors during the first year after stroke? Neurorehabilitation, 34(2), 297-304. doi:10.3233/nre-141047	
White, J. H., Magin, P., Attia, J., Sturm, J., Carter, G., & Pollack, M. (2012). Trajectories of psychological distress after stroke. Ann Fam Med, 10(5), 435-442. doi:10.1370/afm.1374	Methodological evaluation of an assessment tool
Wu, M. H., Lee, S., Su, H. Y., & Pai, H. C. (2015). The effect of cognitive appraisal in middle-aged women stroke survivors and the psychological health of their caregivers: a follow-up study. J Clin Nurs, 24(21-22), 3155-3164. doi:10.1111/jocn.12926	No adults with required neurological injuries
Yang, E. J., Kim, M. H., Lim, J. Y., & Paik, N. J. (2013). Oropharyngeal Dysphagia in a community-based elderly cohort: the korean longitudinal study on health and aging. J Korean Med Sci, 28(10), 1534-1539. doi:10.3346/jkms.2013.28.10.1534	No adults with required neurological injuries
Zhang, X., Sun, Q., Wu, M., & Xia, G. (2013). Health-related quality of life after stroke: a 2-year prospective cohort study in Wuhan, China. Int J Neurosci, 123(2), 138-141. doi:10.3109/00207454.2012.746336	Longitudinal time window too short

1. Stroke	
Article (WoK)	**Reason for exclusion**
Back, T., Grunig, S., Winter, Y., Bodechtel, U., Guthke, K., Khati, D., & von Kummer, R. (2013). Neuroborreliosis-associated cerebral vasculitis: long-term outcome and health-related quality of life. Journal of Neurology, 260(6), 1569-1575. doi:10.1007/s00415-013-6831-4	No adults with required neurological injuries
Barker-Collo, S., Krishnamurthi, R., Feigin, V., Jones, A., Theadom, A., Barber, P. A., . . . Bennett, D. (2016). Neuropsychological Outcome and its Predictors Across the First Year after Ischaemic Stroke. Brain Impairment, 17(2), 111-122. doi:10.1017/BrImp.2016.17	Longitudinal time window too short
Batchelor, F. A., Hill, K. D., Mackintosh, S. F., Said, C. M., & Whitehead, C. H. (2009). The FLASSH study: protocol for a randomised controlled trial evaluating falls prevention after stroke and two sub-studies. Bmc Neurology, 9. doi:10.1186/1471-2377-9-14	Primary aim is investigation of a specific intervention
Bolsche, F., Hasenbein, U., Reissberg, H., Schlote, A., & Wallesch, C. W. (2003). Results of in- vs outpatient post-stroke rehabilitation over 6 months. Fortschritte Der Neurologie Psychiatrie, 71(9), 458-+.	Primary aim is investigation of a specific intervention
Busija, L., Tao, L. W., Liew, D., Weir, L., Yan, B., Silver, G., . . . Hand, P. J. (2013). Do Patients Who Take Part in Stroke Research Differ from Non-Participants? Implications for Generalizability of Results. Cerebrovascular Diseases, 35(5), 483-491. doi:10.1159/000350724	Methodological evaluation of an assessment tool
Caeiro, L., Ferro, J. M., e Melo, T. P., Canhao, P., & Figueira, M. L. (2013). Post-Stroke Apathy: An Exploratory Longitudinal Study. Cerebrovascular Diseases, 35(6), 507-513. doi:10.1159/000350202	Longitudinal time window too short
Cameron, J. I., Cheung, A. M., Streiner, D. L., Coyte, P. C., & Stewart, D. E. (2011). Stroke Survivor Depressive Symptoms Are Associated With Family Caregiver Depression During the First 2 Years Poststroke. Stroke, 42(2), 302-306. doi:10.1161/strokeaha.110.597963	Longitudinal time window too short
Chang, W. H., Sohn, M. K., Lee, J., Kim, D. Y., Lee, S. G., Shin, Y. I., . . . Kim, Y. H. (2015). Korean Stroke Cohort for functioning and rehabilitation (KOSCO): study rationale and protocol of a multi-centre prospective cohort study. Bmc Neurology, 15. doi:10.1186/s12883-015-0293-5	Longitudinal time window too short
Corrigan, J. D., Bogner, J. A., Mysiw, W. J., Clinchot, D., & Fugate, L. (2001). Life satisfaction after traumatic brain injury. Journal of Head Trauma Rehabilitation, 16(6), 543-555.	No adults with required neurological injuries
De Ryck, A., Fransen, E., Brouns, R., Geurden, M., Peij, D., Marien, P., . . . Engelborghs, S. (2014). Poststroke depression and its multifactorial nature: Results from a prospective longitudinal study. Journal of the Neurological Sciences, 347(1-2), 159-166. doi:10.1016/j.jns.2014.09.038	Longitudinal time window too short
Drewes, C., Sagberg, L. M., Jakola, A. S., & Solheim, O. (2016). Quality of life in patients with intracranial tumors: does tumor laterality matter? Journal of Neurosurgery, 125(6), 1400-1407. doi:10.3171/2015.12.jns152252	No adults with required neurological injuries
Fleming, J., Liddle, J., Nalder, E., Weir, N., & Cornwell, P. (2014). Return to driving in the first 6 months of community integration after acquired brain injury. Neurorehabilitation, 34(1), 157-166. doi:10.3233/nre-131012	No adults with required neurological injuries
Forkel, S. J., Thiebaut De Schotten, M., Dell'Acqua, F., Kalra, L., Murphy, D. G. M., Williams, S. C. R., & Catani, M. (2014). Anatomical predictors of aphasia recovery: a tractography study of bilateral perisylvian language networks. Brain, 137, 2027-2039. doi:10.1093/brain/awu113	Longitudinal time window too short
Glass, H. C., Bonifacio, S. L., Peloquin, S., Shimotake, T., Sehring, S., Sun, Y., . . . Ferriero, D. M. (2010). Neurocritical Care for Neonates. Neurocritical Care, 12(3), 421-429. doi:10.1007/s12028-009-9324-7	No adults with required neurological injuries
Grohn, B., Worrall, L., Simmons-Mackie, N., & Hudson, K. (2014). Living successfully with aphasia during the first year post-stroke: A longitudinal qualitative study. Aphasiology, 28(12), 1405-1425. doi:10.1080/02687038.2014.935118	Longitudinal time window too short
Guo, Y. E., Togher, L., Power, E., Heard, R., Luo, N., Yap, P., & Koh, G. C. H. (2017). Sensitivity to change and responsiveness of the Stroke and Aphasia Quality-of-Life Scale (SAQOL) in a Singapore stroke population. Aphasiology, 31(4), 427-446. doi:10.1080/02687038.2016.1261269	Methodological evaluation of an assessment tool
Guzauskas, G. F., Boudreau, D. M., Villa, K. F., Levine, S. R., & Veenstra, D. L. (2012). The Cost-Effectiveness of Primary Stroke Centers for Acute Stroke Care. Stroke, 43(6), 1617-+. doi:10.1161/strokeaha.111.648238	Primary aim is investigation of a specific intervention
Haley, W. E., Roth, D. L., Hovater, M., & Clay, O. J. (2015). Long-term impact of stroke on family caregiver well-being A population-based case-control study. Neurology, 84(13), 1323-1329. doi:10.1212/wnl.0000000000001418	No adults with required neurological injuries
Hopman, W. M., & Verner, J. (2003). Quality of life during and after inpatient stroke rehabilitation. Stroke, 34(3), 801-805. doi:10.1161/01.str.0000057978.15397.6f	Longitudinal time window too short
Huff, W., Steckel, R., & Sitzer, M. (2003). Poststroke depression: risk factors and effects on the course of the stroke. Nervenarzt, 74(2), 104-+. doi:10.1007/s00115-002-1417-x	Longitudinal time window too short
Jonsson, A. C., Lindgren, I., Hallstrom, B., Norrving, B., & Lindgren, A. (2005). Determinants of quality of life in stroke survivors and their informal caregivers. Stroke, 36(4), 803-808. doi:10.1161/01.str.0000160873.32791.20	Longitudinal time window too short
Loetscher, T., Chen, C. L., Wignall, S., Bulling, A., Hoppe, S., Churches, O., . . . Lee, A. (2015). A study on the natural history of scanning behaviour in patients with visual field defects after stroke. Bmc Neurology, 15. doi:10.1186/s12883-015-0321-5	Primary aim is investigation of a specific intervention
Meyer, B., Ringel, F., Winter, Y., Spottke, A., Gharevi, N., Dams, J., . . . Dodel, R. (2010). Health-Related Quality of Life in Patients with Subarachnoid Haemorrhage. Cerebrovascular Diseases, 30(4), 423-431. doi:10.1159/000317078	Longitudinal time window too short

Muller-Nordhorn, J., Nolte, C. H., Rossnagel, K., Jungehulsing, G. J., Reich, A., Roll, S., . . . Willich, S. N. (2005). The use of the 12-item short-form health status instrument in a longitudinal study of patients with stroke and transient ischaemic attack. Neuroepidemiology, 24(4), 196-202. doi:10.1159/000084712	Methodological evaluation of an assessment tool
Mumby, K., & Whitworth, A. (2013). Adjustment processes in chronic aphasia after stroke: Exploring multiple perspectives in the context of a community-based intervention. Aphasiology, 27(4), 462-489. doi:10.1080/02687038.2013.772559	Longitudinal time window too short
Murphy, M. A., Persson, H. C., Danielsson, A., Broeren, J., Lundgren-Nilsson, A., & Sunnerhagen, K. S. (2011). SALGOT - Stroke Arm Longitudinal study at the University of Gothenburg, prospective cohort study protocol. Bmc Neurology, 11. doi:10.1186/1471-2377-11-56	Longitudinal time window too short
Padua, L., Pareyson, D., Aprile, I., Cavallaro, T., Quattrone, A., Rizzuto, N., . . . Schenone, A. (2008). Natural history of CMT1A including QoL: A 2-year prospective study. Neuromuscular Disorders, 18(3), 199-203. doi:10.1016/j.nmd.2007.11.008	Longitudinal time window too short
Parag, V., Hackett, M. L., Yapa, C. M., Kerse, N., McNaughton, H., Feigin, V. L., . . . Auckland Reg Community Stroke, S. (2008). The impact of stroke on unpaid caregivers: Results from the Auckland Regional Community Stroke study, 2002-2003. Cerebrovascular Diseases, 25(6), 548-554. doi:10.1159/000131673	No adults with required neurological injuries
Park, J. H., Lee, J. J., Lee, S. B., Huh, Y., Choi, E. A., Youn, J. C., . . . Kim, K. W. (2010). Prevalence of major depressive disorder and minor depressive disorder in an elderly Korean population: Results from the Korean Longitudinal Study on Health and Aging (KLoSHA). Journal of Affective Disorders, 125(1-3), 234-240. doi:10.1016/j.jad.2010.02.109	Longitudinal time window too short
Pioro, E. P., Brooks, B. R., Cummings, J., Schiffer, R., Thisted, R. A., Wynn, D., . . . Safety Tolerability, E. (2010). Dextromethorphan Plus Ultra Low-Dose Quinidine Reduces Pseudobulbar Affect. Annals of Neurology, 68(5), 693-702. doi:10.1002/ana.22093	Primary aim is investigation of a specific intervention
Pucciarelli, G., Vellone, E., Savini, S., Simeone, S., Ausili, D., Alvaro, R., . . . Lyons, K. S. (2017). Roles of Changing Physical Function and Caregiver Burden on Quality of Life in Stroke: A Longitudinal Dyadic Analysis. Stroke, 48(3), 733-739. doi:10.1161/strokeaha.116.014989	No adults with required neurological injuries
Schlote, A., Richter, M., Frank, B., & Wallesch, C. W. (2006). A longitudinal study of health-related quality of life of first stroke survivors' close relatives. Cerebrovascular Diseases, 22(2-3), 137-142. doi:10.1159/000093242	No adults with required neurological injuries
Simuni, T., Luo, S. T., Chou, K. L., Fernandez, H., He, B., & Parashos, S. (2013). Rankin scale as a potential measure of global disability in early Parkinson's disease. Journal of Clinical Neuroscience, 20(9), 1200-1203. doi:10.1016/j.jocn.2012.10.030	No adults with required neurological injuries
Suchy-Dicey, A. M., Shibata, D., Best, L. G., Verney, S. P., Longstreth, W. T., Lee, E. T., . . . Buchwald, D. (2016). Cranial Magnetic Resonance Imaging in Elderly American Indians: Design, Methods, and Implementation of the Cerebrovascular Disease and Its Consequences in American Indians Study. Neuroepidemiology, 47(2), 67-75. doi:10.1159/000443277	No adults with required neurological injuries
Sunnerhagen, K. S., Danielsson, A., Rafsten, L., Bjorkdahl, A., Axelsson, A. B., Nordin, A., . . . Frojd, K. (2013). Gothenburg very early supported discharge study (GOTVED) NCT01622205: a block randomized trial with superiority design of very early supported discharge for patients with stroke. Bmc Neurology, 13. doi:10.1186/1471-2377-13-66	Primary aim is investigation of a specific intervention
Tang, W. K., Chen, Y. K., Lu, J., Ahuja, A. T., Chu, W. C. W., Mok, V. C. T., . . . Wong, K. S. (2011). Cerebral microbleeds and quality of life in acute ischemic stroke. Neurological Sciences, 32(3), 449-454. doi:10.1007/s10072-011-0571-y	Longitudinal time window too short
Toso, V., Gandolfo, C., Paolucci, S., Provinciali, L., Torta, R., Grassivaro, N., & Grp, D. S. (2004). Post-stroke depression: research methodology of a large multicentre observational study (DESTRO). Neurological Sciences, 25(3), 138-144. doi:10.1007/s10072-004-0247-y	Longitudinal time window too short
Tweedy, S. M., Beckman, E. M., Johnston, L. M., & Connick, M. J. (2016). Performance-Focussed Sport - An Avenue to Gold-Medal Clinical Outcomes for People with Neurological Impairments? Brain Impairment, 17(1), 99-110. doi:10.1017/BrImp.2016.5	No adults with required neurological injuries
von Steinbuechel, N., Richter, S., Morawetz, C., & Riemsma, R. (2005). Assessment of subjective health and health-related quality of life in persons with acquired or degenerative brain injury. Current Opinion in Neurology, 18(6), 681-691. doi:10.1097/01.wco.0000194140.56429.75	No adults with required neurological injuries
White, C. L., McClure, L. A., Wallace, P. M., Braimah, J., Liskay, A., Roldan, A., . . . Investigators, S. P. S. (2011). The Correlates and Course of Depression in Patients with Lacunar Stroke: Results from the Secondary Prevention of Small Subcortical Strokes (SPS3) Study. Cerebrovascular Diseases, 32(4), 354-360. doi:10.1159/000330350	Longitudinal time window too short
Wills, A. M. A., Perez, A., Wang, J., Su, X., Morgan, J., Rajan, S. S., . . . Parkinson, N. E. T. (2016). Association Between Change in Body Mass Index, Unified Parkinson's Disease Rating Scale Scores, and Survival Among Persons With Parkinson Disease Secondary Analysis of Longitudinal Data From NINDS Exploratory Trials in Parkinson Disease Long-term Study 1. Jama Neurology, 73(3), 321-328. doi:10.1001/jamaneurol.2015.4265	No adults with required neurological injuries
Wilz, G., & Kalytta, T. (2008). Anxiety symptoms in spouses of stroke patients. Cerebrovascular Diseases, 25(4), 311-315. doi:10.1159/000118375	No adults with required neurological injuries
Wondergem, R., Pisters, M. F., Wouters, E. J., Olthof, N., de Bie, R. A., Visser-Meily, J. M. A., & Veenhof, C. (2017). The Course of Activities in Daily Living: Who Is at Risk for Decline after First Ever Stroke? Cerebrovascular Diseases, 43(1-2), 1-8. doi:10.1159/000451034	No longitudinal design

Spinal cord injury	
Articles (PubMed)	**Reason for exclusion**
Amtmann, D., Bamer, A. M., Cook, K. F., Askew, R. L., Noonan, V. K., & Brockway, J. A. (2012). University of Washington self-efficacy scale: a new self-efficacy scale for people with disabilities. Arch Phys Med Rehabil, 93(10), 1757-1765. doi:10.1016/j.apmr.2012.05.001	Methodological evaluation of an assessment tool
Bonanno, G. A., Kennedy, P., Galatzer-Levy, I. R., Lude, P., & Elfstrom, M. L. (2012). Trajectories of resilience, depression, and anxiety following spinal cord injury. Rehabil Psychol, 57(3), 236-247. doi:10.1037/a0029256	Longitudinal time window too short
Byra, S. (2016). Posttraumatic growth in people with traumatic long-term spinal cord injury: predictive role of basic hope and coping. Spinal Cord, 54(6), 478-482. doi:10.1038/sc.2015.177	No specific QoL outcome measure
Charlifue, S., & Gerhart, K. (2004). Community integration in spinal cord injury of long duration. Neurorehabilitation, 19(2), 91-101. (Charlifue & Gerhart, 2004)	No full text available
Craig, A., Hancock, K., & Dickson, H. (1999). Improving the long-term adjustment of spinal cord injured persons. Spinal Cord, 37(5), 345-350.	Year of publication before 2000
Craig, A., Nicholson Perry, K., Guest, R., Tran, Y., Dezarnaulds, A., Hales, A., . . . Middleton, J. (2015). Prospective study of the occurrence of psychological disorders and comorbidities after spinal cord injury. Arch Phys Med Rehabil, 96(8), 1426-1434. doi:10.1016/j.apmr.2015.02.027	Longitudinal time window too short
Daverat, P., Petit, H., Kemoun, G., Dartigues, J. F., & Barat, M. (1995). The long term outcome in 149 patients with spinal cord injury. Paraplegia, 33(11), 665-668. doi:10.1038/sc.1995.139	Year of publication before 2000
Edelaar-Peeters, Y., & Stiggelbout, A. M. (2013). Anticipated adaptation or scale recalibration? Health Qual Life Outcomes, 11, 171. doi:10.1186/1477-7525-11-171	Methodological evaluation of an assessment tool
Engel, L., Bryan, S., Evers, S. M., Dirksen, C. D., Noonan, V. K., & Whitehurst, D. G. (2014). Exploring psychometric properties of the SF-6D, a preference-based health-related quality of life measure, in the context of spinal cord injury. Qual Life Res, 23(8), 2383-2393. doi:10.1007/s11136-014-0677-9	Methodological evaluation of an assessment tool
Erosa, N. A., Berry, J. W., Elliott, T. R., Underhill, A. T., & Fine, P. R. (2014). Predicting quality of life 5 years after medical discharge for traumatic spinal cord injury. Br J Health Psychol, 19(4), 688-700. doi:10.1111/bjhp.12063	**Included**
Faaborg, P. M., Christensen, P., Finnerup, N., Laurberg, S., & Krogh, K. (2008). The pattern of colorectal dysfunction changes with time since spinal cord injury. Spinal Cord, 46(3), 234-238. doi:10.1038/sj.sc.3102121	No specific QoL outcome measure
Gerhart, K. A., Weitzenkamp, D. A., Kennedy, P., Glass, C. A., & Charlifue, S. W. (1999). Correlates of stress in long-term spinal cord injury. Spinal Cord, 37(3), 183-190.	Year of publication before 2000
Hall, K. M., Knudsen, S. T., Wright, J., Charlifue, S. W., Graves, D. E., & Werner, P. (1999). Follow-up study of individuals with high tetraplegia (C1-C4) 14 to 24 years postinjury. Arch Phys Med Rehabil, 80(11), 1507-1513.	Year of publication before 2000
Hicks, A. L., Adams, M. M., Ginis, K. M., Giangregorio, L., Latimer, A., Phillips, S. M., & McCartney, N. (2005). Long-term body-weight-supported treadmill training and subsequent follow-up in persons with chronic SCI: effects on functional walking ability and measures of subjective well-being. Spinal Cord, 43(5), 291-298. doi:10.1038/sj.sc.3101710	Primary aim is investigation of a specific intervention
Holicky, R., & Charlifue, S. (1999). Ageing with spinal cord injury: the impact of spousal support. Disabil Rehabil, 21(5-6), 250-257.	Year of publication before 2000
Hubert, G., Tousignant, M., Routhier, F., Corriveau, H., & Champagne, N. (2013). Effect of service dogs on manual wheelchair users with spinal cord injury: a pilot study. J Rehabil Res Dev, 50(3), 341-350.	Primary aim is investigation of a specific intervention.
January, A. M., Zebracki, K., Chlan, K. M., & Vogel, L. C. (2014). Symptoms of depression over time in adults with pediatric-onset spinal cord injury. Arch Phys Med Rehabil, 95(3), 447-454. doi:10.1016/j.apmr.2013.11.011	No adults with required neurological injuries
Johnston, M., Nissim, E. N., Wood, K., Hwang, K., & Tulsky, D. (2002). Objective and subjective handicap following spinal cord injury: interrelationships and predictors. J Spinal Cord Med, 25(1), 11-22.	Longitudinal time window too short
Jones, M. L., Leslie, D. P., Bilsky, G., & Bowman, B. (2008). Effects of intrathecal baclofen on perceived sexual functioning in men with spinal cord injury. J Spinal Cord Med, 31(1), 97-102.	Primary aim is investigation of a specific intervention
Kemp, B. J., Bateham, A. L., Mulroy, S. J., Thompson, L., Adkins, R. H., & Kahan, J. S. (2011). Effects of reduction in shoulder pain on quality of life and community activities among people living long-term with SCI paraplegia: a randomized control trial. J Spinal Cord Med, 34(3), 278-284. doi:10.1179/107902611x12972448729486	Primary aim is investigation of a specific intervention
Kennedy, P., Lude, P., Elfstrom, M. L., & Smithson, E. (2010). Sense of coherence and psychological outcomes in people with spinal cord injury: appraisals and behavioural responses. Br J Health Psychol, 15(Pt 3), 611-621. doi:10.1348/135910709x478222	Longitudinal time window too short
Kennedy, P., Lude, P., Elfstrom, M. L., & Smithson, E. (2012). Appraisals, coping and adjustment pre and post SCI rehabilitation: a 2-year follow-up study. Spinal Cord, 50(2), 112-118. doi:10.1038/sc.2011.127	Longitudinal time window too short
Kennedy, P., Lude, P., Elfstrom, M. L., & Smithson, E. (2010). Cognitive appraisals, coping and quality of life outcomes: a multi-centre study of spinal cord injury rehabilitation. Spinal Cord, 48(10), 762-769. doi:10.1038/sc.2010.20	Longitudinal time window too short
Kennedy, P., & Rogers, B. (2000). Reported quality of life of people with spinal cord injuries: a longitudinal analysis of the first 6 months post-discharge. Spinal Cord, 38(8), 498-503. doi:10.1038/sj.sc.3101021	Longitudinal time window too short
Kogos, S. C., Richards, J. S., Banos, J. H., Ness, T. J., Charlifue, S. W., Whiteneck, G. G., & Lammertse, D. P. (2005). Visceral pain and life quality in persons with spinal cord injury: A brief report. Journal of Spinal Cord Medicine, 28(4), 333-337.	Not enough participants at all time points
Krause, J. S., & Bozard, J. L. (2012). Natural course of life changes after spinal cord injury: a 35-year longitudinal study. Spinal Cord, 50(3), 227-231. doi:10.1038/sc.2011.106	**Included**

Krause, J. S. (1992). Longitudinal changes in adjustment after spinal cord injury: a 15-year study. Arch Phys Med Rehabil, 73(6), 564-568.	Year of publication before 2000
Krause, J. S. (1997). Adjustment after spinal cord injury: a 9-year longitudinal study. Arch Phys Med Rehabil, 78(6), 651-657.	Year of publication before 2000
Krause, J. S., Clark, J. M., & Saunders, L. L. (2015). SCI Longitudinal Aging Study: 40 Years of Research. Top Spinal Cord Inj Rehabil, 21(3), 189-200. doi:10.1309/sci2103-189	Longitudinal time window too short
Krause, J. S., & Coker, J. L. (2006). Aging after spinal cord injury: A 30-year longitudinal study. Journal of Spinal Cord Medicine, 29(4), 371-376.	No specific QoI outcome measure
Krause, J. S., & Broderick, L. (2005). A 25-year longitudinal study of the natural course of aging after spinal cord injury. Spinal Cord, 43(6), 349-356. doi:10.1038/sj.sc.3101726	No specific QoI outcome measure
Charlifue, S., & Gerhart, K. (2004). Community integration in spinal cord injury of long duration. Neurorehabilitation, 19(2), 91-101.	No specific QoL outcome measure
McColl, M. A., Charlifue, S., Glass, C., Lawson, N., & Savic, G. (2004). Aging, gender, and spinal cord injury. Arch Phys Med Rehabil, 85(3), 363-367.	Longitudinal time window without multiple assessments
Merenda, L. A., Duffy, T., Betz, R. R., Mulcahey, M. J., Dean, G., & Pontari, M. (2007). Outcomes of urinary diversion in children with spinal cord injuries. J Spinal Cord Med, 30 Suppl 1, S41-47.	Primary aim is investigation of a specific intervention
Modirian, E., Pirouzi, P., Soroush, M., Karbalaei-Esmaeili, S., Shojaei, H., & Zamani, H. (2010). Chronic pain after spinal cord injury: results of a long-term study. Pain Med, 11(7), 1037-1043. doi:10.1111/j.1526-4637.2010.00865.x	Longitudinal time window too short
Paul, C., Derrett, S., McAllister, S., Herbison, P., Beaver, C., & Sullivan, M. (2013). Socioeconomic outcomes following spinal cord injury and the role of no-fault compensation: longitudinal study. Spinal Cord, 51(12), 919-925. doi:10.1038/sc.2013.110	Longitudinal time window too short
Pershouse, K. J., Barker, R. N., Kendall, M. B., Buettner, P. G., Kuipers, P., Schuurs, S. B., & Amsters, D. I. (2012). Investigating changes in quality of life and function along the lifespan for people with spinal cord injury. Arch Phys Med Rehabil, 93(3), 413-419. doi:10.1016/j.apmr.2011.10.014	**Included**
Peter, C., Muller, R., Post, M. W., van Leeuwen, C. M., Werner, C. S., & Geyh, S. (2014). Psychological resources, appraisals, and coping and their relationship to participation in spinal cord injury: a path analysis. Arch Phys Med Rehabil, 95(9), 1662-1671. doi:10.1016/j.apmr.2014.04.012	Longitudinal time window too short
Post, M. W., Brinkhof, M. W., von Elm, E., Boldt, C., Brach, M., Fekete, C., . . . Stucki, G. (2011). Design of the Swiss Spinal Cord Injury Cohort Study. Am J Phys Med Rehabil, 90(11 Suppl 2), S5-16. doi:10.1097/PHM.0b013e318230fd41	Longitudinal time window too short
Putzke, J. D., Richards, J. S., Hicken, B. L., & DeVivo, M. J. (2002). Interference due to pain following spinal cord injury: important predictors and impact on quality of life. Pain, 100(3), 231-242.	Longitudinal time window too short
Singh, R., Dhankar, S. S., & Rohilla, R. (2008). Quality of life of people with spinal cord injury in Northern India. Int J Rehabil Res, 31(3), 247-251. doi:10.1097/MRR.0b013e3282fb7d25	Longitudinal time window too short
Smith, A. E., Molton, I. R., McMullen, K., & Jensen, M. P. (2015). Sexual Function, Satisfaction, and Use of Aids for Sexual Activity in Middle-Aged Adults with Long-Term Physical Disability. Top Spinal Cord Inj Rehabil, 21(3), 227-232. doi:10.1309/sci2103-227	longitudinal time window without multiple assessments
Sullivan, M., Paul, C. E., Herbison, G. P., Tamou, P., Derrett, S., & Crawford, M. (2010). A longitudinal study of the life histories of people with spinal cord injury. Inj Prev, 16(6), e3. doi:10.1136/ip.2010.028134	Longitudinal time window too short
Tate, D. G., Kalpakjian, C. Z., & Forchheimer, M. B. (2002). Quality of life issues in individuals with spinal cord injury. Arch Phys Med Rehabil, 83(12 Suppl 2), S18-25. doi:10.1053/apmr.2002.36835	Longitudinal time window without multiple assessments.
Tran, K., Hukins, C., Geraghty, T., Eckert, B., & Fraser, L. (2010). Sleep-disordered breathing in spinal cord-injured patients: a short-term longitudinal study. Respirology, 15(2), 272-276. doi:10.1111/j.1440-1843.2009.01669.x	Longitudinal time window too short
van Koppenhagen, C. F., Post, M., de Groot, S., van Leeuwen, C., van Asbeck, F., Stolwijk-Swuste, J., . . . Lindeman, E. (2014). Longitudinal relationship between wheelchair exercise capacity and life satisfaction in patients with spinal cord injury: A cohort study in the Netherlands. Journal of Spinal Cord Medicine, 37(3), 328-337. doi:10.1179/2045772313y.0000000167	**Included**
van Leeuwen, C. M., Post, M. W., Hoekstra, T., van der Woude, L. H., de Groot, S., Snoek, G. J., . . . Lindeman, E. (2011). Trajectories in the course of life satisfaction after spinal cord injury: identification and predictors. Arch Phys Med Rehabil, 92(2), 207-213. doi:10.1016/j.apmr.2010.10.011	**Included**
Vogel, L. C., Krajci, K. A., & Anderson, C. J. (2002). Adults with pediatric-onset spinal cord injury: part 1: prevalence of medical complications. J Spinal Cord Med, 25(2), 106-116.	No adults with required neurological injuries
Vogel, L. C., Krajci, K. A., & Anderson, C. J. (2002). Adults with pediatric-onset spinal cord injuries: part 3: impact of medical complications. J Spinal Cord Med, 25(4), 297-305.	No adults with required neurological injuries
Warren, L., Wrigley, J. M., Yoels, W. C., & Fine, P. R. (1996). Factors associated with life satisfaction among a sample of persons with neurotrauma. J Rehabil Res Dev, 33(4), 404-408.	Year of publication before 2000
Wielink, G., Essink-Bot, M. L., van Kerrebroeck, P. E., & Rutten, F. F. (1997). Sacral rhizotomies and electrical bladder stimulation in spinal cord injury. 2. Cost-effectiveness and quality of life analysis. Dutch Study Group on Sacral Anterior Root Stimulation. Eur Urol, 31(4), 441-446.	Primary aim is investigation of a specific intervention.

Spinal cord injury	
Article (WoK)	**Reason for exclusion**
Apkarian, A. V., Baliki, M. N., & Farmer, M. A. (2013). Predicting transition to chronic pain. *Current Opinion in Neurology, 26*(4), 360-367. doi:10.1097/WCO.0b013e32836336ad	No longitudinal design
Boakye, M., Leigh, B. C., & Skelly, A. C. (2012). Quality of life in persons with spinal cord injury: comparisons with other populations. *Journal of Neurosurgery-Spine, 17*, 29-37. doi:10.3171/2012.6.aospine1252	No longitudinal design
Chan, S. C. C., & Chan, A. P. S. (2005). Rehabilitation outcomes following traumatic spinal cord injury in a tertiary spinal cord injury centre: a comparison with an international standard. *Spinal Cord, 43*(8), 489-498. doi:10.1038/sj.sc.3101743	Longitudinal time window too short
Chan, S. C. C., & Chan, A. P. S. (2013). One-year follow-up of Chinese people with spinal cord injury: A preliminary study. *Journal of Spinal Cord Medicine, 36*(1), 12-23. doi:10.1179/1079026812z.00000000059	Longitudinal time window too short
Charlifue, S., & Gerhart, K. (2004). Changing psychosocial morbidity in people aging with spinal cord injury. *NeuroRehabilitation, 19*(1), 15-23.	No full text available
Corrigan, J. D., Bogner, J. A., Mysiw, W. J., Clinchot, D., & Fugate, L. (2001). Life satisfaction after traumatic brain injury. *Journal of Head Trauma Rehabilitation, 16*(6), 543-555.	Longitudinal time window too short
Cragg, J. J., Haefeli, J., Jutzeler, C. R., Rohrich, F., Weidner, N., Saur, M., . . . Kramer, J. K. (2016). Effects of Pain and Pain Management on Motor Recovery of Spinal Cord-Injured Patients: A Longitudinal Study. *Neurorehabilitation and Neural Repair, 30*(8), 753-761. doi:10.1177/1545968315624777	Longitudinal time window too short
Ditunno, P. L., Patrick, M., Stineman, M., & Ditunno, J. F. (2008). Who wants to walk? Preferences for recovery after SCI: a longitudinal and cross-sectional study. *Spinal Cord, 46*(7), 500-506. doi:10.1038/sj.sc.3102172	No specific QoL outcome measure
Eriks-Hoogland, I. E., Hoekstra, T., de Groot, S., Stucki, G., Post, M. W., & van der Woude, L. H. (2014). Trajectories of musculoskeletal shoulder pain after spinal cord injury: Identification and predictors. *Journal of Spinal Cord Medicine, 37*(3), 288-298. doi:10.1179/2045772313y.0000000168	No specific QoL outcome measure
Finnerup, N. B., Jensen, M. P., Norrbrink, C., Trok, K., Johannesen, I. L., Jensen, T. S., & Werhagen, L. (2016). A prospective study of pain and psychological functioning following traumatic spinal cord injury. *Spinal Cord, 54*(10), 816-821. doi:10.1038/sc.2015.236	No full text available
Fisher, C. G., Noonan, V. K., & Dvorak, M. F. (2006). Changing face of spine trauma care in North America. *Spine, 31*(11), S2-S8. doi:10.1097/01.brs.0000217948.02567.3a	No longitudinal design
Fogelberg, D. J., Hughes, A. J., Vitiello, M. V., Hoffman, J. M., & Amtmann, D. (2016). Comparison of Sleep Problems in Individuals with Spinal Cord Injury and Multiple Sclerosis. *Journal of Clinical Sleep Medicine, 12*(5), 695-701. doi:10.5664/jcsm.5798	No adults with required neurological injuries
Franceschini, M., Di Clemente, B., Rampello, A., Nora, M., & Spizzichino, L. (2003). Longitudinal outcome 6 years after spinal cord injury. *Spinal Cord, 41*(5), 280-285. doi:10.1038/sj.sc.3101457	**Included**
Hart, T., Whyte, J., Polansky, M., Kersey-Matusiak, G., & Fidler-Sheppard, R. (2005). Community outcomes following traumatic brain injury - Impact of race and preinjury status. *Journal of Head Trauma Rehabilitation, 20*(2), 158-172. doi:10.1097/00001199-200503000-00004	No adults with required neurological injuries
Hwang, M., Zebracki, K., Chlan, K. M., & Vogel, L. C. (2014). Longitudinal changes in medical complications in adults with pediatric-onset spinal cord injury. *Journal of Spinal Cord Medicine, 37*(2), 171-178. doi:10.1179/2045772313y.0000000150	No specific QoL outcome measure
Jensen, M. P., Smith, A. E., Alschuler, K. N., Gillanders, D. T., Amtmann, D., & Molton, I. R. (2016). The role of pain acceptance on function in individuals with disabilities: a longitudinal study. *Pain, 157*(1), 247-254. doi:10.1097/j.pain.0000000000000361	No adults with required neurological injuries
Kennedy, P., Lude, P., & Taylor, N. (2006). Quality of life, social participation, appraisals and coping post spinal cord injury: a review of four community samples. *Spinal Cord, 44*(2), 95-105. doi:10.1038/sj.sc.3101787	No longitudinal design
Kent, M. L., & Dorstyn, D. S. (2014). Psychological variables associated with employment following spinal cord injury: a meta-analysis. *Spinal Cord, 52*(10), 722-728. doi:10.1038/sc.2014.92	No longitudinal design
Ketchum, J. M., Getachew, M. A., Krch, D., Kolakowsky-Hayner, S. A., Banos, J. H., Lequerica, A., . . . Arango-Lasprilla, J. C. (2012). Characteristics associated with satisfaction with life 1 year post traumatic brain injury in a population of Hispanic individuals. *NeuroRehabilitation, 30*(1), 23-33. doi:10.3233/nre-2012-0724	Longitudinal time window too short
Kraft, R., & Dorstyn, D. (2015). Psychosocial correlates of depression following spinal injury: A systematic review. *Journal of Spinal Cord Medicine, 38*(5), 571-583. doi:10.1179/2045772314y.0000000295	No longitudinal design
Kratz, A. L., Chadd, E., Jensen, M. P., Kehn, M., & Kroll, T. (2015). An examination of the psychometric properties of the community integration questionnaire (CIQ) in spinal cord injury. *Journal of Spinal Cord Medicine, 38*(4), 446-455. doi:10.1179/2045772313y.0000000182	Methodological evaluation of an assessment tool
Krause, J. S., Saladin, L. K., & Adkins, R. H. (2009). Disparities in subjective well-being, participation, and health after spinal cord injury: A 6-year longitudinal study. *NeuroRehabilitation, 24*(1), 47-56. doi:10.3233/nre-2009-0453	No full tekst available
Matter, B., Feinberg, M., Schomer, K., Harniss, M., Brown, P., & Johnson, K. (2009). Information Needs of People With Spinal Cord Injuries. *Journal of Spinal Cord Medicine, 32*(5), 545-554.	No specific QoL outcome measure
Migliorini, C., Callaway, L., & New, P. (2013). Preliminary investigation into subjective well-being, mental health, resilience, and spinal cord injury. *Journal of Spinal Cord Medicine, 36*(6), 660-665. doi:10.1179/2045772313y.0000000100	Not enough participants at all time points
Mortenson, W. B., Noreau, L., & Miller, W. C. (2010). The relationship between and predictors of quality of life after spinal cord injury at 3 and 15 months after discharge. *Spinal Cord, 48*(1), 73-79. doi:10.1038/sc.2009.92	Longitudinal time window too short

Muller, R., Peter, C., Cieza, A., & Geyh, S. (2012). The role of social support and social skills in people with spinal cord injury-a systematic review of the literature. *Spinal Cord, 50*(2), 94-106. doi:10.1038/sc.2011.116	No longitudinal design
Nielsen, S. D., Faaborg, P. M., Christensen, P., Krogh, K., & Finnerup, N. B. (2017). Chronic abdominal pain in long-term spinal cord injury: a follow-up study. *Spinal Cord, 55*(3), 290-293. doi:10.1038/sc.2016.124	No specific QoL outcome measure
Post, M. W. M., & van Leeuwen, C. M. C. (2012). Psychosocial issues in spinal cord injury: a review. *Spinal Cord, 50*(5), 382-389. doi:10.1038/sc.2011.182	No longitudinal design
Putzke, J. D., Barrett, J. J., Richards, J. S., & DeVivo, M. J. (2003). Age and spinal cord injury: An emphasis on outcomes among the elderly. *Journal of Spinal Cord Medicine, 26*(1), 37-44.	No longitudinal design
Putzke, J. D., Barrett, J. J., Richards, J. S., Underhill, A. T., & LoBello, S. G. (2004). Life satisfaction following spinal cord injury: Long-term follow up. *Journal of Spinal Cord Medicine, 27*(2), 106-110.	No full texst available
Sakakibara, B. M., Hitzig, S. L., Miller, W. C., Eng, J. J., & Team, S. R. (2012). An evidence-based review on the influence of aging with a spinal cord injury on subjective quality of life. *Spinal Cord, 50*(8), 570-578. doi:10.1038/sc.2012.19	No longitudinal design
Salisbury, S. K., Nitz, J., & Souvlis, T. (2006). Shoulder pain following tetraplegia: a follow-up study 2-4 years after injury. *Spinal Cord, 44*(12), 723-728. doi:10.1038/sj.sc.3101908	No specific QoL outcome measure
Thietje, R., Giese, R., Kaphengst, C., Runde, P., & Schulz, A. P. (2010). Parameters for positive outcome of the in-hospital rehabilitation of spinal cord lesion patients: the Boberg Quality Score. *Spinal Cord, 48*(7), 537-541. doi:10.1038/sc.2009.171	Longitudinal time window too short
Tweedy, S. M., Beckman, E. M., Johnston, L. M., & Connick, M. J. (2016). Performance-Focussed Sport - An Avenue to Gold-Medal Clinical Outcomes for People with Neurological Impairments? *Brain Impairment, 17*(1), 99-110. doi:10.1017/BrImp.2016.5	No adults with required neurological injuries
van Leeuwen, C. M. C., Kraaijeveld, S., Lindeman, E., & Post, M. W. M. (2012). Associations between psychological factors and quality of life ratings in persons with spinal cord injury: a systematic review. *Spinal Cord, 50*(3), 174-187. doi:10.1038/sc.2011.120	No longitudinal design
Vassend, O., Quale, A. J., Roise, O., & Schanke, A. K. (2011). Predicting the long-term impact of acquired severe injuries on functional health status: the role of optimism, emotional distress and pain. *Spinal Cord, 49*(12), 1193-1197. doi:10.1038/sc.2011.70	No adults with required neurological injuries
Wen, H., Reinhardt, J. D., Gosney, J. E., Baumberger, M., Zhang, X., & Li, J. (2013). Spinal cord injury-related chronic pain in victims of the 2008 Sichuan earthquake: a prospective cohort study. *Spinal Cord, 51*(11), 857-862. doi:10.1038/sc.2013.59	Not enough participants at all time points

Traumatic brain injury	
Article (PubMed)	**Reason for exclusion**
Anderson, V., Brown, S., Newitt, H., & Hoile, H. (2011). Long-term outcome from childhood traumatic brain injury: intellectual ability, personality, and quality of life. Neuropsychology, 25(2), 176-184. doi:10.1037/a0021217	No longitudinal design
Beck, B. (2016). [Outcome in traumatic brain injury: Considered from a neurological viewpoint]. Unfallchirurg, 119(7), 554-559. doi:10.1007/s00113-016-0190-4	No longitudinal design
Bogner, J. A., Corrigan, J. D., Fugate, L., Mysiw, W. J., & Clinchot, D. (2001). Role of agitation in prediction of outcomes after traumatic brain injury. Am J Phys Med Rehabil, 80(9), 636-644.	Longitudinal time window too short
Boosman, H., Winkens, I., van Heugten, C. M., Rasquin, S. M., Heijnen, V. A., & Visser-Meily, J. M. (2017). Predictors of health-related quality of life and participation after brain injury rehabilitation: The role of neuropsychological factors. Neuropsychol Rehabil, 27(4), 581-598. doi:10.1080/09602011.2015.1113996	Longitudinal time window too short
Bressan, S., Takagi, M., Anderson, V., Davis, G. A., Oakley, E., Dunne, K., . . . Babl, F. E. (2016). Protocol for a prospective, longitudinal, cohort study of postconcussive symptoms in children: the Take C.A.Re (Concussion Assessment and Recovery Research) study. BMJ Open, 6(1), e009427. doi:10.1136/bmjopen-2015-009427	No adults with required neurological injuries
Catroppa, C., Stone, K., Hearps, S. J., Soo, C., Anderson, V., & Rosema, S. (2015). Evaluation of an attention and memory intervention post-childhood acquired brain injury: Preliminary efficacy, immediate and 6 months post-intervention. Brain Inj, 29(11), 1317-1324. doi:10.3109/02699052.2015.1043345	Longitudinal time window too short
Cieza, A., Bostan, C., Ayuso-Mateos, J. L., Oberhauser, C., Bickenbach, J., Raggi, A., . . . Chatterji, S. (2013). The psychosocial difficulties in brain disorders that explain short term changes in health outcomes. BMC Psychiatry, 13, 78. doi:10.1186/1471-244x-13-78	Longitudinal time window too short
Crowe, L., Collie, A., Hearps, S., Dooley, J., Clausen, H., Maddocks, D., . . . Anderson, V. (2016). Cognitive and physical symptoms of concussive injury in children: a detailed longitudinal recovery study. Br J Sports Med, 50(5), 311-316. doi:10.1136/bjsports-2015-094663	No adults with required neurological injuries
Davis, L. C., Sherer, M., Sander, A. M., Bogner, J. A., Corrigan, J. D., Dijkers, M. P., . . . Seel, R. T. (2012). Preinjury predictors of life satisfaction at 1 year after traumatic brain injury. Arch Phys Med Rehabil, 93(8), 1324-1330. doi:10.1016/j.apmr.2012.02.036	Longitudinal time window too short
Dikmen, S. S., Ross, B. L., Machamer, J. E., & Temkin, N. R. (1995). One year psychosocial outcome in head injury. J Int Neuropsychol Soc, 1(1), 67-77.	Longitudinal time window too short
Gould, K. R., & Ponsford, J. L. (2015). A longitudinal examination of positive changes in quality-of-life after traumatic brain injury. Brain Inj, 29(3), 283-290. doi:10.3109/02699052.2014.974671	Longitudinal time window without multiple assessments
Gregorio, G. W., Gould, K. R., Spitz, G., van Heugten, C. M., & Ponsford, J. L. (2014). Changes in self-reported pre- to postinjury coping styles in the first 3 years after traumatic brain injury and the effects on psychosocial and emotional functioning and quality of life. J Head Trauma Rehabil, 29(3), E43-53. doi:10.1097/HTR.0b013e318292fb00	No full text available
Hibbard, M. R., Ashman, T. A., Spielman, L. A., Chun, D., Charatz, H. J., & Melvin, S. (2004). Relationship between depression and psychosocial functioning after traumatic brain injury. Arch Phys Med Rehabil, 85(4 Suppl 2), S43-53.	Longitudinal time window without multiple assessments
Johansson, U., & Bernspang, B. (2003). Life satisfaction related to work re-entry after brain injury: a longitudinal study. Brain Inj, 17(11), 991-1002.	Not enough participants at all time points
Juengst, S. B., Adams, L. M., Bogner, J. A., Arenth, P. M., O'Neil-Pirozzi, T. M., Dreer, L. E., . . . Wagner, A. K. (2015). Trajectories of life satisfaction after traumatic brain injury: Influence of life roles, age, cognitive disability, and depressive symptoms. Rehabil Psychol, 60(4), 353-364. doi:10.1037/rep0000056	**Included**
Kashluba, S., Paniak, C., Blake, T., Reynolds, S., Toller-Lobe, G., & Nagy, J. (2004). A longitudinal, controlled study of patient complaints following treated mild traumatic brain injury. Arch Clin Neuropsychol, 19(6), 805-816. doi:10.1016/j.acn.2003.09.005	Longitudinal time window too short
Levac, D., DeMatteo, C., Hanna, S., & Wishart, L. (2008). Intra-individual variability in recovery from paediatric acquired brain injury: relationship to outcomes at 1 year. *Dev Neurorehabil, 11*(3), 195-203. doi:10.1080/17518420802055177	Longitudinal time window too short
Lin, M. R., Chiu, W. T., Chen, Y. J., Yu, W. Y., Huang, S. J., & Tsai, M. D. (2010). Longitudinal changes in the health-related quality of life during the first year after traumatic brain injury. *Arch Phys Med Rehabil, 91*(3), 474-480. doi:10.1016/j.apmr.2009.10.031	Longitudinal time window too short
Lin, Y. N., Chu, S. F., Liang, W. M., Chiu, W. T., & Lin, M. R. (2014). Validation of the quality of life after brain injury in Chinese persons with traumatic brain injury in Taiwan. *J Head Trauma Rehabil, 29*(1), E37-47. doi:10.1097/HTR.0b013e3182816363	Methodological evaluation of an assessment tool
Lobello, S. G., Underhill, A. T., & Fine, P. R. (2004). The reliability and validity of the Life Satisfaction Index-A with survivors of traumatic brain injury. *Brain Inj, 18*(11), 1127-1134. doi:10.1080/02699050410001672378	Methodological evaluation of an assessment tool
Mutschler, W. (2016). [What do we know about the long-term fate of seriously injured?]. *Unfallchirurg, 119*(7), 544-545. doi:10.1007/s00113-016-0191-3	No adults with required neurological injuries
Mutschler, W., Mutschler, M., Graw, M., & Lefering, R. (2016). [Long-term survival after severe trauma]. *Unfallchirurg, 119*(7), 546-553. doi:10.1007/s00113-016-0185-1	Longitudinal time window too short
Norup, A., & Mortensen, E. L. (2015). Prevalence and predictors of personality change after severe brain injury. *Arch Phys Med Rehabil, 96*(1), 56-62. doi:10.1016/j.apmr.2014.08.009	Not enough participants at all time points
Norup, A., Petersen, J., & Mortensen, E. L. (2015). Relatives of patients with severe brain injury: Growth curve analysis of anxiety and depression the first year after injury. *Brain Inj, 29*(7-8), 822-829. doi:10.3109/02699052.2015.1016451	Longitudinal time window too short

Novack, T. A., Labbe, D., Grote, M., Carlson, N., Sherer, M., Arango-Lasprilla, J. C., . . . Seel, R. T. (2010). Return to driving within 5 years of moderate-severe traumatic brain injury. *Brain Inj, 24*(3), 464-471. doi:10.3109/02699051003601713	No specific QoL outome measure
O'Donnell, M. L., Creamer, M., Elliott, P., Atkin, C., & Kossmann, T. (2005). Determinants of quality of life and role-related disability after injury: impact of acute psychological responses. *J Trauma, 59*(6), 1328-1334; discussion 1334-1325.	Longitudinal time window too short
Pagulayan, K. F., Temkin, N. R., Machamer, J., & Dikmen, S. S. (2006). A longitudinal study of health-related quality of life after traumatic brain injury. *Arch Phys Med Rehabil, 87*(5), 611-618. doi:10.1016/j.apmr.2006.01.018	**Included**
Petersen, C., Scherwath, A., Fink, J., & Koch, U. (2008a). Health-related quality of life and psychosocial consequences after mild traumatic brain injury in children and adolescents. *Brain Inj, 22*(3), 215-221. doi:10.1080/02699050801935245	No adults with required neurological injuries
Petersen, C., Scherwath, A., Fink, J., & Koch, U. (2008b). [Health care needs of children and adolescents with a traumatic brain injury]. *Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz, 51*(6), 629-636. doi:10.1007/s00103-008-0536-3	No adults with required neurological injuries
Pieper, P., & Garvan, C. (2015). Concordance of Child and Parent Reports of Health-Related Quality of Life in Children With Mild Traumatic Brain or Non-Brain Injuries and in Uninjured Children: Longitudinal Evaluation. *J Pediatr Health Care, 29*(4), 343-351. doi:10.1016/j.pedhc.2015.01.008	No adults with required neurological injuries
Renaud, M. I., Lambregts, S. A., de Kloet, A. J., Catsman-Berrevoets, C. E., van de Port, I. G., & van Heugten, C. M. (2016). Activities and participation of children and adolescents after mild traumatic brain injury and the effectiveness of an early intervention (Brains Ahead!): study protocol for a cohort study with a nested randomised controlled trial. *Trials, 17*(1), 236. doi:10.1186/s13063-016-1357-6	No adults with required neurological injuries
Resch, J. A., Villarreal, V., Johnson, C. L., Elliott, T. R., Kwok, O. M., Berry, J. W., & Underhill, A. T. (2009). Trajectories of life satisfaction in the first 5 years following traumatic brain injury. *Rehabil Psychol, 54*(1), 51-59	**Included**
Richardson, C., McKay, A., & Ponsford, J. L. (2014). The trajectory of awareness across the first year after traumatic brain injury: the role of biopsychosocial factors. *Brain Inj, 28*(13-14), 1711-1720. doi:10.3109/02699052.2014.954270	Longitudinal time window too short
Riley, G. A., Hough, A., Meader, L. M., & Brennan, A. J. (2015). The course and impact of family optimism in the post-acute period after acquired brain injury. *Brain Inj, 29*(7-8), 804-812. doi:10.3109/02699052.2015.1004754	Longitudinal time window too short
Seibert, P. S., Reedy, D. P., Hash, J., Webb, A., Stridh-Igo, P., Basom, J., & Zimmerman, C. G. (2002). Brain injury: quality of life's greatest challenge. *Brain Inj, 16*(10), 837-848. doi:10.1080/02699050210131939	Not enough participants at all time points
Smeets, S. M., Vink, M., Ponds, R. W., Winkens, I., & van Heugten, C. M. (2017). Changes in impaired self-awareness after acquired brain injury in patients following intensive neuropsychological rehabilitation. *Neuropsychol Rehabil, 27*(1), 116-132. doi:10.1080/09602011.2015.1077144	Primary aim is investigation of a specific intervention
Tham, S. W., Palermo, T. M., Wang, J., Jaffe, K. M., Temkin, N., Durbin, D., & Rivara, F. P. (2013). Persistent pain in adolescents following traumatic brain injury. *J Pain, 14*(10), 1242-1249. doi:10.1016/j.jpain.2013.05.007	No adults with required neurological injuries
Thomas, M. (2004). The Potential Unlimited Programme: an outdoor experiential education and group work approach that facilitates adjustment to brain injury. *Brain Inj, 18*(12), 1271-1286.	Primary aim is investigation of a specific intervention
Thompson, H. J. (2009). A critical analysis of measures of caregiver and family functioning following traumatic brain injury. *J Neurosci Nurs, 41*(3), 148-158.	No longitudinal design
Tomberg, T., Toomela, A., Ennok, M., & Tikk, A. (2007). Changes in coping strategies, social support, optimism and health-related quality of life following traumatic brain injury: a longitudinal study. *Brain Inj, 21*(5), 479-488. doi:10.1080/02699050701311737	Not enough participants at all time points
Underhill, A. T., Lobello, S. G., Stroud, T. P., Terry, K. S., Devivo, M. J., & Fine, P. R. (2003). Depression and life satisfaction in patients with traumatic brain injury: a longitudinal study. *Brain Inj, 17*(11), 973-982.	**Included**
Warren, L., Wrigley, J. M., Yoels, W. C., & Fine, P. R. (1996). Factors associated with life satisfaction among a sample of persons with neurotrauma. *J Rehabil Res Dev, 33*(4), 404-408.	Longitudinal time window too short
Williams, M. W., Rapport, L. J., Millis, S. R., & Hanks, R. A. (2014). Psychosocial outcomes after traumatic brain injury: life satisfaction, community integration, and distress. *Rehabil Psychol, 59*(3), 298-305. doi:10.1037/a0037164	Longitudinal time window without multiple assessments
Williamson, M. L., Elliott, T. R., Berry, J. W., Underhill, A. T., Stavrinos, D., & Fine, P. R. (2013). Predictors of health-related quality-of-life following traumatic brain injury. *Brain Inj, 27*(9), 992-999. doi:10.3109/02699052.2013.801512	**Included**

Traumatic brain injury	
Article (WoK)	**Reason for exclusion**
Andelic, N., Arango-Lasprilla, J. C., Perrin, P. B., Sigurdardottir, S., Lu, J., Landa, L. O., . . . Roe, C. (2016). Modeling of Community Integration Trajectories in the First Five Years after Traumatic Brain Injury. *Journal of Neurotrauma, 33*(1), 95-100. doi:10.1089/neu.2014.3844	No specific QoL outcome measure
Andelic, N., Perrin, P. B., Forslund, M. V., Soberg, H. L., Sigurdardottir, S., Sveen, U., . . . Roe, C. (2015). Trajectories of physical health in the first 5 years after traumatic brain injury. *J Neurol, 262*(3), 523-531. doi:10.1007/s00415-014-7595-1	**Included**
Arango-Lasprilla, J. C., Ketchum, J. M., Gary, K., Hart, T., Corrigan, J., Forster, L., & Mascialino, G. (2009). Race/ethnicity differences in satisfaction with life among persons with traumatic brain injury. *NeuroRehabilitation, 24*(1), 5-14. doi:10.3233/nre-2009-0449	Longitudinal time window too short
Baptiste, B., Dawson, D. R., & Streiner, D. (2015). Predicting use of case management support services for adolescents and adults living in community following brain injury: A longitudinal Canadian database study with implications for life care planning. *NeuroRehabilitation, 36*(3), 301-312. doi:10.3233/nre-151218	No specific QoL outcome measure
Behan, L. A., Phillips, J., Thompson, C. J., & Agha, A. (2008). Neuroendocrine disorders after traumatic brain injury. *Journal of Neurology Neurosurgery and Psychiatry, 79*(7), 753-759. doi:10.1136/jnnp.2007.132837	Longitudinal time window too short
Corrigan, J. D., Bogner, J. A., Mysiw, W. J., Clinchot, D., & Fugate, L. (2001). Life satisfaction after traumatic brain injury. *Journal of Head Trauma Rehabilitation, 16*(6), 543-555.	Longitudinal time window too short
Fleming, J., Liddle, J., Nalder, E., Weir, N., & Cornwell, P. (2014). Return to driving in the first 6 months of community integration after acquired brain injury. *NeuroRehabilitation, 34*(1), 157-166. doi:10.3233/nre-131012	Longitudinal time window too short
Hart, T., Whyte, J., Polansky, M., Kersey-Matusiak, G., & Fidler-Sheppard, R. (2005). Community outcomes following traumatic brain injury - Impact of race and preinjury status. *Journal of Head Trauma Rehabilitation, 20*(2), 158-172. doi:10.1097/00001199-200503000-00004	Longitudinal time window too short
Hoffman, J. M., Lucas, S., Dikmen, S., Braden, C. A., Brown, A. W., Brunner, R., . . . Bell, K. R. (2011). Natural History of Headache after Traumatic Brain Injury. *Journal of Neurotrauma, 28*(9), 1719-1725. doi:10.1089/neu.2011.1914	Longitudinal time window too short
Ketchum, J. M., Getachew, M. A., Krch, D., Kolakowsky-Hayner, S. A., Banos, J. H., Lequerica, A., . . . Arango-Lasprilla, J. C. (2012). Characteristics associated with satisfaction with life 1 year post traumatic brain injury in a population of Hispanic individuals. *NeuroRehabilitation, 30*(1), 23-33. doi:10.3233/nre-2012-0724	Longitudinal time window too short
Kratz, A. L., Chadd, E., Jensen, M. P., Kehn, M., & Kroll, T. (2015). An examination of the psychometric properties of the community integration questionnaire (CIQ) in spinal cord injury. *Journal of Spinal Cord Medicine, 38*(4), 446-455. doi:10.1179/2045772313y.0000000182	Longitudinal time window too short
Losoi, H., Silverberg, N. D., Waljas, M., Turunen, S., Rosti-Otajarvi, E., Helminen, M., . . . Iverson, G. L. (2016). Recovery from Mild Traumatic Brain Injury in Previously Healthy Adults. *Journal of Neurotrauma, 33*(8), 766-776. doi:10.1089/neu.2015.4070	Longitudinal time window too short
Maas, A. I. R., Menon, D. K., Steyerberg, E. W., Citerio, G., Lecky, F., Manley, G. T., . . . Participants, C.-T. (2015). Collaborative European NeuroTrauma Effectiveness Research in Traumatic Brain Injury (CENTER-TBI): A Prospective Longitudinal Observational Study. *Neurosurgery, 76*(1), 67-80. doi:10.1227/neu.0000000000000575	Longitudinal time window too short
Pagulayan, K. F., Temkin, N. R., Machamer, J. E., & Dikmen, S. S. (2007). The measurement and magnitude of awareness difficulties after traumatic brain injury: A longitudinal study. *Journal of the International Neuropsychological Society, 13*(4), 561-570. doi:10.1017/s1355617707070713	Longitudinal time window too short
Rao, V., Koliatsos, V., Ahmed, F., Lyketsos, C., & Kortte, K. (2015). Neuropsychiatric Disturbances Associated with Traumatic Brain Injury: A Practical Approach to Evaluation and Management. *Seminars in Neurology, 35*(1), 64-82. doi:10.1055/s-0035-1544241	No longitudinal design
Shear, D. A., Lu, X. C. M., Bombard, M. C., Pedersen, R., Chen, Z. Y., Davis, A., & Tortella, F. C. (2010). Longitudinal Characterization of Motor and Cognitive Deficits in a Model of Penetrating Ballistic-Like Brain Injury. *Journal of Neurotrauma, 27*(10), 1911-1923. doi:10.1089/neu.2010.1399	Longitudinal time window too short
Strauss, S. B., Kim, N., Branch, C. A., Kahn, M. E., Kim, M., Lipton, R. B., . . . Lipton, M. L. (2016). Bidirectional Changes in Anisotropy Are Associated with Outcomes in Mild Traumatic Brain Injury. *American Journal of Neuroradiology, 37*(11), 1983-1991. doi:10.3174/ajnr.A4851	Longitudinal time window too short
von Steinbuechel, N., Richter, S., Morawetz, C., & Riemsma, R. (2005). Assessment of subjective health and health-related quality of life in persons with acquired or degenerative brain injury. *Current Opinion in Neurology, 18*(6), 681-691. doi:10.1097/01.wco.0000194140.56429.75	No longitudinal design

Multiple sclerosis	
Articles (PubMed)	**Reason for exclusion**
Absoud, M., Cummins, C., Chong, W. K., De Goede, C., Foster, K., Gunny, R., . . . Wassmer, E. (2011). Paediatric UK demyelinating disease longitudinal study (PUDDLS). BMC Pediatr, 11, 68. doi:10.1186/1471-2431-11-68	No adults with required neurological injuries
Amtmann, D., Bamer, A. M., Cook, K. F., Askew, R. L., Noonan, V. K., & Brockway, J. A. (2012). University of Washington self-efficacy scale: a new self-efficacy scale for people with disabilities. Arch Phys Med Rehabil, 93(10), 1757-1765. doi:10.1016/j.apmr.2012.05.001	Methodological evaluation of an assessment tool
Arnoldus, J. H., Killestein, J., Pfennings, L. E., Jelles, B., Uitdehaag, B. M., & Polman, C. H. (2000). Quality of life during the first 6 months of interferon-beta treatment in patients with MS. Mult Scler, 6(5), 338-342. doi:10.1177/135245850000600508	Primary aim is investigation of a specific intervention
Baumstarck, K., Pelletier, J., Boucekine, M., & Auquier, P. (2015). Predictors of quality of life in patients with relapsing-remitting multiple sclerosis: a 2-year longitudinal study. Rev Neurol (Paris), 171(2), 173-180. doi:10.1016/j.neurol.2014.09.005	Longitudinal time window too short
Baumstarck, K., Pelletier, J., Butzkueven, H., Fernandez, O., Flachenecker, P., Idiman, E., . . . Auquier, P. (2013). Health-related quality of life as an independent predictor of long-term disability for patients with relapsing-remitting multiple sclerosis. Eur J Neurol, 20(6), 907-914, e978-909. doi:10.1111/ene.12087	Longitudinal time window too short
Baumstarck, K., Butzkueven, H., Fernandez, O., Flachenecker, P., Stecchi, S., Idiman, E., . . . Auquier, P. (2013). Responsiveness of the Multiple Sclerosis International Quality of Life questionnaire	Methodological evaluation of an assessment tool
Boucekine, M., Loundou, A., Baumstarck, K., Minaya-Flores, P., Pelletier, J., Ghattas, B., & Auquier, P. (2013). Using the random forest method to detect a response shift in the quality of life of multiple sclerosis patients: a cohort study. BMC Med Res Methodol, 13, 20. doi:10.1186/1471-2288-13-20	Methodological evaluation of an assessment tool
Brochet, B., Deloire, M. S., Ouallet, J. C., Salort, E., Bonnet, M., Jove, J., & Petry, K. G. (2009). Pain and quality of life in the early stages after multiple sclerosis diagnosis: a 2-year longitudinal study. Clin J Pain, 25(3), 211-217. doi:10.1097/AJP.0b013e3181891347	Longitudinal time window too short
Chruzander, C., Ytterberg, C., Gottberg, K., Einarsson, U., Widen Holmqvist, L., & Johansson, S. (2014). A 10-year follow-up of a population-based study of people with multiple sclerosis in Stockholm, Sweden: changes in health-related quality of life and the value of different factors in predicting health-related quality of life. J Neurol Sci, 339(1-2), 57-63. doi:10.1016/j.jns.2014.01.020	**Included**
Cieza, A., Bostan, C., Ayuso-Mateos, J. L., Oberhauser, C., Bickenbach, J., Raggi, A., . . . Chatterji, S. (2013). The psychosocial difficulties in brain disorders that explain short term changes in health outcomes. BMC Psychiatry, 13, 78. doi:10.1186/1471-244x-13-78	Longitudinal time window too short
Clingerman, E., Stuifbergen, A., & Becker, H. (2004). The influence of resources on perceived functional limitations among women with multiple sclerosis. J Neurosci Nurs, 36(6), 312-321.	Longitudinal time window too short
Cohen, M., Lebrun, C., Aufauvre, D., Chanalet, S., Filleau-Bertogliatti, C., Camu, W., . . . Clavelou, P. (2010). [Longitudinal study of health related quality of life in multiple sclerosis: correlation with MRI parameters]. Rev Neurol (Paris), 166(11), 894-900. doi:10.1016/j.neurol.2010.06.002	Longitudinal time window too short
Cutajar, R., Ferriani, E., Scandellari, C., Sabattini, L., Trocino, C., Marchello, L. P., & Stecchi, S. (2000). Cognitive function and quality of life in multiple sclerosis patients. J Neurovirol, 6 Suppl 2, S186-190.	No full text available
de Groot, V., Beckerman, H., Twisk, J. W., Uitdehaag, B. M., Hintzen, R. Q., Minneboo, A., . . . Bouter, L. M. (2008). Vitality, perceived social support and disease activity determine the performance of social roles in recently diagnosed multiple sclerosis: a longitudinal analysis. J Rehabil Med, 40(2), 151-157. doi:10.2340/16501977-0145	**Included**
Di Fabio, R. P., Choi, T., Soderberg, J., & Hansen, C. R. (1997). Health-related quality of life for patients with progressive multiple sclerosis: influence of rehabilitation. Phys Ther, 77(12), 1704-1716.	Year of publication before 2000
Edgar, C., Jongen, P. J., Sanders, E., Sindic, C., Goffette, S., Dupuis, M., . . . Wesnes, K. (2011). Cognitive performance in relapsing remitting multiple sclerosis: a longitudinal study in daily practice using a brief computerized cognitive battery. BMC Neurol, 11, 68. doi:10.1186/1471-2377-11-68	Longitudinal time window to short
Freedman, M. S., Bar-Or, A., Oger, J., Traboulsee, A., Patry, D., Young, C., . . . Verco, T. (2011). A phase III study evaluating the efficacy and safety of MBP8298 in secondary progressive MS. Neurology, 77(16), 1551-1560. doi:10.1212/WNL.0b013e318233b240	Primary aim is investigation of a specific intervention
Freidel, M., Ortler, S., Fuchs, A., Seibert, S., & Schuh, K. (2015). Acceptance of the extracare program by Beta interferon-treated patients with multiple sclerosis: results of the explore study. J Neurosci Nurs, 47(1), E31-39. doi:10.1097/jnn.0000000000000100	Primary aim is investigation of a specific intervention
Frodin, U., Borjeson, S., Lyth, J., & Lotfi, K. (2011). A prospective evaluation of patients' health-related quality of life during auto-SCT: a 3-year follow-up. Bone Marrow Transplant, 46(10), 1345-1352. doi:10.1038/bmt.2010.304	Primary aim was investigation of a specific intervention
Giordano, A., Ferrari, G., Radice, D., Randi, G., Bisanti, L., & Solari, A. (2012). Health-related quality of life and depressive symptoms in significant others of people with multiple sclerosis: a community study. Eur J Neurol, 19(6), 847-854. doi:10.1111/j.1468-1331.2011.03638.x	No adults with required neurological injuries
Giordano, A., Pucci, E., Naldi, P., Mendozzi, L., Milanese, C., Tronci, F., . . . Solari, A. (2009). Responsiveness of patient reported outcome measures in multiple sclerosis relapses: the REMS study. J Neurol Neurosurg Psychiatry, 80(9), 1023-1028. doi:10.1136/jnnp.2008.171181	Methodological evaluation of an assessment tool

Gold, S. M., Schulz, H., Stein, H., Solf, K., Schulz, K. H., & Heesen, C. (2010). Responsiveness of patient-based and external rating scales in multiple sclerosis: head-to-head comparison in three clinical settings. J Neurol Sci, 290(1-2), 102-106. doi:10.1016/j.jns.2009.10.020	Methodological evaluation of an assessment tool
Goodwin, E., & Green, C. (2015). A Quality-Adjusted Life-Year Measure for Multiple Sclerosis: Developing a Patient-Reported Health State Classification System for a Multiple Sclerosis-Specific Preference-Based Measure. Value Health, 18(8), 1016-1024. doi:10.1016/j.jval.2015.07.002	Methodological evaluation of an assessment tool
Gottberg, K., Chruzander, C., Einarsson, U., Fredrikson, S., Johansson, S., & Widen Holmqvist, L. (2014). Health-related quality of life in partners of persons with MS: a longitudinal 10-year perspective. BMJ Open, 4(12), e006097. doi:10.1136/bmjopen-2014-006097	No adults with required neurological injuries
Guimaraes, F. A., Oliveira-Cardoso, E. A., Mastropietro, A. P., Voltarelli, J. C., & Santos, M. A. (2010). Impact of autologous hematopoetic stem cell transplantation on the quality of life of patients with multiple sclerosis. Arq Neuropsiquiatr, 68(4), 522-527.	Primary aim is investigation of a specific intervention
Gulick, E. E. (1997). Correlates of quality of life among persons with multiple sclerosis. Nurs Res, 46(6), 305-311.	Year of publication before 2000
Haupts, M., Elias, G., Hardt, C., Langenbahn, H., Obert, H., Pohlau, D., . . . von Wussow, P. (2003). [Quality of life in patients with remitting-relapsing multiple sclerosis in Germany]. Nervenarzt, 74(2), 144-150. doi:10.1007/s00115-002-1446-5	Longitudinal time window too short
Hawton, A., Green, C., Telford, C., Zajicek, J., & Wright, D. (2012). Using the Multiple Sclerosis Impact Scale to estimate health state utility values: mapping from the MSIS-29, version 2, to the EQ-5D and the SF-6D. Value Health, 15(8), 1084-1091. doi:10.1016/j.jval.2012.07.007	Methodological evaluation of an assessment tool
Hayton, T., Furby, J., Smith, K. J., Altmann, D. R., Brenner, R., Chataway, J., . . . Kapoor, R. (2012). Clinical and imaging correlates of the multiple sclerosis impact scale in secondary progressive multiple sclerosis. J Neurol, 259(2), 237-245. doi:10.1007/s00415-011-6151-5	Longitudinal time window too short
Hopman, W. M., Coo, H., Edgar, C. M., McBride, E. V., Day, A. G., & Brunet, D. G. (2007). Factors associated with health-related quality of life in multiple sclerosis. Can J Neurol Sci, 34(2), 160-166.	Longitudinal time window without multiple assessments
Hopman, W. M., Coo, H., Pavlov, A., Day, A. G., Edgar, C. M., McBride, E. V., & Brunet, D. G. (2009). Multiple sclerosis: change in health-related quality of life over two years. Can J Neurol Sci, 36(5), 554-561.	Longitudinal time window too short
Hughes, A. J., Beier, M., Hartoonian, N., Turner, A. P., Amtmann, D., & Ehde, D. M. (2015). Self-efficacy as a longitudinal predictor of perceived cognitive impairment in individuals with multiple sclerosis. Arch Phys Med Rehabil, 96(5), 913-919. doi:10.1016/j.apmr.2015.01.008	No specific QOL outcome measure
Jongen, P. J., Heerings, M., Lemmens, W. A., Donders, R., van der Zande, A., van Noort, E., & Kool, A. (2015). A prospective web-based patient-centred interactive study of long-term disabilities, disabilities perception and health-related quality of life in patients with multiple sclerosis in The Netherlands: the Dutch Multiple Sclerosis Study protocol. BMC Neurol, 15, 128. doi:10.1186/s12883-015-0379-0	Longitudinal time window too short
Jongen, P. J., Lehnick, D., Koeman, J., Frequin, S., Heersema, D., Kornips, B., . . . Hiel, J. (2014). Fatigue and health-related quality of life in relapsing-remitting multiple sclerosis after 2 years glatiramer acetate treatment are predicted by changes at 6 months: an observational multi-center study. J Neurol, 261(8), 1469-1476. doi:10.1007/s00415-014-7363-2	Primary aim is investigation of a specific intervention
Jongen, P. J., Sindic, C., Carton, H., Zwanikken, C., Lemmens, W., & Borm, G. (2010). Improvement of health-related quality of life in relapsing remitting multiple sclerosis patients after 2 years of treatment with intramuscular interferon-beta-1a. J Neurol, 257(4), 584-589. doi:10.1007/s00415-009-5378-x	Primary aim is investigation of a specific intervention
Kapoor, S. (2013). Commentary on: predictive value of health-related quality of life in progression of disability and depression in persons with multiple sclerosis: a 3-year study. Acta Neurol Belg, 113(3), 367. doi:10.1007/s13760-013-0209-3	Longitudinal time window too short
Khan, F., Amatya, B., & Kesselring, J. (2013). Longitudinal 7-year follow-up of chronic pain in persons with multiple sclerosis in the community. J Neurol, 260(8), 2005-2015. doi:10.1007/s00415-013-6925-z	**Included**
Levy, S. S., Li, K. K., Cardinal, B. J., & Maddalozzo, G. F. (2009). Transitional shifts in exercise behavior among women with multiple sclerosis. Disabil Health J, 2(4), 216-223. doi:10.1016/j.dhjo.2009.04.001	Longitudinal time window too short
Li, M. P., Jelinek, G. A., Weiland, T. J., Mackinlay, C. A., Dye, S., & Gawler, I. (2010). Effect of a residential retreat promoting lifestyle modifications on health-related quality of life in people with multiple sclerosis. Qual Prim Care, 18(6), 379-389.	Primary aim is investigation of a specific intervention
Mendes, M. F., Balsimelli, S., Stangehaus, G., & Tilbery, C. P. (2004). [Validation of the functional assessment of multiple sclerosis quality of life instrument in a Portuguese language]. Arq Neuropsiquiatr, 62(1), 108-113.	Other language
Minden, S. L., Frankel, D., Hadden, L. S., Srinath, K. P., & Perloff, J. N. (2004). Disability in elderly people with multiple sclerosis: An analysis of baseline data from the Sonya Slifka Longitudinal Multiple Sclerosis Study. Neurorehabilitation, 19(1), 55-67.	Longitudinal time window without multiple assessments
Morales-Gonzales, J. M., Benito-Leon, J., Rivera-Navarro, J., & Mitchell, A. J. (2004). A systematic approach to analyse health-related quality of life in multiple sclerosis: the GEDMA study. Mult Scler, 10(1), 47-54. doi:10.1191/1352458504ms967oa	Longitudinal time window too short
Motl, R. W., & McAuley, E. (2010). Symptom cluster and quality of life: preliminary evidence in multiple sclerosis. J Neurosci Nurs, 42(4), 212-216.	Longitudinal time window too short

Neuteboom, R. F., Janssens, A. C., Siepman, T. A., Hoppenbrouwers, I. A., Ketelslegers, I. A., Jafari, N., . . . Hintzen, R. Q. (2012). Pregnancy in multiple sclerosis: clinical and self-report scales. J Neurol, 259(2), 311-317. doi:10.1007/s00415-011-6186-7	Longitudinal time window too short
O'Connor, E. J., & McCabe, M. P. (2011). Predictors of quality of life in carers for people with a progressive neurological illness: a longitudinal study. Qual Life Res, 20(5), 703-711. doi:10.1007/s11136-010-9804-4	No adults with required neurological injuries
O'Connor, P., Lee, L., Ng, P. T., Narayana, P., & Wolinsky, J. S. (2001). Determinants of overall quality of life in secondary progressive MS: a longitudinal study. Neurology, 57(5), 889-891.	Longitudinal time window too short
Orbach, R., Zhao, Z., Wang, Y. C., O'Neill, G., & Cadavid, D. (2012). Comparison of disease activity in SPMS and PPMS in the context of multicenter clinical trials. PLoS One, 7(10), e45409. doi:10.1371/journal.pone.0045409	Longitudinal time window too short
Pakenham, K. I. (2007). The nature of caregiving in multiple sclerosis: development of the caregiving tasks in multiple sclerosis scale. Mult Scler, 13(7), 929-938. doi:10.1177/1352458507076973	No adults with required neurological injuries
Pakenham, K. I., & Cox, S. (2009). The dimensional structure of benefit finding in multiple sclerosis and relations with positive and negative adjustment: A longitudinal study. Psychol Health, 24(4), 373-393. doi:10.1080/08870440701832592	Longitudinal time window too short
Patrick, E., Christodoulou, C., & Krupp, L. B. (2009). Longitudinal correlates of fatigue in multiple sclerosis. Mult Scler, 15(2), 258-261. doi:10.1177/1352458508097466	Longitudinal time window too short
Patti, F., Amato, M. P., Trojano, M., Bastianello, S., Tola, M. R., Picconi, O., . . . Grimaldi, L. M. (2012). Longitudinal changes in social functioning in mildly disabled patients with relapsing-remitting multiple sclerosis receiving subcutaneous interferon beta-1a: results from the COGIMUS (COGnitive Impairment in MUltiple Sclerosis) study (II). Qual Life Res, 21(7), 1111-1121. doi:10.1007/s11136-011-0021-6	Primary aim is investigation of a specific intervention
Patti, F., Pappalardo, A., Montanari, E., Pesci, I., Barletta, V., & Pozzilli, C. (2014). Interferon-beta-1a treatment has a positive effect on quality of life of relapsing-remitting multiple sclerosis: results from a longitudinal study. J Neurol Sci, 337(1-2), 180-185. doi:10.1016/j.jns.2013.12.006	Primary aim is investigation of a specific intervention
Pozzilli, C., Schweikert, B., Ecari, U., Oentrich, W., & Bugge, J. P. (2012). Quality of life and depression in multiple sclerosis patients: longitudinal results of the BetaPlus study. J Neurol, 259(11), 2319-2328. doi:10.1007/s00415-012-6492-8	Longitudinal time window too short
Rapkin, B. D., & Schwartz, C. E. (2016). Distilling the essence of appraisal: a mixed methods study of people with multiple sclerosis. Qual Life Res, 25(4), 793-805. doi:10.1007/s11136-015-1119-z	Longitudinal time window too short
Rashid, T. M., & Hollander, J. B. (1998). Multiple sclerosis and the neurogenic bladder. Phys Med Rehabil Clin N Am, 9(3), 615-629.	Year of publication before 2000
Rivera-Navarro, J., Morales-Gonzalez, J. M., & Benito-Leon, J. (2003). Informal caregiving in multiple sclerosis patients: data from the Madrid Demyelinating Disease Group study. Disabil Rehabil, 25(18), 1057-1064.	No adults with required neurological injuries
Rudick, R. A., Miller, D., Hass, S., Hutchinson, M., Calabresi, P. A., Confavreux, C., . . . Panzara, M. A. (2007). Health-related quality of life in multiple sclerosis: effects of natalizumab. Ann Neurol, 62(4), 335-346. doi:10.1002/ana.21163	Primary aim is investigation of a specific intervention
Ruet, A., Deloire, M., Hamel, D., Ouallet, J. C., Petry, K., & Brochet, B. (2013). Cognitive impairment, health-related quality of life and vocational status at early stages of multiple sclerosis: a 7-year longitudinal study. J Neurol, 260(3), 776-784. doi:10.1007/s00415-012-6705-1	**Included**
Schinzel, J., Zimmermann, H., Paul, F., Ruprecht, K., Hahn, K., Brandt, A. U., & Dorr, J. (2014). Relations of low contrast visual acuity, quality of life and multiple sclerosis functional composite: a cross-sectional analysis. BMC Neurol, 14, 31. doi:10.1186/1471-2377-14-31	Longitudinal time window too short
Schwartz, C. E., Bode, R. K., Quaranto, B. R., & Vollmer, T. (2012). The symptom inventory disability-specific short forms for multiple sclerosis: construct validity, responsiveness, and interpretation. Arch Phys Med Rehabil, 93(9), 1617-1628.e1611. doi:10.1016/j.apmr.2012.01.012	Methodological evaluation of an assessment tool
Schwartz, C. E., Quaranto, B. R., Rapkin, B. D., Healy, B. C., Vollmer, T., & Sprangers, M. A. (2014). Fluctuations in appraisal over time in the context of stable versus non-stable health. Qual Life Res, 23(1), 9-19. doi:10.1007/s11136-013-0471-0	Longitudinal time window too short
Solari, A., Ferrari, G., & Radice, D. (2006). A longitudinal survey of self-assessed health trends in a community cohort of people with multiple sclerosis and their significant others. J Neurol Sci, 243(1-2), 13-20. doi:10.1016/j.jns.2005.11.005	**Included**
Stuifbergen, A. K., Blozis, S. A., Harrison, T. C., & Becker, H. A. (2006). Exercise, functional limitations, and quality of life: A longitudinal study of persons with multiple sclerosis. Arch Phys Med Rehabil, 87(7), 935-943. doi:10.1016/j.apmr.2006.04.003	**Included**
Treadaway, K., Cutter, G., Salter, A., Lynch, S., Simsarian, J., Corboy, J., . . . Frohman, E. M. (2009). Factors that influence adherence with disease-modifying therapy in MS. J Neurol, 256(4), 568-576. doi:10.1007/s00415-009-0096-y	Primary aim is investigation of a specific intervention
Wu, N., Minden, S. L., Hoaglin, D. C., Hadden, L., & Frankel, D. (2007). Quality of life in people with multiple sclerosis: data from the Sonya Slifka Longitudinal Multiple Sclerosis Study. J Health Hum Serv Adm, 30(3), 233-267.	Longitudinal time window too short
Wynia, K., van Wijlen, A. T., Middel, B., Reijneveld, S. A., & Meilof, J. F. (2012). Change in disability profile and quality of life in multiple sclerosis patients: a five-year longitudinal study using the Multiple Sclerosis Impact Profile (MSIP). Mult Scler, 18(5), 654-661. doi:10.1177/1352458511423935	**Included**

Zivadinov, R., Zorzon, M., Tommasi, M. A., Nasuelli, D., Bernardi, M., Monti-Bragadin, L., & Cazzato, G. (2003). A longitudinal study of quality of life and side effects in patients with multiple sclerosis treated with interferon beta-1a. J Neurol Sci, 216(1), 113-118.	Primary aim is investigation of a specific intervention

Multiple sclerosis	
Article (WoK)	**Reason for exclusion**
Amato, M. P., Zipoli, V., & Portaccio, E. (2006). Multiple sclerosis-related cognitive changes: A review of cross-sectional and longitudinal studies. *J Neurol Sci, 245*(1-2), 41-46. doi:10.1016/j.jns.2005.08.019	No longitudinal design
Artemiadis, A. K., Anagnostouli, M. C., & Alexopoulos, E. C. (2011). Stress as a Risk Factor for Multiple Sclerosis Onset or Relapse: A Systematic Review. *Neuroepidemiology, 36*(2), 109-120. doi:10.1159/000323953	No longitudinal design
Baruch, N. F., O'Donnell, E. H., Glanz, B. I., Benedict, R. H. B., Musallam, A. J., Healy, B. C., . . . Chitnis, T. (2016). Cognitive and patient-reported outcomes in adults with pediatric-onset multiple sclerosis. *Multiple Sclerosis Journal, 22*(3), 354-361. doi:10.1177/1352458515588781	No adults with required neurological injuries
Barwick, F. H., & Arnett, P. A. (2011). Relationship Between Global Cognitive Decline and Depressive Symptoms in Multiple Sclerosis. *Clinical Neuropsychologist, 25*(2), 193-209. doi:10.1080/13854046.2010.538435	No longitudinal design
Benito-Leon, J., Mitchell, A., Rivera-Navarro, J., & Morales-Gonzalez, J. M. (2012). Health-Related Quality of Life Predicts Disability in Multiple Sclerosis: A Longitudinal Prospective Study. *Neurology, 78*.	No full text available
Bove, R., Healy, B. C., Musallam, A., Glanz, B. I., De Jager, P. L., & Chitnis, T. (2016). Exploration of changes in disability after menopause in a longitudinal multiple sclerosis cohort. *Multiple Sclerosis Journal, 22*(7), 935-943. doi:10.1177/1352458515606211	Longitudinal time window without multiple assessments
Bruce, A. S., & Arnett, P. A. (2008). Longitudinal study of the symptom checklist 90-revised in multiple sclerosis patients. *Clinical Neuropsychologist, 22*(1), 46-59. doi:10.1080/13854040601064518	Not enough participants at all time points
Caceres, F., Vanotti, S., Benedict, R. H. B., & Grp, R. W. (2014). Cognitive and neuropsychiatric disorders among multiple sclerosis patients from Latin America: Results of the RELACCEM study. *Multiple Sclerosis and Related Disorders, 3*(3), 335-340. doi:10.1016/j.msard.2013.10.007	No specific QoL outcome measure
Cavallari, M., Palotai, M., Glanz, B. I., Egorova, S., Prieto, J. C., Healy, B. C., . . . Guttmann, C. R. G. (2016). Fatigue predicts disease worsening in relapsing-remitting multiple sclerosis patients. *Multiple Sclerosis Journal, 22*(14), 1841-1849. doi:10.1177/1352458516635874	Not enough participants at all time points
Christodoulou, C., Melville, P., Scherl, W. F., Morgan, T., MacAllister, W. S., Canfora, D. M., . . . Krupp, L. B. (2005). Perceived cognitive dysfunction and observed neuropsychological performance: Longitudinal relation in persons with multiple sclerosis. *Journal of the International Neuropsychological Society, 11*(5), 614-619. doi:10.1017/s1355617705050733	Longitudinal time window too short
Chruzander, C., Tinghog, P., Ytterberg, C., Holmqvist, L. W., Alexanderson, K., Hillert, J., & Johansson, S. (2016). Longitudinal changes in sickness absence and disability pension, and associations between disability pension and disease-specific and contextual factors and functioning, in people with multiple sclerosis. *J Neurol Sci, 367*, 319-325. doi:10.1016/j.jns.2016.05.055	No specific QoL outcome measure
Comi, G., & Filippi, M. (2005). Clinical trials in multiple sclerosis: methodological issues. *Current Opinion in Neurology, 18*(3), 245-252. doi:10.1097/01.wco.0000169740.91416.a2	Methodological evaluation of an assessment tool
Conway, D. S., Thompson, N. R., & Cohen, J. A. (2017). Influence of hypertension, diabetes, hyperlipidemia, and obstructive lung disease on multiple sclerosis disease course. *Multiple Sclerosis Journal, 23*(2), 277-285. doi:10.1177/1352458516650512	No full text available
Cores, E. V., Vanotti, S., Burin, D. I., Politis, D. G., & Villa, A. (2014). Factors associated to the work situation of patients with multiple sclerosis. *Revista De Neurologia, 58*(4), 175-183.	No longitudinal design
Cotter, J., Firth, J., Enzinger, C., Kontopantelis, E., Yung, A. R., Elliott, R., & Drake, R. J. (2016). Social cognition in multiple sclerosis A systematic review and meta-analysis. *Neurology, 87*(16), 1727-1736. doi:10.1212/wnl.0000000000003236	No longitudinal design
Darija, K. T., Tatjana, P., Goran, T., Nebojsa, S., Irena, D., Sarlota, M., & Jelena, D. (2015). Sexual dysfunction in multiple sclerosis: A 6-year follow-up study. *J Neurol Sci, 358*(1-2), 317-323. doi:10.1016/j.jns.2015.09.023	No specific QoL outcome measure
de Groot, V., Beckerman, H., Lankhorst, G. J., Polman, C. H., & Bouter, L. M. (2005). The initial course of daily functioning in multiple sclerosis: a three-year follow-up study. *Multiple Sclerosis, 11*(6), 713-718. doi:10.1191/1352458505ms1238oa	**Included**
Di Legge, S., Piattella, M. C., Pozzilli, C., Pantano, P., Caramia, F., Pestalozza, I. F., . . . Lenzi, G. L. (2003). Longitudinal evaluation of depression and anxiety in patients with clinically isolated syndrome at high risk of developing early multiple sclerosis. *Multiple Sclerosis, 9*(3), 302-306. doi:10.1191/1352458503ms921oa	Not enough participants at all time points
Donatella, S., Paolo, I., & Daria, V. (2001). Longitudinal study of cognitive function, psychiatric aspects and quality of life in multiple sclerosis relapsing-remitting patients. *Ann Neurol, 50*(3), S59-S59.	No full text available
Fogelberg, D. J., Hughes, A. J., Vitiello, M. V., Hoffman, J. M., & Amtmann, D. (2016). Comparison of Sleep Problems in Individuals with Spinal Cord Injury and Multiple Sclerosis. *Journal of Clinical Sleep Medicine, 12*(5), 695-701. doi:10.5664/jcsm.5798	No specific QoL outcome measure
Foley, P. L., Vesterinen, H. M., Laird, B. J., Sena, E. S., Colvin, L. A., Chandran, S., . . . Fallon, M. T. (2013). Prevalence and natural history of pain in adults with multiple sclerosis: Systematic review and meta-analysis. *Pain, 154*(5), 632-642. doi:10.1016/j.pain.2012.12.002	No longitudinal design
Frades-Payo, B., Forjaz, M. J., & Martinez-Martin, P. (2009). THE CURRENT STATE OF THE ART CONCERNING QUALITY OF LIFE IN PARKINSON'S DISEASE: I. INSTRUMENTS, COMPARATIVE STUDIES AND TREATMENTS. *Revista De Neurologia, 49*(11), 594-598.	No adults with required neurological injuries

Fredrikson, S., Wicklein, E. M., Kim, K. K., Prayoowiwat, N., Scherer, P., & Langdon, D. (2008). Cognition, fatigue, depression and health-related quality of life in early multiple sclerosis: baseline data from CogniMS, a multinational longitudinal study. *Multiple Sclerosis, 14*, S42-S42.	Longitudinal time window too short
Fredrikson, S., Wicklein, E. M., Prayoonwiwat, N., Beckmann, K., Scherer, P., & Langdon, D. (2010). Cognitive performance and health-related quality of life in clinically isolated syndrome (CIS) suggestive of multiple sclerosis: 2-year data from CogniCIS, a multinational, longitudinal study. *Eur J Neurol, 17*, 57-57.	Longitudinal time window too short
Frndak, S. E., Kordovski, V. M., Cookfair, D., Rodgers, J. D., Weinstock-Guttman, B., & Benedict, R. H. B. (2015). Disclosure of disease status among employed multiple sclerosis patients: Association with negative work events and accommodations. *Multiple Sclerosis Journal, 21*(2), 225-234. doi:10.1177/1352458514540971	Longitudinal time window too short
Galetta, K. M., & Balcer, L. J. (2013). Measures of visual pathway structure and function in MS: Clinical usefulness and role for MS trials. *Multiple Sclerosis and Related Disorders, 2*(3), 172-182. doi:10.1016/j.msard.2012.12.004	No longitudinal design
Galetta, K. M., Graves, J., Talman, L. S., Lile, D. J., Frohman, E. M., Calabresi, P. A., . . . Balcer, L. J. (2012). Visual Pathway Axonal Loss in Benign Multiple Sclerosis: A Longitudinal Study. *Journal of Neuro-Ophthalmology, 32*(2), 116-123. doi:10.1097/WNO.0b013e318240204d	No specific QoL outcome measure
Garcia-Martin, E., Rodriguez-Mena, D., Herrero, R., Almarcegui, C., Dolz, I., Martin, J., . . . Pablo, L. E. (2013). Neuro-ophthalmologic evaluation, quality of life, and functional disability in patients with MS. *Neurology, 81*(1), 76-83.	Not enough participants at all time points
Giordano, A., Ferrari, G., Radice, D., Randi, G., Bisanti, L., Solari, A., & Study, P. (2013). Self-assessed health status changes in a community cohort of people with multiple sclerosis: 11years of follow-up. *Eur J Neurol, 20*(4), 681-688. doi:10.1111/ene.12028	**Included**
Glanz, B. I., Healy, B. C., Hviid, L. E., Chitnis, T., & Weiner, H. L. (2012). Cognitive deterioration in patients with early multiple sclerosis: a 5-year study. *Journal of Neurology Neurosurgery and Psychiatry, 83*(1), 38-43. doi:10.1136/jnnp.2010.237834	No specific QoL outcome measure
Hawton, A., Green, C., Telford, C. J., Wright, D. E., & Zajicek, J. P. (2012). The use of multiple sclerosis condition-specific measures to inform health policy decision-making: mapping from the MSWS-12 to the EQ-5D. *Multiple Sclerosis Journal, 18*(6), 853-861. doi:10.1177/1352458511429319	No longitudinal design
Husain, A. F., Stewart, K., Arseneault, R., Moineddin, R., Cellarius, V., Librach, S. L., & Dudgeon, D. (2007). Women experience higher levels of fatigue than men at the end of life: A longitudinal home palliative care study. *Journal of Pain and Symptom Management, 33*(4), 389-397. doi:10.1016/j.jpainsymman.2006.09.019	No adults with required neurological injuries
Izquierdo, G., Venegas, A., Sanabria, C., & Navarro, G. (2015). Long-term epidemiology of multiple sclerosis in the Northern Seville District. *Acta Neurologica Scandinavica, 132*(2), 111-117. doi:10.1111/ane.12363	No specific QoL outcome measure
Janssens, A., Buljevac, D., van Doorn, P. A., van der Meche, F. G. A., Polman, C. H., Passchier, J., & Hintzen, R. Q. (2006). Prediction of anxiety and distress following diagnosis of multiple sclerosis: a two-year longitudinal study. *Multiple Sclerosis, 12*(6), 794-801. doi:10.1177/1352458506070935	Longitudinal time window too short
Jensen, M. P., Smith, A. E., Alschuler, K. N., Gillanders, D. T., Amtmann, D., & Molton, I. R. (2016). The role of pain acceptance on function in individuals with disabilities: a longitudinal study. *Pain, 157*(1), 247-254. doi:10.1097/j.pain.0000000000000361	No adults with required neurological injuries
Johansson, S., Gottberg, K., Kierkegaard, M., & Ytterberg, C. (2016). Variations in and predictors of the occurrence of depressive symptoms and mood symptoms in multiple sclerosis: a longitudinal two-year study. *BMC Neurol, 16*. doi:10.1186/s12883-016-0551-1	Longitudinal time window too short
Jonsson, A., Andresen, J., Storr, L., Tscherning, T., Sorensen, P. S., & Ravnborg, M. (2006). Cognitive impairment in newly diagnosed multiple sclerosis patients: A 4-year follow-up study. *J Neurol Sci, 245*(1-2), 77-85. doi:10.1016/j.jns.2005.09.016	No specific QoL outcome measure
Julian, L. J., Vella, L., Frankel, D., Minden, S. L., Oksenberg, J. R., & Mohr, D. C. (2009). ApoE alleles, depression and positive affect in multiple sclerosis. *Multiple Sclerosis, 15*(3), 311-315. doi:10.1177/1352458508099478	No longitudinal design
Julian, L. J., Vella, L., Vollmer, T., Hadjimichael, O., & Mohr, D. C. (2008). Employment in multiple sclerosis Exiting and re-entering the work force. *J Neurol, 255*(9), 1354-1360. doi:10.1007/s00415-008-0910-y	No specific QoL outcome measure
Kamin, F., Rommer, P. S., Abu-Mugheisib, M., Koehler, W., Hoffmann, F., Winkelmann, A., . . . Zettl, U. K. (2015). Effects of intrathecal triamincinolone-acetonide treatment in MS patients with therapy-resistant spasticity. *Spinal Cord, 53*(2), 109-113. doi:10.1038/sc.2014.155	Primary aim is investigation of a specific intervention
Krysko, K. M., & O'Connor, P. (2016). Quality of Life, Cognition and Mood in Adults with Pediatric Multiple Sclerosis. *Canadian Journal of Neurological Sciences, 43*(3), 368-374. doi:10.1017/cjn.2015.354	Not enough participants at all time points
Lebrun, C., Cohen, M., Clavelou, P., & Sfsep. (2016). Evaluation of quality of life and fatigue in radiologically isolated syndrome. *Rev Neurol (Paris), 172*(6-7), 392-395. doi:10.1016/j.neurol.2016.04.004	No adults with required neurological injuries
Leniger, T., Brandes, I., & Hessling, A. (2016). The MSFC in the Prospective Employment Status of Rehabilitants with Multiple Sclerosis. *Aktuelle Neurologie, 43*(5), 293-297. doi:10.1055/s-0042-106472	No specific QoL outcome measure
Leocani, L., & Comi, G. (2000). Neurophysiological investigations in multiple sclerosis. *Current Opinion in Neurology, 13*(3), 255-261. doi:10.1097/00019052-200006000-00004	Primary aim is investigation of a specific intervention
Lerdal, A., Celius, E. G., Krupp, L., & Dahl, A. A. (2007). A prospective study of patterns of fatigue in multiple sclerosis. *Eur J Neurol, 14*(12), 1338-1343. doi:10.1111/j.1468-1331.2007.01974.x	Longitudinal time window too short

Marck, C. H., Jelinek, P. L., Weiland, T. J., Hocking, J. S., De Livera, A. M., Taylor, K. L., . . . Jelinek, G. A. (2016). Sexual function in multiple sclerosis and associations with demographic, disease and lifestyle characteristics: an international cross-sectional study. *BMC Neurol, 16*. doi:10.1186/s12883-016-0735-8	No longitudinal design
Marin, B., Couratier, P., Preux, P. M., & Logroscino, G. (2011). Can Mortality Data Be Used to Estimate Amyotrophic Lateral Sclerosis Incidence? *Neuroepidemiology, 36*(1), 29-38. doi:10.1159/000321930	No adults with required neurological injuries
Minden, S. L., Frankel, D., Hadden, L., Perloff, J., Srinath, K. P., & Hoaglin, D. C. (2006). The Sonya Slifka Longitudinal Multiple Sclerosis Study: methods and sample characteristics. *Multiple Sclerosis, 12*(1), 24-38. doi:10.1191/135248506ms1262oa	Longitudinal time window without multiple assessments
Moccia, M., Palladino, R., Carotenuto, A., Russo, C. V., Triassi, M., Lanzillo, R., & Morra, V. B. (2016). Predictors of long-term interferon discontinuation in newly diagnosed relapsing multiple sclerosis. *Multiple Sclerosis and Related Disorders, 10*, 90-96. doi:10.1016/j.msard.2016.09.011	Primary aim is investigation of a specific intervention
Morrow, S. A., Weinstock-Guttman, B., Munschauer, F. E., Hojnacki, D., & Benedict, R. H. B. (2009). Subjective fatigue is not associated with cognitive impairment in multiple sclerosis: cross-sectional and longitudinal analysis. *Multiple Sclerosis, 15*(8), 998-1005. doi:10.1177/1352458509106213	No specific QoL outcome measure
Nourbakhsh, B., Julian, L., & Waubant, E. (2016). Fatigue and depression predict quality of life in patients with early multiple sclerosis: a longitudinal study. *Eur J Neurol, 23*(9), 1482-1486. doi:10.1111/ene.13102	Not enough participants at all time points
Noyes, K., Bajorska, A., Chappel, A., Schwid, S. R., Mehta, L. R., Weinstock-Guttman, B., . . . Dick, A. W. (2011). Cost-effectiveness of disease-modifying therapy for multiple sclerosis A population-based study. *Neurology, 77*(4), 355-363.	No longitudinal design
O'Connor, P. W., Ritvo, P. G., & Blair, N. L. (2000). Longitudinal changes in quality of life, EDSS, and the multiple sclerosis functional composite: A three-year study. *Neurology, 54*(7), A55-A56.	No full text available
Palmer, A. J., Colman, S., O'Leary, B., Taylor, B. V., & Simmons, R. D. (2013). The economic impact of multiple sclerosis in Australia in 2010. *Multiple Sclerosis Journal, 19*(12), 1640-1646. doi:10.1177/1352458513488230	No specific QoL outcome measure
Pardini, M., Cordano, C., Benassi, F., Mattei, C., Sassos, D., Guida, S., . . . Gialloreti, L. E. (2014). Agomelatine but not melatonin improves fatigue perception: A longitudinal proof-of-concept study. *European Neuropsychopharmacology, 24*(6), 939-944. doi:10.1016/j.euroneuro.2014.02.010	Primary aim is investigation of a specific intervention
Patten, S. B., Williams, J. V. A., & Metz, L. (2008). Anti-depressant use in association with interferon and glatiramer acetate treatment in multiple sclerosis. *Multiple Sclerosis, 14*(3), 406-411. doi:10.1177/1352458507082942	Primary aim is investigation of a specific intervention
Patti, F., Amato, M. P., Trojano, M., Bastianello, S., Tola, M. R., Picconi, O., . . . Grimaldi, L. (2010). Longitudinal Changes in Depression, Fatigue, Quality of Life, and Social Functioning in Patients with Relapsing-Remitting Multiple Sclerosis Receiving Subcutaneous Interferon Beta-1a in the COGIMUS (COGnitive Impairment in MUltiple Sclerosis) Study. *Neurology, 74*(9), A160-A160.	Primary aim is investigation of a specific intervention
Patti, F., Amato, M. P., Trojano, M., Bastianello, S., Tola, M. R., Picconi, O., . . . Grp, C. S. (2011). Quality of life, depression and fatigue in mildly disabled patients with relapsing-remitting multiple sclerosis receiving subcutaneous interferon beta-1a: 3-year results from the COGIMUS (COGnitive Impairment in MUltiple Sclerosis) study. *Multiple Sclerosis Journal, 17*(8), 991-1001. doi:10.1177/1352458511401943	Primary aim is investigation of a specific intervention
Pioro, E. P., Brooks, B. R., Cummings, J., Schiffer, R., Thisted, R. A., Wynn, D., . . . Safety Tolerability, E. (2010). Dextromethorphan Plus Ultra Low-Dose Quinidine Reduces Pseudobulbar Affect. *Ann Neurol, 68*(5), 693-702. doi:10.1002/ana.22093	No adults with required neurological injuries
Qureshi, S. S., Beh, S. C., Frohman, T. C., & Frohman, E. M. (2014). An update on neuro-ophthalmology of multiple sclerosis: the visual system as a model to study multiple sclerosis. *Current Opinion in Neurology, 27*(3), 300-308. doi:10.1097/wco.0000000000000098	No longitudinal design
Rosti-Otajarvi, E., Mantynen, A., Koivisto, K., Huhtala, H., & Hamalainen, P. (2013). Neuropsychological rehabilitation has beneficial effects on perceived cognitive deficits in multiple sclerosis during nine-month follow-up. *J Neurol Sci, 334*(1-2), 154-160. doi:10.1016/j.jns.2013.08.017	Longitudinal time window too short
Sakai, R. E., Feller, D. J., Galetta, K. M., Galetta, S. L., & Balcer, L. J. (2011). Vision in Multiple Sclerosis: The Story, Structure-Function Correlations, and Models for Neuroprotection. *Journal of Neuro-Ophthalmology, 31*(4), 362-373. doi:10.1097/WNO.0b013e318238937f	No longitudinal design
Sandroff, B. M., Hillman, C. H., Benedict, R. H. B., & Motl, R. W. (2015). Acute effects of walking, cycling, and yoga exercise on cognition in persons with relapsing-remitting multiple sclerosis without impaired cognitive processing speed. *Journal of Clinical and Experimental Neuropsychology, 37*(2), 209-219. doi:10.1080/13803395.2014.1001723	Primary aim is investigation of a specific intervention
Sauter, C., Zebenholzer, K., Hisakawa, J., Zeitlhofer, J., & Vass, K. (2008). A longitudinal study on effects of a six-week course for energy conservation for multiple sclerosis patients. *Multiple Sclerosis, 14*(4), 500-505. doi:10.1177/1352458507084649	Longitudinal time window too short
Schmitz-Hubsch, T., Fimmers, R., Rakowicz, M., Rola, R., Zdzienicka, E., Fancellu, R., . . . Klockgether, T. (2010). Responsiveness of different rating instruments in spinocerebellar ataxia patients. *Neurology, 74*(8), 678-684.	Methodological evaluation of an assessment tool
Schwartz, C. E., Ayandeh, A., & Motl, R. W. (2014). Investigating the minimal important difference in ambulation in multiple sclerosis: A disconnect between performance-based and patient-reported outcomes? *J Neurol Sci, 347*(1-2), 268-274. doi:10.1016/j.jns.2014.10.021	Methodological evaluation of an assessment tool

Shinto, L., Yadav, V., Morris, C., Lapidus, J. A., Senders, A., & Bourdette, D. (2006). Demographic and health-related factors associated with complementary and alternative medicine (CAM) use in multiple sclerosis. *Multiple Sclerosis, 12*(1), 94-100. doi:10.1191/1352458506ms1230oa	No longitudinal design
Simpson, S., Tan, H., Otahal, P., Taylor, B., Ponsonby, A. L., Lucas, R. M., . . . Ausimmune AusLong, I. (2016). Anxiety, depression and fatigue at 5-year review following CNS demyelination. *Acta Neurologica Scandinavica, 134*(6), 403-413. doi:10.1111/ane.12554	No adults with required neurological injuries
Sonder, J. M., Balk, L. J., Bosma, L., Polman, C. H., & Uitdehaag, B. M. J. (2014). Do patient and proxy agree? Long-term changes in multiple sclerosis physical impact and walking ability on patient-reported outcome scales. *Multiple Sclerosis Journal, 20*(12), 1616-1623. doi:10.1177/1352458514529173	Longitudinal time window too short
Sonder, J. M., Balk, L. J., van der Linden, F. A. H., Bosma, L., Polman, C. H., & Uitdehaag, B. M. J. (2015). Toward the use of proxy reports for estimating long-term patient-reported outcomes in multiple sclerosis. *Multiple Sclerosis Journal, 21*(14), 1865-1871. doi:10.1177/1352458514544078	Longitudinal time window too short
van de Port, I. G. L., Kwakkel, G., Schepers, V. P. M., Heinemans, C. T. I., & Lindeman, E. (2007). Is fatigue an independent factor associated with activities of daily living, instrumental activities of daily living and health-related quality of life in chronic stroke? *Cerebrovascular Diseases, 23*(1), 40-45. doi:10.1159/000095757	No adults with required neurological injuries
van der Linden, F. A. H., Kragt, J. J., van Bon, M., Klein, M., Thompson, A. J., van der Ploeg, H. M., . . . Uitdehaag, B. M. J. (2008). Longitudinal proxy measurements in multiple sclerosis: patient-proxy agreement on the impact of MS on daily life over a period of two years. *BMC Neurol, 8*. doi:10.1186/1471-2377-8-2	Longitudinal time window too short
Wegener, S., Marx, I., & Zettl, U. K. (2013). Cognitive Deficits and Dementia in Patients with Multiple Sclerosis: Status Quo and Open Questions. *Fortschritte Der Neurologie Psychiatrie, 81*(11), 639-647. doi:10.1055/s-0033-1355497	No longitudinal design
Wollin, J., Fulcher, G., Kendall, E., Chaboyer, W., Charker, J., McDonald, E., & Simmons, R. (2007). Quality of life and self-management in multiple sclerosis: national baseline data from the Australian MS Longitudinal Study. *Multiple Sclerosis, 13*, S263-S263.	Longitudinal time window without multiple assessments
Ytterberg, C., Johansson, S., Holmqvist, L. W., & von Koch, L. (2008). Longitudinal variations and predictors of increased perceived impact of multiple sclerosis, a two-year study. *J Neurol Sci, 270*(1-2), 53-59. doi:10.1016/j.jns.2008.01.014	Longitudinal time window too short
Zahavi, A., Geertzen, J. H. B., Middel, B., Staal, M., & Rietman, J. S. (2004). Long term effect (more than five years) of intrathecal baclofen on impairment, disability, and quality of life in patients with severe spasticity of spinal origin. *Journal of Neurology Neurosurgery and Psychiatry, 75*(11), 1553-1557. doi:10.1136/jnnp.2003.014282	Primary aim is investigation of a specific intervention
Zajicek, J. P., Ingram, W. M., Vickery, J., Creanor, S., Wright, D. E., & Hobart, J. C. (2010). Patient-orientated longitudinal study of multiple sclerosis in south west England (The South West Impact of Multiple Sclerosis Project, SWIMS) 1: protocol and baseline characteristics of cohort. *BMC Neurol, 10*. doi:10.1186/1471-2377-10-88	Longitudinal time window without multiple assessments
Zivadinov, R., & Bakshi, R. (2004). Central nervous system atrophy and clinical status in multiple sclerosis. *Journal of Neuroimaging, 14*(3), 27S-35S. doi:10.1177/1051228404266266	No longitudinal design
Zorzon, M., Zivadinov, R., Bragadin, L. M., Moretti, R., De Masi, R., Nasuelli, D., & Cazzato, G. (2001). Sexual dysfunction in multiple sclerosis: a 2-year follow-up study. *J Neurol Sci, 187*(1-2), 1-5. doi:10.1016/s0022-510x(01)00493-2	Longitudinal time window too short

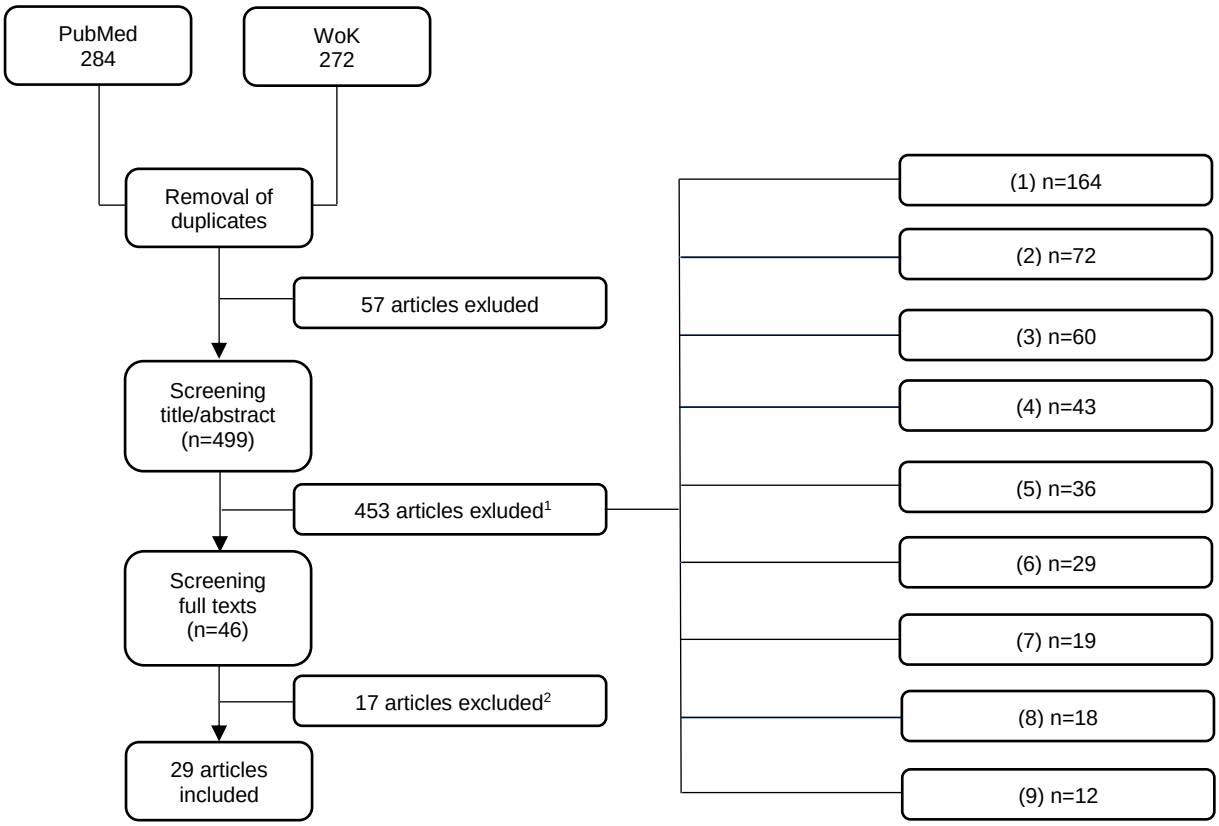
Parkinson's disease	
Article (PubMed)	**Reason for exclusion**
Cavanaugh, J. T., Ellis, T. D., Earhart, G. M., Ford, M. P., Foreman, K. B., & Dibble, L. E. (2015). Toward Understanding Ambulatory Activity Decline in Parkinson Disease. Phys Ther, 95(8), 1142-1150. doi:10.2522/ptj.20140498	Longitudinal time window too short
Cieza, A., Bostan, C., Ayuso-Mateos, J. L., Oberhauser, C., Bickenbach, J., Raggi, A., . . . Chatterji, S. (2013). The psychosocial difficulties in brain disorders that explain short term changes in health outcomes. BMC Psychiatry, 13, 78. doi:10.1186/1471-244x-13-78	Longitudinal time window too short
Corcos, D. M., Robichaud, J. A., David, F. J., Leurgans, S. E., Vaillancourt, D. E., Poon, C., . . . Comella, C. L. (2013). A two-year randomized controlled trial of progressive resistance exercise for Parkinson's disease. Mov Disord, 28(9), 1230-1240. doi:10.1002/mds.25380	Primary aim is investigation of a specific intervention
Dams, J., Siebert, U., Bornschein, B., Volkmann, J., Deuschl, G., Oertel, W. H., . . . Reese, J. P. (2013). Cost-effectiveness of deep brain stimulation in patients with Parkinson's disease. Mov Disord, 28(6), 763-771. doi:10.1002/mds.25407	Primary aim is investigation of a specific intervention
Duncan, G. W., Khoo, T. K., Yarnall, A. J., O'Brien, J. T., Coleman, S. Y., Brooks, D. J., . . . Burn, D. J. (2014). Health-related quality of life in early Parkinson's disease: the impact of nonmotor symptoms. Mov Disord, 29(2), 195-202. doi:10.1002/mds.25664	Longitudinal time window too short
Elm, J. J. (2012). Design innovations and baseline findings in a long-term Parkinson's trial: the National Institute of Neurological Disorders and Stroke Exploratory Trials in Parkinson's Disease Long-Term Study-1. Mov Disord, 27(12), 1513-1521. doi:10.1002/mds.25175	Primary aim is investigation of a specific intervention
Emre, M., Poewe, W., De Deyn, P. P., Barone, P., Kulisevsky, J., Pourcher, E., . . . Strohmaier, C. (2014). Long-term safety of rivastigmine in parkinson disease dementia: an open-label, randomized study. Clin Neuropharmacol, 37(1), 9-16. doi:10.1097/wnf.0000000000000010	Primary aim is investigation of a specific intervention
Forjaz, M. J., Frades-Payo, B., & Martinez-Martin, P. (2009). [The current state of the art concerning quality of life in Parkinson's disease: II. Determining and associated factors]. Rev Neurol, 49(12), 655-660.	Article in other language
Grosset, D., Taurah, L., Burn, D. J., MacMahon, D., Forbes, A., Turner, K., . . . Chaudhuri, K. R. (2007). A multicentre longitudinal observational study of changes in self reported health status in people with Parkinson's disease left untreated at diagnosis. J Neurol Neurosurg Psychiatry, 78(5), 465-469. doi:10.1136/jnnp.2006.098327	Longitudinal time window too short
[A longitudinal study of patients with Parkinson's disease (ELEP): aims and methodology]. (2006). Rev Neurol, 42(6), 360-365.	Article in other language
Haahr, A., Kirkevold, M., Hall, E. O., & Ostergaard, K. (2013). 'Being in it together': living with a partner receiving deep brain stimulation for advanced Parkinson's disease--a hermeneutic phenomenological study. J Adv Nurs, 69(2), 338-347. doi:10.1111/j.1365-2648.2012.06012.x	No adults with required neurological injuries
Happe, S., & Berger, K. (2001). The association of dopamine agonists with daytime sleepiness, sleep problems and quality of life in patients with Parkinson's disease--a prospective study. J Neurol, 248(12), 1062-1067.	Primary aim is investigation of a specific intervention
Harro, C. C., Shoemaker, M. J., Frey, O., Gamble, A. C., Harring, K. B., Karl, K. L., . . . VanHaitsma, R. J. (2014). The effects of speed-dependent treadmill training and rhythmic auditory-cued overground walking on balance function, fall incidence, and quality of life in individuals with idiopathic Parkinson's disease: a randomized controlled trial. NeuroRehabilitation, 34(3), 541-556. doi:10.3233/nre-141048	Primary aim is investigation of a specific intervention
Hauser, R. A., Lew, M. F., Hurtig, H. I., Ondo, W. G., Wojcieszek, J., & Fitzer-Attas, C. J. (2009). Long-term outcome of early versus delayed rasagiline treatment in early Parkinson's disease. Mov Disord, 24(4), 564-573. doi:10.1002/mds.22402	Primary aim is investigation of a specific intervention
Henrichsmann, M., & Hempel, G. (2016). Impact of medication therapy management in patients with Parkinson's disease. Int J Clin Pharm, 38(1), 54-60. doi:10.1007/s11096-015-0206-0	Primary aim is investigation of a specific intervention
Isacson, D., Bingefors, K., Kristiansen, I. S., & Nyholm, D. (2008). Fluctuating functions related to quality of life in advanced Parkinson disease: effects of duodenal levodopa infusion. Acta Neurol Scand, 118(6), 379-386. doi:10.1111/j.1600-0404.2008.01049.x	Primary aim is investigation of a specific intervention
Jones, J. D., Marsiske, M., Okun, M. S., & Bowers, D. (2015). Latent growth-curve analysis reveals that worsening Parkinson's disease quality of life is driven by depression. Neuropsychology, 29(4), 603-609. doi:10.1037/neu0000158	Longitudinal time window too short
Karlsen, K. H., Tandberg, E., Arsland, D., & Larsen, J. P. (2000). Health related quality of life in Parkinson's disease: a prospective longitudinal study. J Neurol Neurosurg Psychiatry, 69(5), 584-589.	**Included**
Kishore, A., Rao, R., Krishnan, S., Panikar, D., Sarma, G., Sivasanakaran, M. P., & Sarma, S. (2010). Long-term stability of effects of subthalamic stimulation in Parkinson's disease: Indian Experience. Mov Disord, 25(14), 2438-2444. doi:10.1002/mds.23269	Primary aim is investigation of a specific intervention
Klotsche, J., Reese, J. P., Winter, Y., Oertel, W. H., Irving, H., Wittchen, H. U., . . . Dodel, R. (2011). Trajectory classes of decline in health-related quality of life in Parkinson's disease: a pilot study. Value Health, 14(2), 329-338. doi:10.1016/j.jval.2010.10.005	**Included**
Luo, S., Ma, J., & Kieburtz, K. D. (2013). Robust Bayesian inference for multivariate longitudinal data by using normal/independent distributions. Stat Med, 32(22), 3812-3828. doi:10.1002/sim.5778	Longitudinal time window too short
Martinez-Martin, P., Carod-Artal, F. J., da Silveira Ribeiro, L., Ziomkowski, S., Vargas, A. P., Kummer, W., & Mesquita, H. M. (2008). Longitudinal psychometric attributes, responsiveness, and importance of change: An approach using the SCOPA-Psychosocial questionnaire. Mov Disord, 23(11), 1516-1523. doi:10.1002/mds.22202	Methodological evaluation of an assessment tool

Martinez-Martin, P., Rodriguez-Blazquez, C., Paz, S., Forjaz, M. J., Frades-Payo, B., Cubo, E., . . . Lizan, L. (2015). Parkinson Symptoms and Health Related Quality of Life as Predictors of Costs: A Longitudinal Observational Study with Linear Mixed Model Analysis. PLoS One, 10(12), e0145310. doi:10.1371/journal.pone.0145310	Longitudinal time window too short
Muslimovic, D., Post, B., Speelman, J. D., Schmand, B., & de Haan, R. J. (2008). Determinants of disability and quality of life in mild to moderate Parkinson disease. Neurology, 70(23), 2241-2247. doi:10.1212/01.wnl.0000313835.33830.80	Longitudinal time window without multiple assessments
O'Connor, E. J., & McCabe, M. P. (2011). Predictors of quality of life in carers for people with a progressive neurological illness: a longitudinal study. Qual Life Res, 20(5), 703-711. doi:10.1007/s11136-010-9804-4	No adults with required neurological injuries
Oguh, O., Eisenstein, A., Kwasny, M., & Simuni, T. (2014). Back to the basics: regular exercise matters in parkinson's disease: results from the National Parkinson Foundation QII registry study. Parkinsonism Relat Disord, 20(11), 1221-1225. doi:10.1016/j.parkreldis.2014.09.008	Primary aim is investigation of a specific intervention
Oguh, O., Kwasny, M., Carter, J., Stell, B., & Simuni, T. (2013). Caregiver strain in Parkinson's disease: national Parkinson Foundation Quality Initiative study. Parkinsonism Relat Disord, 19(11), 975-979. doi:10.1016/j.parkreldis.2013.06.015	No adults with required neurological injuries
Pahwa, R., Lyons, K., McGuire, D., Silverstein, P., Zwiebel, F., Robischon, M., & Koller, W. C. (1997). Comparison of standard carbidopa-levodopa and sustained-release carbidopa-levodopa in Parkinson's disease: pharmacokinetic and quality-of-life measures. Mov Disord, 12(5), 677-681. doi:10.1002/mds.870120508	Year of publication before 2000
Paker, N., Bugdayci, D., Goksenoglu, G., Sen, A., & Kesiktas, N. (2013). Effects of robotic treadmill training on functional mobility, walking capacity, motor symptoms and quality of life in ambulatory patients with Parkinson's disease: a preliminary prospective longitudinal study. NeuroRehabilitation, 33(2), 323-328. doi:10.3233/nre-130962	Primary aim is investigation of a specific intervention
Plouvier, A. O., Olde Hartman, T. C., van Weel, C., Bloem, B. R., & Lagro-Janssen, A. L. (2015). Transitions in Parkinson's disease in primary care: protocol of a longitudinal mixed methods study. BMJ Open, 5(6), e007171. doi:10.1136/bmjopen-2014-007171	Longitudinal time window too short
Pontone, G. M., Bakker, C. C., Chen, S., Mari, Z., Marsh, L., Rabins, P. V., . . . Bassett, S. S. (2016). The longitudinal impact of depression on disability in Parkinson disease. Int J Geriatr Psychiatry, 31(5), 458-465. doi:10.1002/gps.4350	Not enough participants at all time points
Prakash, K. M., Nadkarni, N. V., Lye, W. K., Yong, M. H., & Tan, E. K. (2016). The impact of non-motor symptoms on the quality of life of Parkinson's disease patients: a longitudinal study. Eur J Neurol, 23(5), 854-860. doi:10.1111/ene.12950	Longitudinal time window too short
Reuther, M., Spottke, E. A., Klotsche, J., Riedel, O., Peter, H., Berger, K., . . . Dodel, R. C. (2007). Assessing health-related quality of life in patients with Parkinson's disease in a prospective longitudinal study. Parkinsonism Relat Disord, 13(2), 108-114. doi:10.1016/j.parkreldis.2006.07.009	Longitudinal time window too short
Schrag, A., Spottke, A., Quinn, N. P., & Dodel, R. (2009). Comparative responsiveness of Parkinson's disease scales to change over time. Mov Disord, 24(6), 813-818. doi:10.1002/mds.22438	Methodological evaluation of an assessment tool
Shearer, J., Green, C., Counsell, C. E., & Zajicek, J. P. (2012). The impact of motor and non motor symptoms on health state values in newly diagnosed idiopathic Parkinson's disease. J Neurol, 259(3), 462-468. doi:10.1007/s00415-011-6202-y	Longitudinal time window too short
Shifren, K. (1996). Individual differences in the perception of optimism and disease severity: a study among individuals with Parkinson's disease. J Behav Med, 19(3), 241-271.	Year of publication before 2000
Sundstedt, S., Nordh, E., Linder, J., Hedstrom, J., Finizia, C., & Olofsson, K. (2017). Swallowing Quality of Life After Zona Incerta Deep Brain Stimulation. Ann Otol Rhinol Laryngol, 126(2), 110-116. doi:10.1177/0003489416675874	No adults with required neurological injuries
Toribio-Diaz, M. E., & Carod-Artal, F. J. (2015). [Subtypes of mild cognitive impairment in Parkinson's disease and factors predicting its becoming dementia]. Rev Neurol, 61(1), 14-24.	Article in other language
Visser, M., van Rooden, S. M., Verbaan, D., Marinus, J., Stiggelbout, A. M., & van Hilten, J. J. (2008). A comprehensive model of health-related quality of life in Parkinson's disease. J Neurol, 255(10), 1580-1587. doi:10.1007/s00415-008-0994-4	Longitudinal time window without multiple assesments
Visser, M., Verbaan, D., van Rooden, S., Marinus, J., van Hilten, J., & Stiggelbout, A. (2009). A longitudinal evaluation of health-related quality of life of patients with Parkinson's disease. Value Health, 12(2), 392-396. doi:10.1111/j.1524-4733.2008.00430.x	Longitudinal time window too short
Volkmann, J., Albanese, A., Kulisevsky, J., Tornqvist, A. L., Houeto, J. L., Pidoux, B., . . . Agid, Y. (2009). Long-term effects of pallidal or subthalamic deep brain stimulation on quality of life in Parkinson's disease. Mov Disord, 24(8), 1154-1161. doi:10.1002/mds.22496	Primary aim is investigation of a specific intervention
Wee, N., Kandiah, N., Acharyya, S., Chander, R. J., Ng, A., Au, W. L., & Tan, L. C. (2016). Baseline predictors of worsening apathy in Parkinson's disease: A prospective longitudinal study. Parkinsonism Relat Disord, 23, 95-98. doi:10.1016/j.parkreldis.2015.12.004	Longitudinal time window too short
Zibetti, M., Merola, A., Ricchi, V., Marchisio, A., Artusi, C. A., Rizzi, L., . . . Lopiano, L. (2013). Long-term duodenal levodopa infusion in Parkinson's disease: a 3-year motor and cognitive follow-up study. J Neurol, 260(1), 105-114. doi:10.1007/s00415-012-6597-0	Primary aim is investigation of a specific intervention
Zoccolella, S., Savarese, M., Lamberti, P., Manni, R., Pacchetti, C., & Logroscino, G. (2011). Sleep disorders and the natural history of Parkinson's disease: the contribution of epidemiological studies. Sleep Med Rev, 15(1), 41-50. doi:10.1016/j.smrv.2010.02.004	Longitudinal time window without multiple assessments

Parkinson's disease	
Article (WoK)	**Reason for exclusion**
Antonini, A., Colosimo, C., Marconi, R., Morgante, L., Barone, P., & Grp, P. S. (2008). The PRIAMO study: background, methods and recruitment. *Neurological Sciences, 29*(2), 61-65. doi:10.1007/s10072-008-0863-z	Longitudinal time window too short
Brooks, D. J., & Doder, M. (2001). Depression in Parkinson's disease. *Current Opinion in Neurology, 14*(4), 465-470. doi:10.1097/00019052-200108000-00006	Longitudinal time window too short
Bruin, V. M. S., Bittencourt, L. R. A., & Tufik, S. (2012). Sleep-Wake Disturbances in Parkinson's Disease: Current Evidence regarding Diagnostic and Therapeutic Decisions. *European Neurology, 67*(5), 257-267. doi:10.1159/000335078	No longitudinal design
Cubo, E., Doumbe, J., Martinez-Martin, P., Rodriguez-Blazquez, C., Kuate, C., Mariscal, N., . . . Grp, E. (2014). Comparison of the clinical profile of Parkinson's disease between Spanish and Cameroonian Cohorts. *J Neurol Sci, 336*(1-2), 122-126. doi:10.1016/j.jns.2013.10.021	No longitudinal design
Cubo, E., Gabriel-Galan, J. M. T., Martinez, J. S., Alcubilla, C. R., Yang, C. W., Arconada, O. F., & Perez, N. M. (2012). Comparison of office-based versus home web-based clinical assessments for Parkinson's disease. *Movement Disorders, 27*(2), 308-311. doi:10.1002/mds.24028	Longitudinal time window too short
Dafsari, H. S., Reddy, P., Herchenbach, C., Wawro, S., Petry-Schmelzer, J. N., Visser-Vandewalle, V., . . . Grp, I. N.-M. S. S. (2016). Beneficial Effects of Bilateral Subthalamic Stimulation on Non-Motor Symptoms in Parkinson's Disease. *Brain Stimulation, 9*(1), 78-85. doi:10.1016/j.brs.2015.08.005	Primary aim is investigation of a specific intervention
Dibble, L. E., Cavanaugh, J. T., Earhart, G. M., Ellis, T. D., Ford, M. P., & Foreman, K. B. (2010). Charting the progression of disability in parkinson disease: study protocol for a prospective longitudinal cohort study. *BMC Neurol, 10*. doi:10.1186/1471-2377-10-110	Longitudinal time window too short
Erro, R., Picillo, M., Vitale, C., Amboni, M., Moccia, M., Santangelo, G., . . . Barone, P. (2016). The non-motor side of the honeymoon period of Parkinson's disease and its relationship with quality of life: a 4-year longitudinal study. *Eur J Neurol, 23*(11), 1673-1679. doi:10.1111/ene.13106	**Included**
Fenelon, G., & Alves, G. (2010). Epidemiology of psychosis in Parkinson's disease. *J Neurol Sci, 289*(1-2), 12-17. doi:10.1016/j.jns.2009.08.014	No longitudinal design
Forsaa, E. B., Larsen, J. P., Wentzel-Larsen, T., Herlofson, K., & Alves, G. (2008). Predictors and course of health-related quality of life in Parkinson's disease. *Movement Disorders, 23*(10), 1420-1427. doi:10.1002/mds.22121	**Included**
Frades-Payo, B., Forjaz, M. J., & Martinez-Martin, P. (2009). THE CURRENT STATE OF THE ART CONCERNING QUALITY OF LIFE IN PARKINSON'S DISEASE: I. INSTRUMENTS, COMPARATIVE STUDIES AND TREATMENTS. *Revista De Neurologia, 49*(11), 594-598.	No longitudinal design
Garcia, D. S., Castro, E. S., Exposito, I., de Deus, T., Tunas, C., Aneiros, A., . . . Torres, M. B. (2017). Comorbid conditions associated with Parkinson's disease: A longitudinal and comparative study with Alzheimer disease and control subjects. *J Neurol Sci, 373*, 210-215. doi:10.1016/j.jns.2016.12.046	No adults with required neurological injuries
Goodwin, V. A., Pickering, R., Ballinger, C., Roberts, H., McIntosh, E., Lamb, S., . . . Grp, P. P. D. (2015). A multi-centre, randomised controlled trial of the effectiveness of PDSAFE to prevent falls among people with Parkinson's: study protocol. *BMC Neurol, 15*. doi:10.1186/s12883-015-0332-2	Primary aim is investigation of a specific intervention
Janicki, S. C., Cosentino, S., & Louis, E. D. (2013). The cognitive side of essential tremor: what are the therapeutic implications? *Therapeutic Advances in Neurological Disorders, 6*(6), 353-368. doi:10.1177/1756285613489591	No longitudinal design
Jenkinson, C., Clarke, C., Gray, R., Hewitson, P., Ives, N., Morley, D., . . . Williams, A. (2015). Comparing results from long and short form versions of the Parkinson's disease questionnaire in a longitudinal study. *Parkinsonism & Related Disorders, 21*(11), 1312-1316. doi:10.1016/j.parkreldis.2015.09.008	Methodological evaluation of an assessment tool
Johnson, S. J., Diener, M. D., Kaltenboeck, A., Birnbaum, H. G., & Siderowf, A. D. (2013). An economic model of Parkinson's disease: Implications for slowing progression in the United States. *Movement Disorders, 28*(3), 319-326. doi:10.1002/mds.25328	No specific QoL outcome measure
Kandiah, N., Zhang, A., Cenina, A. R., Au, W. L., Nadkarni, N., & Tan, L. C. (2014). Montreal Cognitive Assessment for the screening and prediction of cognitive decline in early Parkinson's disease. *Parkinsonism & Related Disorders, 20*(11), 1145-1148. doi:10.1016/j.parkreldis.2014.08.002	Longitudinal time window too short
Kelly, D. H., McGinley, J. L., Huxham, F. E., Menz, H. B., Watts, J. J., Iansek, R., . . . Morris, M. E. (2012). Health-related quality of life and strain in caregivers of Australians with Parkinson's disease: An observational study. *BMC Neurol, 12*. doi:10.1186/1471-2377-12-57	No adults with required neurological injuries
Kotronoulas, G., Wengstrom, Y., & Kearney, N. (2013). Sleep and Sleep-Wake Disturbances in Care Recipient-Caregiver Dyads in the Context of a Chronic Illness: A Critical Review of the Literature. *Journal of Pain and Symptom Management, 45*(3), 579-594. doi:10.1016/j.jpainsymman.2012.03.013	No longitudinal design
Lawson, R. A., Yarnall, A. J., Duncan, G. W., Breen, D. P., Khoo, T. K., Williams-Gray, C. H., . . . Grp, I.-P. S. (2016). Cognitive decline and quality of life in incident Parkinson's disease: The role of attention. *Parkinsonism & Related Disorders, 27*, 47-53. doi:10.1016/j.parkreldis.2016.04.009	**Included**
Lilleeng, B., Gjerstad, M., Baardsen, R., Dalen, I., & Larsen, J. P. (2015). Motor symptoms after deep brain stimulation of the subthalamic nucleus. *Acta Neurologica Scandinavica, 131*(5), 298-304. doi:10.1111/ane.12342	The primary aim is investigation of a specific intervention
Luo, N., Tan, L. C. S., Zhao, Y. J., Lau, P. N., Au, W. L., & Li, S. C. (2009). Determination of the Longitudinal Validity and Minimally Important Difference of the 8-item Parkinson's Disease	Methodological evaluation of an assessment tool

Questionnaire (PDQ-8). *Movement Disorders, 24*(2), 183-187. doi:10.1002/mds.22240	
Martinez-Martin, P., Linazasoro, G., Kulisevky, J., Barbera, M. A., de Pedro, J., Cubo, E., . . . Grp, E. (2006). A longitudinal study of patients with Parkinson's disease (ELEP): Aims and methodology. *Revista De Neurologia, 42*(6), 360-365.	Longitudinal time window without multiple assessments
Martinez-Martin, P., Salvador, C., Menendez-Guisasola, L., Gonzalez, S., Tobias, A., Almazan, J., & Chaudhuri, K. R. (2004). Parkinson's disease Sleep Scale: Validation study of a Spanish version. *Movement Disorders, 19*(10), 1226-1232. doi:10.1002/mds.20144	Methodological evaluation of an assessment tool
McRae, C., Fazio, E., Kuhne, J., Ellgring, H., Russell, D., Hultgren, K., . . . Fahn, S. (2014). Longitudinal study of neural tissue implantation for treatment of Parkinson's disease: Effects on quality of life. *Movement Disorders, 29*, S445-S445.	The primary aim is investigation of a specific intervention
McRae, C., McNevin, C., Greene, P., & Fahn, S. (2011). Longitudinal study of neural tissue implantation for treatment of Parkinson's disease: Effects on quality of life. *Movement Disorders, 26*, S295-S295.	The primary aim is investigation of a specific intervention
Mills, K. A., Mari, Z., Pontone, G. M., Pantelyat, A., Zhang, A., Yoritomo, N., . . . Rosenthal, L. S. (2016). Cognitive impairment in Parkinson's disease: Association between patient-reported and clinically measured outcomes. *Parkinsonism & Related Disorders, 33*, 107-114. doi:10.1016/j.parkreldis.2016.09.025	No specific QoL outcome measure
Monchi, O., Hanganu, A., & Bellec, P. (2016). Markers of cognitive decline in PD: The case for heterogeneity. *Parkinsonism & Related Disorders, 24*, 8-14. doi:10.1016/j.parkreldis.2016.01.002	No longitudinal design
Paulsen, J. S., & Long, J. D. (2014). Onset of Huntington's Disease: Can It Be Purely Cognitive? *Movement Disorders, 29*(11), 1342-1350. doi:10.1002/mds.25997	No adults with required neurological injuries
Prakash, K. M., Nadkarni, N. V., Lye, W. K., Yong, M. H., Chew, L. M., & Tan, E. K. (2015). A longitudinal study of non-motor symptom burden in Parkinson's disease after a transition to expert care. *Parkinsonism & Related Disorders, 21*(8), 843-847. doi:10.1016/j.parkreldis.2015.04.017	Longitudinal time window too short
Rohde, K., Riedel, O., Lueken, U., Rietzel, S., Fauser, M., Ossig, C., . . . Storch, A. (2013). Impulsive-Compulsive Behaviours in a German Parkinson's Disease Outpatient Sample. *Fortschritte Der Neurologie Psychiatrie, 81*(9), 503-510. doi:10.1055/s-0033-1350457	No real QoL outcome measure
Scullin, M. K., Sollinger, A. B., Land, J., Wood-Siverio, C., Zanders, L., Lee, R., . . . Factor, S. A. (2013). Sleep and impulsivity in Parkinson's disease. *Parkinsonism & Related Disorders, 19*(11), 991-994. doi:10.1016/j.parkreldis.2013.06.018	No longitudinal design
Simuni, T., Luo, S. T., Chou, K. L., Fernandez, H., He, B., & Parashos, S. (2013). Rankin scale as a potential measure of global disability in early Parkinson's disease. *Journal of Clinical Neuroscience, 20*(9), 1200-1203. doi:10.1016/j.jocn.2012.10.030	Methodological evaluation of an assessment tool
Skodda, S., Groenheit, W., Mancinelli, N., & Schlegel, U. (2013). Progression of Voice and Speech Impairment in the Course of Parkinson's Disease: A Longitudinal Study. *Parkinsons Disease*. doi:10.1155/2013/389195	Longitudinal time window too short
Tickle-Degnen, L., Saint-Hilaire, M., Thomas, C. A., Habermann, B., Martinez, L. S. S., Terrin, N., . . Naumova, E. N. (2014). Emergence and evolution of social self-management of Parkinson's disease: study protocol for a 3-year prospective cohort study. *BMC Neurol, 14*. doi:10.1186/1471-2377-14-95	Longitudinal time window too short
Udow, S. J., Robertson, A. D., MacIntosh, B. J., Espay, A. J., Rowe, J. B., Lang, A. E., & Masellis, M. (2016). 'Under pressure': is there a link between orthostatic hypotension and cognitive impairment in a-synucleinopathies? *Journal of Neurology Neurosurgery and Psychiatry, 87*(12), 1311-1321. doi:10.1136/jnnp-2016-314123	No longitudinal design
Valldeoriola, F., Morsi, O., Tolosa, E., Rumia, J., Marti, M. J., & Martinez-Martin, P. (2007). Prospective comparative study on cost-effectiveness of subthalamic stimulation and best medical treatment in advanced Parkinson's disease. *Movement Disorders, 22*(15), 2183-2191. doi:10.1002/mds.21652	The primary aim is investigation of a specific intervention
von Steinbuechel, N., Richter, S., Morawetz, C., & Riemsma, R. (2005). Assessment of subjective health and health-related quality of life in persons with acquired or degenerative brain injury. *Current Opinion in Neurology, 18*(6), 681-691. doi:10.1097/01.wco.0000194140.56429.75	No longitudinal design
Wee, N., Kandiah, N., Acharyya, S., Chander, R. J., Ng, A., Au, W. L., & Tan, L. C. S. (2016). Depression and anxiety are co-morbid but dissociable in mild Parkinson's disease: A prospective longitudinal study of patterns and predictors. *Parkinsonism & Related Disorders, 23*, 50-56. doi:10.1016/j.parkreldis.2015.12.001	Longitudinal time window too short
Wee, N., Wen, M. C., Kandiah, N., Chander, R. J., Ng, A., Au, W. L., & Tan, L. C. S. (2016). Neural correlates of anxiety symptoms in mild Parkinson's disease: A prospective longitudinal voxel-based morphometry study. *J Neurol Sci, 371*, 131-136. doi:10.1016/j.jns.2016.10.021	Longitudinal time window too short
Wills, A. M. A., Elm, J. J., Ye, R., Chou, K. L., Parashos, S. A., Hauser, R. A., . . . Investigators, N. N.-P. (2016). Cognitive function in 1736 participants in NINDS Exploratory Trials in PD Long-term Study-1. *Parkinsonism & Related Disorders, 33*, 127-133. doi:10.1016/j.parkreldis.2016.10.005	No specific QoL outcome measure
Wills, A. M. A., Perez, A., Wang, J., Su, X., Morgan, J., Rajan, S. S., . . . Parkinson, N. E. T. (2016). Association Between Change in Body Mass Index, Unified Parkinson's Disease Rating Scale Scores, and Survival Among Persons With Parkinson Disease Secondary Analysis of Longitudinal Data From NINDS Exploratory Trials in Parkinson Disease Long-term Study 1. *Jama Neurology, 73*(3), 321-328. doi:10.1001/jamaneurol.2015.4265	No specific QoL outcome measure
Winter, Y., Balzer-Geldsetzer, M., Spottke, A., Reese, J. P., Baum, E., Klotsche, J., . . . Dodel, R. (2010). Longitudinal study of the socioeconomic burden of Parkinson's disease in Germany. *Eur J Neurol, 17*(9), 1156-1163. doi:10.1111/j.1468-1331.2010.02984.x	Longitudinal time window too short
Zhu, K., van Hilten, J. J., & Marinus, J. (2016). The course of insomnia in Parkinson's disease. *Parkinsonism & Related Disorders, 33*, 51-57. doi:10.1016/j.parkreldis.2016.09.010	No specific QoL outcome measure
Zhu, K., van Hilten, J. J., & Marinus, J. (2017). Onset and evolution of anxiety in Parkinson's disease. *Eur J Neurol, 24*(2), 404-411. doi:10.1111/ene.13217	No specific QoL outcome measure

Zhu, K. D., van Hilten, J. J., & Marinus, J. (2016a). Associated and predictive factors of depressive symptoms in patients with Parkinson's disease. *J Neurol, 263*(6), 1215-1225. doi:10.1007/s00415-016-8130-3	No specific QoL outcome measure
Zhu, K. D., van Hilten, J. J., & Marinus, J. (2016b). Course and risk factors for excessive daytime sleepiness in Parkinson's disease. *Parkinsonism & Related Disorders, 24*, 34-40. doi:10.1016/j.parkreldis.2016.01.020	No specific QoL outcome measure



[1]Selection criteria: (1) Longitudinal time window too short: < 3 years (2) No adults with required neurological injuries (3) Primary aim is investigation of a specific intervention (4) No longitudinal design (5) No specific QoL outcome measure (6) Methodological evaluation of an assessment tool (7) Longitudinal time window without multiple assessments (8) Not enough participants at all time points: < 50 (9) Year of publication before 2000

[2]No full text available (13), full texts in other languages (4)

Figure 1: Flowchart of the in- and excluded studies

Table 3: Cochrane checklist: cohort studies

1. Was the included group of patients clearly described and was the group composed on an equal moment in the disease-course?
2. Was the follow-up complete?
3. Were the outcomes of the study explicit and described in objective terms?
4. Were the measurements of the outcomes found to be valid and reliable?
5. Were the outcomes determined in an independent manner (blind)?
6. Were the prognostic factors explicit and described in objective terms?
7. Was the follow-up available for an adequate proportion of the originally included patients?
8. Was the measurement of prognostic factors performed identically for each patient?
9. Was the measurement of the prognostic factors found to be valid and reliable?
10. Was the measurement of prognostic factors performed in an adequate proportion of the population?

Cochrane checklist: cohort studies (prognosis)		ITEM		OUTCOMES			PROGNOSTIC FACTORS				
		1. Clearly described group / equal moment of group composition	2. Complete follow-up	3. Specific / objective	4. Valid / reliable	5. Independent determination	6 Specific / objective	7. Follow-up for adequate proportion of original group	8. Identical performance of measurements	9. Valid / reliable	10. Measured in adequate proportion of population
Stroke	(Ayerbe et al.)	+	+	-	+	n.a.	+	-	-	+	+
	(Hubbard et al.)	+	+	+	+	n.a.	+/-	+	+	+	+
	(Luengo-Fernandez et al.)	+	-	-	+	n.a.	+	-	+	+	-
	(Patel et al.)	+	+	-	+	n.a.	+	-	+	+	+
	(van de Port ert al.)	+	+	+	+	n.a.	+/-	+	+	+	+
SCI	(Charlifue et al.)	+	-	+/-	+	n.a.	+/-	-	-	+	+/-
	(Erosa et al.)	+	+	+	+/-	n.a.	-	+	+	-	-
	(Krause et al.)	+	+	-	-	n.a.	+	+/-	-	+	+
	(van Koppenhagen et al.)	+	+	-	+	n.a.	+	-	+	+	+
	(van Leeuwen et al.)	+	+	+	+	n.a.	+	+	+	+	-
TBI	(Andelic et al.)	+	+	+	+	n.a.	+	+	+	+	-
	(Juengst et al.)	+	+	+	+	n.a.	+	+	-	+	+
	(Resch et al.)	+	+	-	+	n.a.	+	-	+	+	+

	(Underhill et al.)	+	-	-	+	n.a.	+/-	-	-	+/-	-
	(Williamson et al.)	+	+/-	+	+	n.a.	-	?	+	+/-	+
MS	(de Groot et al., 2008)	+	+	+	+	n.a.	+	+	+	+	+
	(de Groot et al., 2005)	+	+	+	+	n.a.	+	+	+	+	+-
	(Chruzander et al.)	+/-	+	-	+	n.a.	+	-	+	+	+
	(Giordano et al.)	-	+	+	+/-	n.a.	+	+	-	+	-
	(Khan et al.)	+/-	+	-	+	n.a.	+	-	+	+	+
	(Ruet et al.)	+	+	+	+	n.a.	-	+	+	+	-
	(Solari et al.)	+/-	+	+	+/-	n.a.	+	+	-	+	-
	(Stuifbergen et al.)	+/-	+	+	+	n.a.	+/-	+	-	-	-
	(Wynia et al.)	+/-	+	+	+	n.a.	+	+	-	+	+
PD	(Erro et al.)	+	+	+	+	n.a.	+	+	-	+	-
	(Forsaa et al.)	+/-	+	+	+	n.a.	+	+	+	+	-
	(Karlsen et al.)	+/-	+	-	+	n.a.	+	-	+	+	+
	(Klotsche et al.)	+/-	+	-	+	n.a.	+	-	+	+	+
	(Lawson et al.)	+	+	-	+	n.a.	+	-	+	+	-

Table 4: Strengths and limitations of the included articles

Article	Strengths	Limitations
(Luengo-Fernandez et al.) Stroke	- Matched controls. - Long follow-up period (5 years). - The Oxford Vascular Study (OXVASC) population comprises more than 91.000 patients. - Only consenting patients were recruited to ensure a 5-year follow-up. - EQ-5D has found to be a valid QoL questionnaire after stroke.	- Between 20% and 30% of EQ-5D data were missing. - During the first 15 months: EQ-5D was not administered at 6-month follow-up. - After April 2007: 2-year follow-up visits were no longer undertaken. - It is possible that cases and controls differed regarding unmeasured factors that are protective against stroke. - EQ-5D responses converted into utilities using IK tariffs developed in the 1990's (potentially dated).
(Patel et al.) Stroke	- Large sample size (397). - The SF-36 is a well-validated, widely used assessment tool. Comparison with other pathologies or healthy subjects remains possible (generic measure). - Patients were all first-ever strokes.	- Several data on HRQoL were missing. These data included data on persons who were too confused or dysphasic, this may have introduced a bias that led to an under-estimation of poor HRQoL. - The SF-36 (a generic measure) may be not sensitive or specific enough to detect the psychological domains of mental health that are relevant to stroke. - The SF-12 was used for some subjects instead of SF-36, though the summary scores produced by either of them have been shown to be replicable. - Several other potential determinants of HRQoL were not examined (depression, role of informal carers, the quality of stroke care given to the subjects, the quality and quantity of social support available).
(Ayerbe et al.) Stroke	- Missing data were handled with sensitivity analysis and estimates were consistent in most cases - The SLSR (South London Stroke Register), as a population based register, represents the least biased sampling frame, and has a large number of patients assessed repeatedly over 10 years. - Comprehensive collection of data at baseline (socio-demographics, stroke severity measures, disability, pharmacological treatment, smoking habits, employment)	- Patients who could not be assessed for anxiety had more severe strokes; therefore, it is possible that the overall frequency and impact of anxiety is actually higher than the one observed. - The use of a cut-off point to define anxiety does not allow the investigation of dose response in QoL. - Missing data
(van de Port ert al.) Stroke	- This study shows for the first time that, longitudinally, post stroke fatigue is an important covariate that is significantly associated with IADL and HRQoL, but not with basic ADL's, between 6 and 36 months after stroke. - The use of validated measurement tools.	- The definition of fatigue is difficult and as a result fatigue has been assessed in different ways, making comparisons between studies difficult. - They were unable to distinguish mental and physical aspects of fatigue. - The possible confounders in our study were included on the basis of previous research and on clinical grounds. - They were not able to correct for lesion site, while literature data show some evidence that patients with brain stem stroke suffer more from fatigue.
(Hubbard et al.) Stroke	- Large sample size. - 15-year follow-up and accuracy of death date and cause. - Its implications for clinical practice and health promotion targeting older women who have survived stroke for many years.	- Reliance on self-reported data. - Women with stroke who died before they reported stroke or who were too frail to continue could not be included. This would lead to over-representation of women who experienced milder strokes and better physical functioning and recovery, biasing results toward survival and the null association. - Some women who reported stroke may have only experienced stroke-like symptoms.
(Charlifue et al.) SCI	- Large sample size. - Very long follow-up (25 years post-injury)	- Large amount of missing data. - A thorough longitudinal exploration of outcomes was limited. - Very few subjects had a continuous data collection at each subsequent time period since injury, limiting the longitudinal analysis. - Data collection was by self-report. Subjects may have forgotten or inaccurately reported information on their own hospitalizations.

(van Koppenhagen et al.) SCI	- Total life satisfaction score is not commonly used worldwide as a measure of life satisfaction in patients with SCI, but it demonstrates similar psychometric properties in comparison with other life satisfaction measures. - Comprehensive description of the patients situation (demographics, lesion characteristics, functional independence, musculoskeletal pain, neuropathic pain, sports participation, 7 other secondary impairments)	- Lost to follow-up: only 58% of patients (the ones with 2 or more measurements) could be included. Most reasons for not attending exercise tests were health-related, e.g. pain or infection. - The nonparticipant group was older and included more persons with tetraplegia; both of these entities are associated with low wheelchair exercise capacity, and dropout of follow-up. Moreover, lesion level was a confounder in the relationship between wheelchair exercise capacity and life satisfaction. Most likely, the loss of older patients with tetraplegic lesions influenced our results. - No causal relationships can be drawn between life satisfaction and life satisfaction.
(Erosa et al.) SCI	- This study emphasizes the need for community-based programmes to identify and assist at-risk individuals with SCI to enhance their QoL.	- The majority of the sample was male and Caucasian. - The study lacked a formal, standardized measure of pain, and it relied on a single-item measure of self-related health status. - Information about the completeness of lesion and severity of the SCI was not collected.
(Krause et al.) SCI	- Very long follow-up (35 years). - The sheer number of survivors over the 35-year interval is encouraging.	- The scope of the outcome variables is relatively limited by the limited options for outcome measurement available at the time this study was initiated. - Attrition over time was high. - The lack of racial–ethnic diversity. This is directly related to the geographical region of the United States from which participants were selected. - The findings are related to the natural course of SCI and are not an assessment of aging per se. We have provided no information for or against the hypothesis that aging is accelerated after SCI or that aging accelerates at a certain point based on chronological age or a particular number of years after injury.
(van Leeuwen et al.) SCI	- Five clear, different trajectories. - The measurements comprised a medical examination, an oral interview with a trained research assistant and a self-report questionnaire. - Eight Dutch rehabilitation centres with specialized SCI units.	- Only Dutch persons with SCI between 18 and 65 years of age with expected permanent wheelchair dependency admitted to a rehabilitation centre were included. This influenced the representativeness and the degree to which the results of this study can be generalized. - Persons who were older, received less everyday social support, and had a non-traumatic injury had a higher chance of dropping out. - Comparison with other studies was difficult (the life satisfaction questionnaire is not commonly used).
(Juengst et al., 2015) TBI	- The sample consisted of participants with complete data. - Large sample of participants (=690). - Long follow-up period (5 years). - The SWLS is a valid measure that is sensitive to changes in life satisfaction in TBI.	- A higher percentage of excluded participants were not driving and had been re-hospitalized during their first year post-injury - Life satisfaction was measured through self-report and could not be completed by proxy. - Numerous premorbid characteristics were unknown and may be important with regard to life satisfaction. - - Measurement of participation in certain roles may have been less precise, which may explain the failure to find an association between certain life roles and life satisfaction trajectory.
(Resch et al., 2009) TBI	- Large sample of participants (=609). - Long follow-up period (5 years). - The LSI is a valid measure that is sensitive to changes in life satisfaction in TBI.	- Outcome variables were assessed by self-report and in telephone interviews. - No measure of distress was administered. However, greater distress usually influences QoL in a negative way. - The study relied on a volunteer sample, and at times unmeasured characteristics of individuals who volunteer for research can be related to variables under investigation.

(Andelic et al., 2015) TBI	- Long follow-up period (5 years) - The SF-36 is been shown to be a valid and reliable measurement in TBI.	- This study included individuals with an age range from 16-55 years with moderate to severe TBI, and thus the results may not generalize to individuals outside this age group and to patients with mild TBI. - The cognitive aspects such as an altered awareness may influence self-reports in patients with severe TBI. - Self-reported physical and psychological/mental health are not independent phenomena, so some of the unexplained variance in the analyses might be influenced by emotional and behavioural aspects not addressed in the current study.
(Underhill et al., 2003) TBI	- Long follow-up period (5 years) - The LSI is a valid measure that is sensitive to changes in life satisfaction in TBI.	- The depression and no depression groups were formed on the basis of self-reported physician diagnosis. - This study utilized a single question about recent depression, as opposed to a more extensive measurement of current mood state or history. - Outcome variables were assessed by self-report and in telephone interviews.
(Williamson et al.) TBI	- In the present study, the internal consistency coefficient of the total SIP scale was 0.97. - The results of the present study appear to be stable estimates as evidenced by the presence of adequate model fit and statistically significant direct and indirect effects.	- Self-report measures were used to assess all variables included in the analyses. Simple indicators of pain and depression were used and these were limited to participant self-report of a physician's diagnosis of pain or depression. Consequently, it is not known what kind of pain the participants may have had (e.g. headache, neuropathic). - The lack of accurate information about dates on which the SIP was completed and returned to the research team limits one's ability to examine the full prospective relations of the independent variables to HRQoL over time.
(de Groot et al., 2008) MS	- The sample consisted of participants with complete data. - No outcome variables were assessed by self-report and in telephone interviews. - The SF-36 is been shown to be a valid and reliable measurement in MS.	- The use of multiple raters, 3 physical therapists had to be trained by the research physician to perform the measurement. - Relatively small sample size (=156) - Short follow- up period (3 years).
(Ruet et al., 2013) MS	- The sample consisted of participants with complete data. - This community based sample is less subject to selection bias than a sample recruited from a MS clinic population and more closely reflects the MS population of the time of diagnosis. - A healthy matched control group. - The SF-36 is been shown to be a valid and reliable measurement in MS.	- Relatively small sample size (=69) - The cognitive test battery did not comprehensive evaluate executive functions, which has been associated with vocational status in prior studies. - Control subjects did not fill the QoL-scale.
(Stuifbergen et al., 2006) MS	- Consistent findings (with earlier studies). - Large sample size (560 participants).	- A 5-year longitudinal study provides only a limited glimpse of the disablement process in persons with a disease that often lasts for 40 years or more. - Exercise, as measured in this study, is broadly defined and relies on self-report. Patients with MS are a highly diverse group and we need to know much more about specific characteristics of their physical activity and exercise within the context of living with functional limitations.
(Chruzander et al.) MS	- The measurement sensitivity to change. - Long follow-up (10 years).	- No disease-specific measurement with pre-defined items to assess HRQoL was used, which might have underestimated the magnitude of the changes in HRQoL. - The magnitude of the changes in HRQoL might be affected by the lost to follow-up of 16 patients.
(Solari et al.) MS	- Study of patients as well as their significant others (comparison of both groups with Italian norms).	- Both surveys were mail-based, participants were not examined clinically by study neurologists. This might affect the reliability, especially for patients with severe cognitive compromise.

		- Participants were identified from a single source (the Lombardy Region Health Register), it's possible that not all MS sufferers in the region were included in this register, especially those with mild forms of MS. - Comparing signigifcant others's health status with data from contemporaneous controls would have been useful and will be addressed in future assessments of this cohort.
(Wynia et al.) MS	- The course of a broad range of MS-related disabilities and QoL in relation to disease severity was examined. - The responsiveness of the MSIP was found to be sufficient for 9 out of 11 MSIP domains. - The results of this study led to a precise insight into the consequences of MS, and subsequently provided information that can guide the selection of health care interventions.	- Lack of information about the use of immunomodulatory treatment among patients in the cohort. This treatment may have a positive impact on the course of the disease, and on the time before and between disability milestones. - The incompleteness and limited quality of the information on causes of death that was obtained.
(Khan et al.) MS	- This study has several advantages, including standardized definition of chronic pain (over a longer time period), diagnosis of definite MS, a homogeneous MS population living in the community with quantified physical and cognitive deficits, who were mobile and able to participate, the face-to-face interview technique, number of variables studied relating to pain (intensity, frequency, location), and access and health service usage to allow comparison with previous studies. The sample in this study had diverse disability and included a range of disease course, duration, and severity of MS.	- A relatively small sample and potential sampling biases (e.g., reliance on convenience samples from clinical settings in a tertiary regional metropolitan region specializing in the treatment of MS), which may influence the generalizability of findings. - Participants who were institutionalized and bed-bound were not included, which may have resulted in under-representation of disability related to severe pain. - Some participants failed to complete follow-up assessments and therefore were excluded from the analysis, which may also have introduced potential bias as these participants may be more vulnerable to pain. - This study did not assess association of psychosocial variables such as coping strategies, pain-related, and other environmental factors, to reduce subject burden.
(de Groot, Beckerman, Lankhorst, Polman, & Bouter) MS	- All participants were diagnosed < 6 months previously. - The validity of the FIM has been established for use in inpatient and outpatient rehabilitation settings, and its reliability is good.	- The definition of the type of MS is a potential weakness. RRMS is relatively easy to recognize, whereas PPMS is more difficult to recognize. Furthermore, there is a small group that cannot be recognized in the early stages of the disease. - 5 patients were classified SPMS at baseline. This is rather unexpected in this incidence cohort, because this type of MS is normally preceded by RRMS. For these patients there was a delay in making the diagnosis, this delay might lead to onset confounding.
(Giordano, Ferrari et al.) MS	- Long follow-up (11years). - Community based nature.	- The three surveys were mail-based, participants were not examined clinically by study neurologists. This might affect the reliability, especially for patients with severe cognitive compromise. - Possible floor effect. - Although EDSS is often used in MS, its heavy reliance on ambulation reduces sensitivity among those with most disability. - Participants were identified from a single source (the Lombardy Region Health Register), it's possible that not all MS sufferers in the region were included in this register, especially those with mild forms of MS.
(Klotsche et al.) PD	- The sample size of this study was appropriate for robust parameter estimates and convergence of the estimation algorithm when using a growth mixture model with a small number of covariates.	- A larger sample size would be necessary to obtain stable parameters estimates for a more complex model with time-varying covariates. - Other covariates that were not included in the model may have influenced the the HRQoL

	- A combination of the generic EuroQoL (clinical and economic evaluation) instrument and the disease-specific PDQ-39. The PDQ-39 is a widely used, reliable and valid PD-specific quality of life instrument. - Beck Depression Inventory (BDI) is a reliable and valid measure for use in patients with PD.	trajectories. In particular, non-motor symptoms, psychiatric complications, sleep disturbances, and autonomic disturbances that are known to reduce HRQoL, were not considered.
(Karlsen, Tandberg, Arsland, & Larsen) PD	- This study is the first to describe the longitudinal evolution of HRQoL over time in patients with Parkinson's disease. - Extensive methods were employed to obtain total case ascertainment. - The medical system in the area is well developed, easily accessed, and independent of economic or social status, thus most cases of Parkinson's disease were included in the study.	- Social factors, including loss of spouse or other relatives, changes in living situations, or degree of social contact may also be expected to influence the observed variation in HRQoL. These factors were not included in the analysis. - The presence of concurrent diseases was not evaluated, which would be expected to be present in this age group. Medications taken for diseases other than PD might influence the results. - Large lost to follow-up
(Erro et al.) PD	- All 'de-novo' patients (disease duration < 2 years) - First study to examine the 'honeymoon period' specifically. - The Non-Motor Symptoms Questionnaire (NMSQuest) is a valid tool in PD collecting information about the presence/absence of 30 non-motor symptoms (NMS's) over nine non-motor domains. The NMSQuest correlates very highly with overall non-motor load and can be considered as a reliable surrogate marker of non-motor burden.	- The cohort is unlikely to reflect the general PD population as enrolment was performed at a tertiary centre. - Data about presence/absence of NMS's was collected but not about their severity. - No enrolment of age-matched healthy controls. - It might be argued that the reported prevalence of some NMS's might have been affected by treatments other than dopaminergic replacement therapy (DRT).
(Forsaa, Larsen et al.) PD	- Few patients were lost to follow-up for other reasons than death. - Due to strict diagnostic criteria, the number of patients who were rediagnosed as not having PD was low. - The Nottingham Health Profile (NHP) is a generic HRQoL questionnaire which has been extensively tested psychometrically and is shown to be both valid and reliable in several patient populations, and feasible for use in patients with PD. A major strength of the NHP and of generic health profile measures in general is that they allow for comparison of HRQL statuses between patient groups, and between patients and healthy controls. In addition, the NHP is easy to administer, understand and answer. - The results may be of particular interest when designing drug trials that intend to explore potential drug influence on HRQoL in PD over several years.	- Large attrition rate due to death. - Other disease-related symptoms, not captured by the models used, such as autonomic and gastrointestinal symptoms, pain and non-PD related comorbidities may also have contributed to the decline in HRQoL in this cohort. - The use of a generic HRQoL measure instrument may underestimate the significance of subtle but highly disease-specific features, particularly in patients with otherwise advanced disease.
(Lawson, Yarnall et al.) PD	- This is the first study to investigate the longitudinal effects of cognitive impairment on QoL using a range of validated assessments in a large group of patients with newly diagnosed PD. - The Montreal Cognitive Assessment (MoCA) is a measure of global cognition that is quick and simple to administer. It could have utility in anticipating future difficulties for individuals with PD.	- 312 patients declined participation, which may introduce selection bias. - The small number of participants who did not return for further evaluation may have been those with a more rapid decline in PD, cognition and QoL and would therefore have been of particular interest to this study. - Missing data were problematic. This reduced the statistical power that requires complete datasets, such as linear regression and PCA.

Table 5: Overview of the included articles: data extraction

1. Stroke

Title / Authors / Journal	*Study design*	*Population*	*Aims study*	*Number of measurements*	*Outcome measures (QOL)*
Quality of life after TIA and stroke: Ten-year results of the Oxford Vascular Study Luengo-Fernandez R., Gray AM., et al. 2013 American academy of neurology,	A prospective longitudinal study United Kingdom	Baseline: 440 TIA and 748 CVA Final follow up: 210 TIA and 269 CVA	To evaluate the 5-year impact of stroke and TIA on utility and quality-adjusted survival.	at 1, 6, 12, 24, and 60 months.	QoL: - EQ-5D-3 questionnaire - quality-adjusted life years (QALY's) Other: - impairment: NIH Stroke scale (NIHSS)
Clinical determinants of long-term quality of life after stroke. M.D. Patel., C.Mckevitt., et al 2007 Age and ageing,	A prospective longitudinal study United Kingdom	Baseline: 946 Final-follow up: 397	To determine factors that independently predicted HRQol 1 and 3 years after stroke.	At baseline, 1 and 3 years.	QoL: - SF-36 or SF-12 (PHSS: physical health summary scale, MHSS: mental health summary score) Other: - socio-demographic characteristics - risk factors - ADL: Barthel index (BI) - stroke severity: Oxfordshire Community Stroke Project Classification
Natural history, predictors and associated outcomes of anxiety up to 10 years after stroke: The South London Stroke Register Luis Ayerbe, Salma A. Ayis, et al. 2014 Age and ageing,	A prospective longitudinal study United Kingdom	Baseline: 1104 final follow up: 230	This study calculates the predictors of anxiety and its association with depression and the association between anxiety 3 months after stroke and mortality, stroke recurrence, disability, cognitive impairment and quality of life at follow-up.	at baseline, 3 months, 1 year end then annually for up to 10 years.	QoL: - SF-36 or SF-12 Other: - depression: Hospital Anxiety and Depression Scale (HADS) - cognitive function: Mini-Mental State examination (MMSE) or the Abbreviated Memory Test (AMT) - socio-demographics characteristics - stroke severity: GCS, hemiparesis and urinary incontinence - ADL: Barthel index (BI) - pharmacological treatment for depression, employment status and smoking habit

Is fatigue an independent factor associated with activities of daily living, instrumental activities of daily living and health-related quality of life in chronic stroke? van de Port IG., Kwakkel G., et al 2007 Cerebrovasc Dis,	A prospective longitudinal study The Netherlands	At 6,12 and 36 months 223 participants were included	To determine the longitudinal association of post stroke fatigue with activities of daily living (ADL), instrumental ADL (IADL) and perceived health-related quality of life (HRQoL) and to establish whether this relationship is confounded by other determinants.	At 6,12 and 36 months.	QoL: - Sickness Impact Profile 68 (SIP 68) Other: - participation: Frenchay Activities Index (FAI) - ADL: Barthel index (BI) - fatigue: Fatigue Severity Scale (FSS) - time independent variables (age, gender and comorbidity) - time dependent variables (depression, severity of hemiplegia and executive functions)
Stroke, Physical Function, and Death Over a 15-Year Period in Older Australian Women Isobel J. Hubbard., et al 2016 American Heart Association, Inc.	A prospective longitudinal study Australia	Baseline: 12432 Final follow-up: 10761	investigates long-term outcomes for women with stroke, comparing mortality rates for those with poor and adequate PF, to understand how long women might live with stroke and with physical disability.	Every 3 years between 1999 and 2011.	QoL: - Medical Outcome Short form (SF) 36 (poor PF < 40 and adequate PF > 40) Other: - demographic covariates - health covariates (BMI, smoking status and comorbidity) - date and cause of death

Title / Authors / Journal	Results	Discussion	Conclusion
Quality of life after TIA and stroke: Ten-year results of the Oxford Vascular Study Luengo-Fernandez R., Gray AM., et al. 2013 American academy of neurology,	Impact of TIA and stroke on EQ-5D utility: at 1 month: TIA (0.77), stroke (0.61) and control (0.85) at 5 years: TIA (0.80), stroke (0.68) and control (0.86) At 1 month, average utility for severe stroke patiënts was 0.13 compared with 0.50 for moderate stroke and 0.73 for minor stroke patiënts. For severe strokes patiënts utility increased to 0.38 at 5 years whereas for minor stroke patiënts utilities remained constant over the 5-year follow-up period. Utilities for matched cases at 5 years postevent were lower than for controls -0.09 for TIA and -0.18 for stroke. quality-adjusted life years: survival data were combined with utility to estimate 5-year QALY's: stroke: lost 2.21 QALY's (1.71 mortality and 1.08 Qol) TIA: lost 1.68 QALY's (0.71 mortality and 0.97 Qol) <u>predictors of short and long-term EQ-5D utility:</u> - event severity, one or more recurrent strokes and stroke vs TIA => lower utility's - men were found to have higher utility than women (not significant) - age left education, married patients and younger at onset => higher utility's	utility for TIA and stroke patients was lower throughout the 5-year follow-up than for matched controls. Quality adjusted survival was considerably affected after stroke and TIA with 5-year quality adjusted life expectancy being 2.21 QALYs for stroke and 3.32 QALYs for TIA patiënts. Because TIA symptoms leave little or no permanent damage to the brain, TIA would be expected to have little impact on QoL. However, the overall combined effect of medication, anxiety and the impact on their working life, will affect QoL. For stroke patiënts, we found an improvement in utility between 1 and 6 months, which was then maintained throughout the remaining 5 years.	5-year adjusted survival after stroke and TIA is reduced. Being older, female, having a moderate to severe stroke, and subsequent strokes after event onset were independent factors in predicting lower utility. There remains considerable scope for improvements in acute treatment and secondary prevention to improve Qol after TIA and stroke.

Clinical determinants of long-term quality of life after stroke. M.D. Patel.,C.Mckevitt., et al 2007 Age and ageing,	<u>HRQOL 1 year after stroke:</u> for PHSS (physical health summary scale: - males were better than females (p=0,025) - non-manual workers better than manual workers (p=0.033) - diabetics were worse than non-diabetics (p<0,01) - premorbid Barthel index <15 were worse than those with premorbid BI 15-20 - right hemispheric lesions, dysphaghia, visuo-spatial neglect, urinary incontinence and cognitive impairment => worse PHSS for MHSS (mental health summary score): - subjects aged over 75 reported better mean MHSS than those under 65. - Ischaemic heart disease, cognitive impairment and being Asian => worse MHSS <u>HRQOL 3 years after stroke PHSS:</u> For PHSS: - hypertension, urinary incontinence and cognitive impairment => worse PHSS - age (>75) and carribean/ african => better PHSS For MHSS: - no significant factors except hypertension	Younger subjects reported that worse mental and physical health may be due to either younger subjects being less able to cope psychosocially than older subjects or they may have higher expectations of health. Lower subjective well-being in women may be due to a social-cultural effect. Once they are disabled by stroke, it may be more difficult for their male partners to look after them, reducing their QoI. This study examined associations between stroke risk factors including diabetes, hypertension and ischaemic heart disease and HRQol long-term after stroke. These associations may be due to the additive effects of the conditions themselves, and emphasise the hypothetical potential of improving HRQOL after stroke by managing the risk factors more effectively after stroke. This study found right hemispheric lesions to be significantly associated with poor PHSS at 1 year after stroke. This may be due to the neurological disturbances associated with right-sided neglect, anosognosia and spatial disoriëntation which may have devastating effects on social functioning and thus on HRQol. Urinary incontinence was independently associated with poor PHSS after stroke. These results not only confirm that incontinence is a good indicator of initial stroke severity, but they also reflect the strong associations incontinence has with long-term outcomes including QoL.	We conclude that determinants of QoI vary over time after stroke and differ for physical and psychosocial aspects of QoI. Long-term QoL remains low up to 3 years after stroke regardless of demographic factors, risk factors, stroke subtypes or initial impairments.
Natural history, predictors and associated outcomes of anxiety up to 10 years after stroke: The South London Stroke Register Luis Ayerbe, Salma A. Ayis, et al. 2014 Age and ageing,	cumulative incidence of anxiety at some time points was 57.5 % and the prevalence ranged from 31.9 to 38.3 %. The proportion of patiënts with anxiety presenting depression simultaneously ranged from 56.9 to 73.2 %. <u>Predictors of anxiety after stroke:</u> - age <65 => anxiety at 3 months, 1, 3 and 5 and 5 years. - female gender => anxiety at 3 months, 1 and 3 years. - disability => anxiety at 3 months and 3 years. - paresis => anxiety at 1 year. - inability to work => anxiety at 3 months - treatment for depression and a smoker at time of stroke => anxiety at 3 and 5 years <u>Health outcomes associated with anxiety up to 10 years after stroke:</u> - no significant association between anxiety at 3 months and mortality after follow-up. - No significant association between anxiety at 3 months and disability, cognitive impairment or physical domain of the QoI at 3 months, 1,3,5 and 10 years - anxiety 3 months after stroke was significantly associated with lower scores in the mental domain of QoI in 1,3 and 5 years.	At any given time point the prevalence of anxiety was over 30 %. The majority of patiënts who had anxiety presented their first symptoms 3 months after stroke. Over half of the patiënts with anxiety had depression at the same time. Therefore, stroke survivors reporting symptoms of anxiety should be screened for depression. Clinicians seeing long-term stroke survivors should also pay special attention to female patiënts who had a severe stroke under the age of 65 as they are at a significantly higher risk for depression and its consequences. The association between anxiety and depression during the follow-up may explain the association between anxiety and lower QoI.	Anxiety is a frequent clinical problem affecting stroke survivors in the long term and it is associated with lower QoI and depression, which predicts shorter survival and poorer prognosis. - Anxiety affects over half of stroke survivors in the long term - Anxiety is strongly associated with depression and leads to lower QoI in the long term after stroke - Female patiënts, aged below 65, suffering severe strokes with previous history of depression are at high risk of anxiety

Is fatigue an independent factor associated with activities of daily living, instrumental activities of daily living and health-related quality of life in chronic stroke? van de Port IG., Kwakkel G., et al 2007 Cerebrovasc Dis,	At 6 months after stroke 68 % were fatigued (4.5), at 12 months 74 % (4.7) and at 36 months 58 % (4.3) <u>fatigue associated with:</u> - not significantly with BI between 6 and 36 months after stroke - significant association with FAI and SIP 68 <u>potential confounding factors:</u> - Instrumental ADL => adding depression (60.1%) and motor function (20.6%) caused a significant reduction in the FFS regression coefficient, therefore no significant relationship between FSS and IADL was found. - Health-related quality of life => no significant reduction in the FFS regression coefficiënt, therefore no significant change was found in the relationship between FSS and SIP-68.	Poststroke fatigue is more related to more complex, energy-consuming ADL's than to basic ADL's, however the association between fatigue and IADL become non-significant after controlling for depression and severity of hemiparesis, suggesting that these 2 factors determine the relationship between fatigue and IADl in chronic stroke. Besides depression the relation between fatigue and IADL was also influenced by motor impairments, since patiënts with severe hemiparesis need more energy for extended ADL. Depression was also the strongest confounder distorting the association between fatigue and perceived HRQol. However, even after controlling for depression, fatigue remained a significant factor that is independently associated with HRQol. Demographic factors such as age, gender and comorbidity did not significantly bias the longitudinal relation between fatigue and IADL or HRQol.	This study shows for the first time that poststroke fatigue is an important covariate that is significantly associated with IADL and HRQol, but not with basic ADL's between 6 and 36 months after stroke.
Stroke, Physical Function, and Death Over a 15-Year Period in Older Australian Women Isobel J. Hubbard., et al 2016 American Heart Association, Inc	Primary outcomes: - 82.2 % from the women who had a poor PF at survey 1 still had a poor PF at survey 6, indicating little recovery using the <40 cut point. - Median survival time was 10 years for poor PF and 12.3 years for adequate PF ho reported stroke. (10 years after stroke, 63% with adequate PF were still alive compared with 49 % with poor PF) - After adjusting for demographic and health covariates PF remained significantly associated with mortality risk among women with new stroke a new stroke during the study period + poor PF: - not partnered, obese (BMI>29,9) and diagnosed with diabetes mellitius, heart disease and hypertension	The study shows that many women who experience stroke, survive many years with poor PF. - Poor PF was associated with diabetes mellitus, heart disease and hypertension => this indicates that poor PF may not be due exclusively to stroke, but also be exacerbated by other conditions. - Mortality rate was significantly higher among women with poor PF compared with women with adequate PF. - 15 years after a new stroke, 41,6 % of women with adequate PF were still alive compared with 27 % with poor PF => demonstrating older women can survive many years after stroke, even with poor PF.	There is currently no strategy to maintain or improve PF in older stroke survivors and no evidence that consideration has been given to the needs of older women living with stroke for > 15 years. Further research is required into how maintaining and sustaining levels of PF can be efficiently achieved in programs that target older women who survive stroke.

2. Spinal cord injury

Title / Authors / Journal	*study design*	*Population*	*Aims study*	*Number of measurements*	*Outcome measures*
Aging with spinal cord injury: changes in selected health indices and life satisfaction Charlifue S., Daniel P. et al, 2004 Arch Phys Med Rehabil,	a prospective longitudinal study U.S. Amerika	Baseline: 7981 Final follow-up: 489	To document the impact of age, age at injury, years post injury, and injury severity on a variety of selected medical outcomes and QoL of people aging with SCI.	1, 5, 10, 15, 20 and 25 years post injury.	QoL: - Self-assessed health status - Satisfaction with Life Scale Other: - pain - demographic characteristics - injury characteristics: ASIA-scale - method of bladder management
Longitudinal relationship between wheelchair exercise capacity and life satisfaction in patients with spinal cord injury: a cohort study in the Netherlands Van Koppenhagen C.F., Post M. et al., 2014 The Journal of Spinal Cord Medicine,	a prospective longitudinal study The Netherlands	Baseline: 225 Final follow-up: 130	To examine the relationship between wheelchair exercise capacity and life satisfaction in persons with spinal cord injury.	at start of active rehabilitation, after 3 months, 1 and 5 years after discharge.	QoL: - Life Satisfaction Now - Life Satisfaction Comparison - Life Satisfaction Total => sum score of both questions Other: - demographic characteristics - lesion characteristics: ASIA Impairment scale - functional independence: FIM - secondary impairments - sports participation - wheelchair exercise capacity: VO2-peak and PO-peak
SCI Longitudinal Aging Study: 40 Years of Research Krause J., Clark J., et al. 2002 Top Spinal Cord Inj Rehabil,	a prospective longitudinal study U.S. America	Final follow-up: 759	To provide a detailed history of the study, response patterns, utilization of measures and a summary of key findings.	8 measurements (1973, 1984, 1989, 1993, 1998, 2003, 2008, 2013)	QoL: - Life Situation Questionnaires (LSQ) Other: - demographic characteristics - injury characteristics - educational status - employment history - medical history - depressive symptoms: Patient health questionnaire (PHQ-9)

Predicting quality of life 5 years after medical discharge for traumatic spinal cord injury Erosa N., Berry J., et al. 2013 British Journal of health Psychology,	a prospective longitudinal study U.S. America	Baseline: 144 Final follow – up: 76	This study tested a contextual model of the mediating effects of participation on the predictive relationships of functional impairment, family satisfaction and pain to QoL following SCI.	At 12, 24, 48 and 60 months after discharge.	QoL: - Life Satisfaction Index - A (LSI) - Self-rated health status Other: - functional impairment: FIM - pain - participation: Craig Hospital assessment and Reporting Technique (CHART) Mobility and Social integration - Family satisfaction scale

Title / Authors / Journal	*Results*	*Discussion*	*Conclusion*
Aging with spinal cord injury: changes in selected health indices and life satisfaction Charlifue S., Daniel P. et al, 2004 Arch Phys Med Rehabil,	<u>Health and psychosocial outcomes:</u> - Low self assessed health score => indicating good perceptions of health by people with SCI - SWLS score were generally high => indicating good life satisfaction by people with SCI - Low pain scores => suggesting that pain did not interfere in daily activities <u>Changes across time:</u> - There was a statistically significant decrease in the average numbers of hospitalizations, number of days hospitalized and the average numbers of pressure ulcers with increased injury duration <u>Predictors of change:</u> - pressure ulcers => presence of ulcers 5 years earlier and a more severe SCI - number of rehospitalizations => being older at injury, unmarried, indwelling catheter, a more severe SCI and having been hospitalized for more days 5 years previously - poorer self-assessed health => poorer perception of health 5 years earlier - lower satisfaction with life => unmarried, lower rating of life satisfaction 5 years earlier	There was a slight, but significant decline in perceived health status as one lives longer with SCI. However, life satisfaction appears to improve, pain as an interfering factor in daily activities becomes less of a problem, and the number and length of hospitalizations decline. ClearlyThe most significant predictor of any of the selected outcomes was the rating of that same outcome 5 years earlier. The evidence is clear that those who are injured later in life have a higher prevalence of medical conditions, which would predispose them to rehospitalizations after rehabilitation.	The findings from this study clearly indicate that the best predictor of a given complication is the previous incidence of that complication even in the long-term survivors. It is incumbent on clinicians never to pass up opportunities for prevention and that effort should be renewed with each intervention.

Longitudinal relationship between wheelchair exercise capacity and life satisfaction in patients with spinal cord injury: a cohort study in the Netherlands Van Koppenhagen C.F., Post M. et al., 2014 The Journal of Spinal Cord Medicine,	This study confirms that most patiënts with SCI demonstrate improvements in wheelchair exercise capacity and life satisfaction through 5 years postdischarge. <u>Relations between wheelchair exercise capacity (WEC) and life satisfaction:</u> - Both POpeak and VO2peak were significantly associated with life satisfaction => 10w higher POpeak was associated with a 0.28 higher life satisfaction and 0.1 l/min VO2peak was associated with a 0.1 higher life satisfaction total score. <u>Confounders:</u> - age => POpeak and life satisfaction total - sports participation => Popeak, VO2peak and life satisfaction total	Patiënts with SCI with high wheel-chair exercise capacity have high life satisfaction. The results provide evidence of the positive relationship between exercise participation and quality of life. Increasing exercise capacity by training and or physical daily activity will most likely increase the general health op patiënts with SCI. The direct benefits are the neuro-hormonal results of the endorphins and oxytocin. The indirect benefits might be due to improved exercise capacity, which seems to be positively correlated with improved functional independence, lower levels of depression, higher social status an improved self-esteem in person with SCI. Up to 20% improvement in peak oxygen uptake and peak power can be achieved by patiënts with SCI. The subsequent improvement in life satisfaction is comparable to positive major life events such as marriage.	Wheelchair exercise capacity and life satisfaction are longitudinally associated up to 5 years after discharge from rehabilitation. Improvement in exercise capacity is associated with improvement in life satisfaction.
SCI Longitudinal Aging Study: 40 Years of Research Krause J., Clark J., et al. 1973 Top Spinal Cord Inj Rehabil,	important protective factors for mortality: - Participation in social activities outside the home and sitting tolerance Important risk factors for mortality: - Self-reported physical and psychological health problems, dependency and economic barriers represented significant risk factors. The participants appeared to be relatively well-adjusted overall, and nearly all outcomes improved over the first 11 years. Where social participation and satisfaction with social activities and health decreased. Satisfaction with employment and employment indicators were maintained. Economic satisfaction improved over time and general satisfaction declined over time. The impact of aging on quality of life suggests that persons who were older at injury had lower levels of Qol. White participants reported higher QoL and males reported lower QoL.	Individuals with SCI face significant challenges in maintaining longevity, therefore it is important to promote their psychological well-being, gainful employment and active participation to reduce their risk of mortality.	The overall results have indicated changing patterns of outcomes over time as persons with SCI age, notable declines in participation and health. There has been a survivor effect whereby persons who are more active, well-adjusted and healthier live longer.

Predicting quality of life 5 years after medical discharge for traumatic spinal cord injury Erosa N., Berry J., et al. 2013 British Journal of health Psychology,	Correlations between the predictor variables (FIM, pain and family satisfaction) and the presumed mediators (mobility and social integration) were all positive, but not all statistically significant. Correlations between both presumed mediators and both outcomes (life satisfaction and self-rated health status) were all positive and statistically significant. The only directional path in the model that contradicted hypotheses was the path from family satisfaction to mobility. Of the 12 specific indirect effects, three were not significant. - family satisfaction => mobility => life satisfaction - family satisfaction => mobility => self-reported health status - pain => social integration => self-reported health status	These findings demonstrate how disability-related and psychological variables can influence QoL through adverse effects on participation. Greater functional ability increases the likelihood of greater mobility and activity in social pursuits and accompanying opportunities to socialize years later. Thus, a person who is more functionally independent may likely experience greater mobility in their surroundings and more social contacts this contributes to greater life satisfaction.	The results imply that participation in the years following discharge has a measurable and pronounced effect on Qol, and there are identifiable factors that place individuals at risk of problems with participation in the years following discharge. These data suggest the need for community-based programmes to identify and assist at-risk individuals with SCI to enhance their QoL.
Trajectories in the course of life satisfaction after spinal cord injury: identification and predictors Van Leeuwen C., Post W., et al 2010 Arch Phys Med Rehabil,	<u>Different trajectories:</u> - The first trajectory: low levels of life satisfaction at all time points (n=56) - The second trajectory: Initial high levels of life satisfaction with slight increments over time (n=34) - The third trajectory: Low life satisfaction at the beginning and high life satisfaction scores at the end (n=48) - The fourth trajectory: high life satisfaction scores at the beginning and steep declines over time (n=5) - - The fifth trajectory: fluctuating life satisfaction levels at different time points (n= 63) <u>Predictors of life satisfaction:</u> - High life satisfaction compared with persons in the low life satisfaction trajectory: younger, paraplegia, higher functional independence, less pain and more everyday social support. - Low life satisfaction at the beginning and high life satisfaction scores at the end compared with persons in the low life satisfaction trajectory: female, higher functional independence and fewer secondary impairments	Functional independence and pain severity discriminated between the low and high life satisfaction trajectories. Furthermore, the present study showed that male sex and lower functional status were predictors of long-term poor life satisfaction. The core message, however is that demographic, lesion, physical and social characteristics at the start of rehabilitation cannot predict life satisfaction trajectories.	The distinct trajectories give professionals insight into how persons differ in their adaptation to an SCI. The results further suggest that it might be sufficient to repeatedly administer only 2 life satisfaction questions at the start of active rehabilitation and 3 months after, to predict long-term life satisfaction and to identify persons who might be considered for psychological consultation.

3. Traumatic brain injury

Title / Authors / Journal	Study design	Population	Aims study	Number of measurements	Outcome measures (QoL)
Trajectories of life satisfaction after TBI: Influence of life roles, age, cognitive disability, and depressive symptoms Shannon B. Juengst, Leah M. Adams, Et al 2015 Rehabilitation psychology,	A prospective longitudinal study U.S. America	Baseline: 9436 Final-follow up: 3022	Identify life satisfaction trajectories after moderate to severe traumatic brain injury, establish a predictive model for these trajectories across the first 5 years post injury *and* describe differences in these life satisfaction trajectory groups.	At 1, 2 and 5 years.	QoL: - Satisfaction with life scale (SWLS) Other: - participation: participation assessment with recombined Tools Objective (PART – O) - ADL: Functional independence Measures motor (FIM-MOT) and cognitive (FIM-COG) subscales - depressive symptoms: Patient Health Questionnaire-9 (PHQ-9)
Predictors of health-related quality-of-life following traumatic brain injury Meredith L. C. Williamson, Timothy R. Elliott, Et al 2012 Brain injury,	A prospective longitudinal study U.S. America	Baseline: 609 Final follow-up: 131	To examine the predictive associations of family satisfaction, functional impairment, pain, and depression on QoL among persons with traumatic brain injury.	At 12, 24, 48 and 60 months	QoL: - Sickness Impact Profile 68 (SIP 68) Other: - ADL: Functional independence measure (FIM) - Family Satisfaction Scale (FFS) - Presence of pain: yes/no - Presence of depression: yes/no
Trajectories of life satisfaction in the first 5 years following traumatic brain injury J. Aaron Resch, V. Villareal., et al 2009 rehabilitation psychology,	A prospective longitudinal study U.S. America	Baseline: 609 At final follow-up: 328	To examine the trajectories of life satisfaction in the first 5 years following the onset of TBI and prospectively examine the long term and co-occurring relationship of functional impairment subsequent to TBI to rates of change in life satisfaction over the first 5 years of TBI.	At 24, 48 and 60 months.	QoL: - The life satisfaction index-A Other: - injury severity: Abrreviated injury scale (AIS) - functional impairment: Functional Independence measure (FIM)
Depression and life satisfaction in patients with traumatic brain injury : A longitudinal study Andrea T. Underhill, Steven G. Lobello., et al 2003 Brain injury,	A prospective longitudinal study U.S. America	Baseline: 324	To examine the relationship of TBI-related depression at or before 24 months post-injury to life satisfaction at 24,48 and 6O months post-injury.	At 24, 48 and 60 months.	QoL: - The life satisfaction index-A Other: - depression: yes/no - injury severity: Abrreviated injury scale (AIS)
Trajectories of physical health in the first 5 years after traumatic brain injury Nada Andelic, Paul B. Perrin, et al 2014 Journal of Neurology,	A prospective longitudinal study Norway	Baseline: 133 At final follow up: 90	To examine whether physical health after TBI changes over time and whether the trajectories of recovery of physical health over 5 years could be predicted by the different demographic and injury-related variables.	At baseline, 1, 2 and 5 years.	QoL: - SF-36 Other: - demographic variables - fysieke activiteit: PF-10 - pijn: Bodily pain (BP-2 items) and General Health Perception (GH-5 items) - role limitations due to physical health problems: RP-4 items

Title / Authors / Journal	Results	Discussion	Conclusion
Trajectories of life satisfaction after TBI: Influence of life roles, age, cognitive disability, and depressive symptoms Shannon B. Juengst, Leah M. Adams,. Et al 2015 Rehabilitation psychology,	Trajectories of life after TBI (n=3022): - stable satisfaction (high life satisfaction across all time points) = 44,5% - stable dissatisfaction (dissatisfaction with life across all time points) =20,9% - initial dissatisfaction improving (initially dissatisfied, but improved over time) = 19,8 % - initial satisfaction declining (initially satisfied with life, but experienced declining life satisfaction) => 14,8 % <u>predicting variables for life satisfaction trajectories:</u> - 60+ age group => more likely belong to the stable satisfaction group and in the initial dissatisfaction improving trajectory groups. - higher FIM-COG scores => more likely belong to the stable satisfaction and initial satisfaction declining group - higher depression scores => more likely belong to all dissatisfied groups <u>Descriptive characterization:</u> - stable high satisfaction => highest percentage of 16-30 years old, high levels of participation, lowest cognitive disability and depressive symptoms - stable dissatisfaction group => highest percentage of 31-59 years old, low levels of participation, highest depressive symptoms and greatest cognitive disability - initially dissatisfaction improving group => started with the second lowest life satisfaction and second highest depressive symptom burden, but had improved by year 5 to have higher satisfaction and lower depressive symptoms than the initial satisfaction declining group and second highest percentages in participation	Life satisfaction can decline immediately following a life-altering event, but evidence suggests that most individuals level of satisfaction improves over time. This adaptation can take many years and is not always a return to pre-injury baseline. The life satisfaction trajectory groups differed by age: Those in middle age groups are more likely to have low life satisfaction than younger and older adults. Compared to older adults, middle aged adults may perceive life roles as both more important to their overall satisfaction and more limited by the effects of a chronic disease. While previous research suggests that both physical and cognitive disability are linked to life satisfaction after traumatic injuries. The present study found that only cognitive disability significantly predicted life satisfaction trajectories.	The known loss of life roles and prevalence of depression after TBI put individuals with TBI at high risk for low or declining life satisfaction. Development of education and intervention programs to address these issues may be critical to life satisfaction after brain injury. These data highlight the importance of addressing depressive symptoms and participation early after TBI.

Predictors of health-related quality-of-life following traumatic brain injury Meredith L. C. Williamson, Timothy R. Elliott, Et al 2012 Brain injury,	There were 2 statistically significant correlations between functional impairment and family satisfaction, as well as family satisfaction and pain. <u>Direct effects:</u> - greater functional impairment at 12 months was associated with the presence of depression at 24 months. - presence of pain at 24 months was associated with the presence of depression at 24 months - greater functional impairment and lower family satisfaction at 12 months were associated with lower QoL at or beyond 24 months post-discharge - The presence of pain and depression at 24 months were also associated with lower QoL at or beyond 24 months post-discharge	Pain may engender depressive symptoms such as negative moods and unpleasant experiences that predict further decreases in QoL among persons with TBI. Impairments in functional abilities following TBI may increase the probability of depressive symptoms which compromises QoL. A resilient, flexible family environment is prospectively predictive of well-being in the first few years following TBI.	QoL following TBI is compromised by factors such as pain, depression and functional impairment that limit expected and desired activities. In contrast, a supportive family environment, greater functional ability and an absence of pain and depression facilitate HRQoL in a fashion consistent with existing models of well-being and positive adjustment.
Trajectories of life satisfaction in the first 5 years following traumatic brain injury J. Aaron Resch, V. Villareal., et al 2009 Rehabilitation psychology,	<u>Modeling total FIM and gender with the rates of change of life satisfaction:</u> - the intercept, time and FIM(Tot) were significantly predictive of life satisfaction - Life satisfaction decreased over time for the entire sample, and participants with higher FIM(Tot) scores had higher life satisfaction at all time points. - Men and women did not differ in their trajectories of life satisfaction over time. <u>Modeling cognitive FIM and gender with the rates of change of life satisfaction:</u> - The intercept, time and FIM (Cog) were significantly predictive of life satisfaction - less cognitive impairment was initially associated with greater life satisfaction - The significant interaction indicates that higher FIM(cog) scores were significantly associated with a slower rate of decrease in life satisfaction <u>Post-hoc analyses:</u> - older age was associated with greater life satisfaction at the first assessment	The trajectory of long-term satisfaction is significantly associated with functional impairment. The associations between functional impairment and the trajectory of life satisfaction are consistent among men and women in the first 5 years after TBI. Finally, the significant association of functional impairment to the rates of change in life satisfaction holds true for both cognitive and motor impairment.	Individuals with greater cognitive and motor impairments following TBI are likely to experience significant declines in life satisfaction within 5 years of living with TBI.

Depression and life satisfaction in patients with traumatic brain injury: A longitudinal study Andrea T. Underhill, Steven G. Lobello., et al 2003 Brain injury,	Ninety respondents (27,8 %) reported a diagnosis of depression and the remaining 324 (72,2 %) reported no diagnosis of depression. <u>Life satisfaction was stable and did not show significant change over time.</u> The interaction between depression and life satisfaction was also not significant, indicating that life satisfaction was stable over time for the depression and no depression groups across the three measurement periods. The results indicate a significant main effect for depression, a significant main effect for employment status and a significant interaction between depression and marital status. The difference in life satisfaction was significant at all three measurement periods. - those who were employed at the 24-month interview period reported greater life satisfaction than the survivors of TBI who were not employed. The differences in life satisfaction between the two groups were maintained at the 48 and 60-month interview periods - The differences in life satisfaction between married and unmarried survivors of TBI were not significant at any of the 3 measurement periods.	Patiënts with TBI who acknowledge a diagnosis of depression at some point during the first 24 months post-injury earn significantly lower mean scores on the life satisfaction index at 24,48 and 60 months post-injury. Life satisfaction scores in the depression and no depression groups were stable over the 36-month period of the study. Employment was also associated with higher scores in life satisfaction and these were also stable across the three measurement periods.	Depression and diminished life satisfaction among survivors of TBI are persistent problems that require the close attention of medical and rehabilitation professionals.

Trajectories of physical health in the first 5 years after traumatic brain injury Nada Andelic, Paul B. Perrin, et al 2014 Journal of Neurology,	<u>Physical functioning (PF):</u> - PF improved across the three time points. (p=0.006) - higher level of education => higher PF scores over time. (p=0.014) - Employed at the time of injury => better PF over time. (p=0.029) - A shorter length of PTA (post-traumatic amnesie) => higher PF scores (p<0.001) - A more severe head injury had better PF over time. (p=0.049) <u>Role-Physical (RP) :</u> - Time was not significant across the three time points. - Men => higher RP across the three time points. - More severe brain injury => higher scores in RP. <u>Bodily Pain (BP):</u> - Time was not significant across the three time points. - Men => higher BP (lower pain) across the three time points. <u>General health (GH):</u> - Time was not significant across the three time points. - Men => higher GH-scores across the three time points. (P=0.037) - employed at the time of injury => higher GH over time. (p<0.001) - Higher ISS (more severe overall injury) => better GH (p=0.004)	The study sample showed lower physical health in all four physical dimensions of SF-36 across the follow-ups when compared with the general population of Norway. This study indicates that PF-scores improved significantly across 1,2 and 5 years post-injury. Physical role limitations remained stable across the three time points. Men had significantly higher RP-scores across the three time points than women. This might do speculate that the items in the RP subscale also pertain to different physical role tasks for men and women, rendering different trajectories. Participants with a higher CT Marschall score reported higher RP over time. This is probably because of high expectation of excellent performance in life roles. In addition, individuals with more severe injuries may have an altered awareness of their functional difficulties and may not distinguish their problems in the same way as those who are less severely injured. It also has been reported that the persistence of pain primarily caused by headache is an important factor in self-perceived QoL and disability status of individuals with TBI. Participants with non-physical work and those who had been employed at the time of injury had better general health over time than participants than those who were unemployed.	Role-Physical, Bodily pain and General Health did not improve over time, despite the improvement in PF. A better understanding of demographic and injury-related factors influencing the Role physical experiences and General Health perception over time and effective reducing rehabilitation strategies are needed to increase the quality of life after TBI.

4. Multiple sclerosis

Title / Authors / Journal	*Study design*	*Population*	*Aims study*	*Number of measurements*	*Outcome measures (QoL)*
A 10- year follow up of a population based study of people with multiple sclerosis in Stockholm, Sweden: Changes in health-related quality of life and the value of different factors in predicting health-related quality of life Chruzander C., Ytterberg C., et al. 2014 Journal of the Neurological Sciences,	A prospective longitudinal design Sweden	Baseline: 166 Final follow up: 118	Explore changes in and the predictive value of personal factors, degree of MS disability, depressive symptoms and cognitive impairment on QoL.	At baseline and 10-year follow-up.	QoL: - Sickness Impact Profile - EuroQol 5D - EQ Visual Analog Scale Other: - disease characteristics: EDSS - coping capacity: Sense of Coherence Scale - cognitive function: Symbol Digits Modalities Test - Depression: Beck Depression Inventory
A longitudinal survey of self-assessed health trends in a community cohort of people with multiple sclerosis and their significant others Solari A., Ferrari G., Radice D. 2005 Journal of the neurological Sciences,	A prospective longitudinal design Italië	Baseline : 251 Final follow – up: 138	To prospectively assess changes in self-perceived health status over 5 years.	5 years follow up after another survey in 1999.	QoL: - MSQOL-54 Other: - depression: Chicago Multiscale Depression Inventory (CMDI) - demographic characteristics - disease characteristics: EDSS
Change in disability profile and quality of life in multiple sclerosis patients: a five-year longitudinal study using the Multiple Sclerosis Impact Profile Wynia K., van Wijlen AT., et al. 2012 Multiple sclerosis journal,	A prospective longitudinal design The Netherlands	Baseline: 378 Final follow–up: 245	To examine the course of MS-related disabilities and QoL in relation to disease severity, and responsiveness of the Multiple Sclerosis Impact Profile.	At baseline and 5-year follow-up.	QoL: - World Health Organization Quality of Life-Abbreviation version (WHOQOL-BREF) Other: - ADL: Multiple Sclerosis Impact Profile - responsiveness of MSIP - Mortality rate - Disease characteristics: EDSS
Longitudinal 7-year follow up of chronic pain in persons with multiple sclerosis in the community Khan F., Amatya B., et al. 2013 J. Neurol.,	A prospective longitudinal design Australia	Baseline: 94 Final follow–up: 74	To examine the course and impact of chronic pain and pain-related disability in persons with multiple sclerosis.	At baseline and 7 year-follow up.	Qol: - Assessment of quality of life (AQoL) questionnaire Other: - pain: Visual analog scale (VAS), Chronic pain grade (CPG) - pain treatments and access - disease characteristics: EDSS

Vitality, perceived social support and disease activity determine the performance of social roles in recently diagnosed multiple sclerosis: a longitudinal analysis de Groot V., Beckerman H., et al. 2008 J. Rehabil Med,	A prospective longitudinal design The Netherlands	Baseline: 156 Final follow –up: 134	To identify the principal determinants that are longitudinally associated with the performance of social roles in the first 3 years following a diagnosis of multiple sclerosis.	At baseline, 6 months, 1, 2 and 3 years.	QoL: - Study Short Form-36 (SF-36) Other: - patient and disease characteristics - psychosocial characteristics - social support: Social Support List Interactions, Social Support List Discrepancies - basic functions/basic ablities
Cognitive impairment, health related quality of life and vocational status at early stages of multiple sclerosis: a 7-year longitudinal study Ruet A., Deloire M., et al. 2012 J. Neurol.,	A prospective longitudinal design France	Baseline: 65 participants Final follow – up: 52 Control group: healthy subjects (n=65)	To assess the association between QoL, cognitive impairment and vocational status in a longitudinal followed sample of newly diagnosed patients.	At baseline and 7-year follow-up.	QoL: - SEP-59 scale/MSQoL Other: - neuropsychological assessment - vocational status - disease characteristics: EDSS - depression: Montgomery and Asberg Depression Rating Scale (MADRS) - fatigue: United-Kingdom Neurological Disability Scale (UKNDS)
Exercise, Functional Limitations, and Quality of Life: A Longitudinal Study of Persons with Multiple Sclerosis Stuifbergen AK., Blozis SA., et al. 2006 Arch Phys Med Rehabil,	A prospective longitudinal design U.S. Amerika	Baseline: 621 Final follow – up: 560	To explore the trajectories of functional limitations, health behaviors (exercise), and QoL and their interrelations over a 5-year time period in a sample of persons with multiple sclerosis (MS).	At baseline and every year after baseline up to 5 years.	QoL: - Quality of Life Index-MS version (QLI-MS) Other: - demographic characteristics - disease characteristics: EDSS - functional limitations: Incapacity Status Scale (ISS) - engaging in activities to increase their level of well-being: Health Promoting Lifestyle Profile 2 (HPLP-2)
The initial course of daily functioning in MS: a three-year follow-up study V. de Groot, H. Beckerman, et al 2005 Multiple sclerosis journal,	A prospective longitudinal design The Netherlands	Final follow-up: 156	The initial course of MS in the domains of neurological deficits, physical functioning, mental health, social functioning and general health for the relapse onset group and the non-relapse onset group in the first three years.	At baseline, 6 months, 1, 2 and 3 years.	QoL: - SF-36 Other: - Neurological deficits: EDSS - Physical functioning: FIM motor function - Cognitive functioning: FIM cognitive function
Self-assessed health status changes in a community cohort of people with multiple sclerosis: 11 years of follow-up Giordano A., Ferrari G., et al 2012 European Journal of Neurology	A prospective longitudinal design Italy	Baseline: 251 Final follow-up: 171	to assess changes in patient self-perceived health status and QoL, and identify predictors of such changes.	Started in 1999, 2004 and 2010.	QoL: - MSQOL-54 Other: - depression: Chicago Multiscale Depression Inventory (CMDI) - neurological deficits: EDSS - demographic variables

Title / Authors / Journal	Results	Discussion	Conclusion
A 10- year follow up of a population based study of people with multiple sclerosis in Stockholm, Sweden: Changes in health-related quality of life and the value of different factors in predicting health-related quality of life Chruzander C., Ytterberg C., et al. 2014 Journal of the Neurological Sciences,	PwMS deceased at the 10-year follow-up scored significantly lower at baseline according to: SIP-Total, SIP Physical and Psychosocial dimension (p<0.001), compared to PwMS who were alive and participated at 10-year follow-up <u>Worse QoL at follow up for:</u> - SIP-total (0.25) - Sip physical dimension (0.33) - SIP body care/movement - SIP social interaction - EQ-5D index (0.29) <u>Factors associated for SIP-total:</u> - Duration of MS (<11y/>12y) (p=0.026) - Type of MS (RR/progressive) (p<0.001) - Degree of MS disability (EDSS) (p<0.008) - Cognition (SDMT) (p=0.033) <u>Factors associated for EQ-VAS</u> - Immunomodulatory treatment (p=0.027) - Degree of MS disability (EDSS) (p<0.008) - Depression (BDI) (p<0.001) - Coping capacity (SOC-scale) (p<0.001)	The high proportion of PwMS reporting comorbidity both at baseline and at follow-up is notable and implies that other disorders besides MS may contribute to the impact of QoL. Response-shift could be a plausible explanation for our result demonstrating a stable psychosocial QoL and QoL as personally labeled. Environmental facilitators (products and technology, personal care providers, personal assistance, health-care systems and policies). might be of importance to reduce the impact of disability on QOL. The presence of these facilitators might differ between countries because of different health-care organizations.	In a 10-year perspective the QoL with regard to its physical domain tends to get worse in PwMS. Whereas QoL, with regard to its psychosocial domain and with regard to PwMS self related health, remains stable. The health profile for those who died during the study period was significantly worse at baseline, compared those who survived. Important modifiable factors for health-care professionals to recognize are depressive symptoms and/or cognitive impairment.
A longitudinal survey of self-assessed health trends in a community cohort of people with multiple sclerosis and their significant others Solari A., Ferrari G., Radice D. 2005 Journal of the neurological Sciences	<u>MSQL-54: comparison over a 5-year period:</u> - domains worsened: health domain (p<0,0001), physical function (p<0,001), general health (p=0,01) - domains improved: social function (p<0,0001), mental health (p=0,001), health distress (p=0,02) <u>Significant overall deterioration in health status over the 5-year period:</u> - the proportion with severe neurological impairment increased from 16% to 33% - The proportion requiring daily home assistance: from 19% to 28%	The findings of a worsening in some health-related quality of life domains, and no change or even improvement in others could be the result of a response shift. Another important finding of the study is that, despite deterioration in clinical status and increased assistance needs, overall use of health care resources (hospital admissions, general practitioner and neurologist consultations) decreased over time. This may be due to reduced availability of resources or greater difficulty in accessing them, or even reduced confidence in the ability of these professionals to help them. Another possible interpretation is that greater acceptance of the disease contributed to the observed improved health distress, mental health and social function, which would tend to decrease the frequency of consultation.	MS has a pervasive but inhomogeneous impact on the lives of MS sufferers: the proportion of those severely impaired doubled over the study period.

Change in disability profile and quality of life in multiple sclerosis patients: a five-year longitudinal study using the Multiple Sclerosis Impact Profile Wynia K., van Wijlen AT., et al. 2012 Multiple sclerosis journal	Overall change in disability profile and QoL: - significant increase in 8/11 MSIP disability domains when compared with baseline, largest, but moderate increase, in the lack of support from environmental factors domain (Mean change: 11.6) - small significant worsening in QoL concerning 1/4 domain: Physical health and autonomy (Mean change: -0.6) Subgroup EDSS 0 to < 4.5: increase in MSIP disability in 7/10 disability domains, lack of support from environmental factors showed a moderate increase (ES: 0.60), all other changes were of a small magnitude; small worsening of QoL concerning physical health and autonomy (ES:0.36). Subgroup EDSS ≥ 4.5 to < 7: mean EDSS score increased from 6.0 to 6.5 (p = 0.000); increase in 5/10 MSIP disability domains, lack of support from environmental factors showed a moderate increase (ES: 0.65), all other changes were of a small magnitude; no changes in QoL among this subgroup. Subgroup EDSS ≥ 7 to < 10: mean EDSS score increased from 8.5 to 9.0 (p = 0.001); small increase in impairment of speech functions (ES:0.47), other MSIP disability domains, as well as all QoL domains, did not change. Mortality rate was highest in in the highest disease severity subgroup: 23.6% died during the 5-year period.	The median age of 51 years for passing the disability milestone EDSS 7 was lower than previous natural history studies. These findings may be indicative of the fact that advances in disease severity in our cohort were faster than these in previous research. There are several reasons that could explain this difference: - Ongoing discussion about when progression in MS can be defined as 'sustained progression'. - Precision of results: exact moment of passing the milestone is somewhere between both measurements - The range between minimum and maximum age for passing a milestone in this simple was 40 years, this broad range might affect the median age - The findings are based on self-report questionnaires, results are similar but not equal to observation-based measures	Prominent increases in multiple aspects of disability and loss of QoL occur in early stages in MS in particular. Health care interventions may lead to large health and QoL gains in particular when offered to patients who are in the first stage of the MS process.
Longitudinal 7-year follow up of chronic pain in persons with multiple sclerosis in the community Khan F., Amatya B., et al. 2013 J. Neurol.,	QoL: Compared with participant report at T1, there was a significant deterioration in scores at T2 for QoL domains of ''independent living'' (p<0.001) and ''physical senses'' (p = 0.013) Prevalence and location of pain: At T2, 13 (13.8 %) more participants reported chronic pain since baseline (T1). The most common pain location was in the lower limbs with more than half (53 %) reporting bilateral pain and a further 18 % reporting unilateral pain in this area. CPG: At T2 more participants reported higher disability, severely limiting their daily activities due to pain (grade IV–high disability, severely limiting, 16.2 vs. 0 %). At T2, 34 participants (46 %) were classified as grade I (low disability, low intensity), 24 (32 %) in grade II (low disability, high intensity), and 4 (5 %) in grade III (high disability, moderately limiting), compared to 21 (34 %), 25 (41 %), and 13 (21 %) at T1, respectively.	This study includes a relatively small sample and potential sampling biases (e.g., reliance on convenience samples from clinical settings in a tertiary regional metropolitan region specializing in the treatment of MS), which may influence the generalizability of findings. The demographic and clinical characteristics of participants in this study, however, are similar to participants in other MS studies in terms of their age, gender, EDSS scores, and disease course.	Over a 7-year observational period, the pwMS in the community reported an increase in the prevalence of chronic pain by almost 15%. This occurred simultaneously with a deterioration in disability, suggesting that with increasing disability and passage of time, the risk of pain syndromes also increased. The self-perceived quality of life during this period decreased as well.

Vitality, perceived social support and disease activity determine the performance of social roles in recently diagnosed multiple sclerosis: a longitudinal analysis de Groot V., Beckerman H., et al. 2008 J. Rehabil Med,	The most pronounced deviation was found for sub-scale SF36rp, followed by SF36sf and SF36re. <u>Higher odds to have a normal performance of social roles:</u> - more vitality (OR = 1.63-2.25) - perceived amount of social support (OR =1.19-1.31) - higher T2-weighted supratentorial lesion load (OR = 0.71 -0.78 <u>Determinants associated with normal physical functioning role:</u> - fatigue (OR=0.81), exacerbations (OR=0.79) and the amount of social support (OR=0.71) <u>determinants associated with normal emotional functioning role:</u> - men (OR=0.16), verbal learning and memory (OR=1.26), no psychoticism (OR=0.66), no neuroticism (OR=0.78) and locus of control physician (OR=1.45) <u>determinants associated with normal social functioning role:</u> - less cerebellar functions (OR=0.70)	They showed that the differences regarding the performance of social roles between the RO (relapse onset) and the NRO (non-relapse onset) groups were not significant. Mental health was relatively unaffected, which indicates that mental health cannot explain the reduced performance of social roles. The association with the perceived amount of social support can be interpreted in 2 ways. The patiënt is less inclined to participate in social activities or shows social dysfunction and experiences this as a lack of social support.	Vitality, perceived amount of social support, and disease activity determine the performance of social roles in the early stage of MS.
Cognitive impairment, health related quality of life and vocational status at early stages of multiple sclerosis: a 7-year longitudinal study Ruet A., Deloire M., et al. 2012 J. Neurol.,	The patiënts had lower score for episodic memory, IPS and executive functions in comparison with healthy subjects. - 52.3 % were classified as cognitively impaired - 54.2 % for the memory domain, 19.1 % for the IPS domain were considered to have cognitively deteriorated 58.3 % were deteriorated according to the EDSS at 7 years. <u>The QoL was lower in the MS patiënts than in their matched controls:</u> - physical functioning, cognitive function, sexual function and overall HRQoL scales deteriorated significant at 7 years Early cognitive status, physical disability and age contributes to vocational status seven years after the MS diagnosis.	Cognitive impairment is frequent in MS, even at an early stage. We showed that half of the newly diagnosed patiënts had a cognitive impairment predominantly affecting IPS. Cognitive impairment at baseline was an independent predictor of EDSS deterioration over 5-7 years. Vocational status 7 years after MS diagnosis was predicted by cognitive deterioration during these years and by early IPS function evaluated 6 months after the MS diagnosis.	Cognitive impairment in newly diagnosed MS patients increased the risk of quitting their employment or reducing their duties in the years following MS diagnosis.

Exercise, Functional Limitations, and Quality of Life: A Longitudinal Study of Persons with Multiple Sclerosis Stuifbergen AK., Blozis SA., et al. 2006 Arch Phys Med Rehabil,	Only for functional limitations was the average annual rate of change statistically different from zero (0.236). Therefore, exercise behaviors and QoL-scores showed no change, but functional limitations increased on average over the 5 years. However individual differences did change at the individual level for both variables. This suggested that about half of the individuals had scores that increased over time and about half had scores that decreased. <u>predictors for functional limitation at time 1:</u> - years since diagnosis and older age <u>predictors for exercise behaviours at time 1:</u> - no predictors <u>predictors for QoL at time 1:</u> - men reported lower QoL <u>Correlations among change characteristics of different outcome variables:</u> - functional limitation scores were negatively correlated with both exercise behaviors (r=-.34) and QoL (r=-.50) - exercise behaviors and QOl correlated positively (r=.42) - behavior scores were negatively correlated with the annual change rate in functional limitations (r=-.17)	this study indicate that overall the trajectory of change over time in MS-related functional limitations is slow but significant and in a direction that reflects greater limitations over time. The possibility of constant change in the degree and extent of functional limitations requires constant adaptation efforts from the person with MS. For some, the disease may appear relatively stable for a period of years and then an exacerbation may result in significant increases in limitations that challenge the adaptive skills of the individual and the family. The negative correlation between change in functional limitations and the change in QoL may reflect how difficult it may be for persons with MS to adapt to uncertain and unpredictable changes in their functional status. It seems possible that persons with MS with varied levels of limitations might slow the trajectory of increasing limitations over the long term with consistent exercise behaviours.	Findings from this study support the importance of continued physical activity and exercise for PwMS across the course of living with their disease. Exercise interventions may have substantial long-term effects on decreasing functional limitations and enhancing QoL for this population.
The initial course of daily functioning in MS: a three-year follow-up study V. de Groot, H. Beckerman, et al 2005 Multiple sclerosis journal,	The neurological deficits (EDSS) and physical functioning (FIMmf) and SF36pf deteriorate significant in the first three years. For the FIMmf there is a difference between the two groups that does not change over time, but for the EDSS and the SF36pf the deterioration is more pronounced in the NRO group (non-relapse onset). mental health (FIMcf) shows a significant deterioration that is the same in both groups.	In the domains of neurological deficits and physical functioning the NRO group shows clinically relevant deterioration, whereas the RO groups stay stable. In the domains of mental health, social functioning and general health there are no clinically relevant changes. This indicates that patients in the NRO group have progressive neurological symptoms that are accompanied by progressive limitation in physical functioning, but not by progressive limitations in the other domains.	On the initial stage of MS, when neurological deficits are relatively minor and mental health is relatively unaffected, patients in both groups experience limitations in daily functioning. Patients in the NRO group have progressive neurological symptoms that are accompanied by progressive limitations in physical functioning, but not by progressive limitations in the other domains.
Self-assessed health status changes in a community cohort of people with multiple sclerosis: 11 years of follow-up Giordano A., Ferrari G., et al 2012 European Journal of Neurology,	<u>Over the study decade, changes in MSQOL-54 composite scores were negligible:</u> - The most important worsening was in the change in health scale from 55.7 to 40.1. (p=0.001) - General health worsened from 50.6 to 47.4 (p=0.001) - Cognitive function deteriorated from 72.1 to 68.3 (p=0.04) - Social function improved significantly over time from 59.3 to 68.1 (p<0.001) - The emotional well being scale improved significantly over 55.9 to 61.1 (p=0.03)	11% of participants died, the proportion of severely disabled increased from 16% to 32% and those requiring daily home care increased from 19% to 30%. Although MSQOL-54 composites remained stable over the decade, individual scores could deteriorate (change in health, general health and cognitive function) or improve (social function and emotional wellbeing)	MS had a pervasive but inhomogeneous impact on the lives of the MS sufferers. Overall clinical deterioration and aging, hospital admissions and medical consultations decreased, suggesting reduced use of health care resources. By contrast, housing adaptations and home care increased, psychological

	- changes in the remaining MSQOL-54 scale scores were not significant High baseline EDSS score was also significantly associated with poor general health, cognitive function and social function. PwMS had significantly worse scores in all CMDI subscales scores than controls.		burden was high and self-perceived cognitive function worsened.

5. Parkinson's disease

Title / Authors / Journal	Study design	Population	Aims study	Number of measurements	Outcome measures (QOL)
Trajectory classes of decline in health-related quality of life in Parkinson's disease: a pilot study Jens Klotsche, Jens Peter Reese, et al 2011 Elsevier,	A prospective longitudinal study Germany	Baseline: 145 Final follow-up: 88	To analyse the change in health-related quality-of-life (HRQoL) in patients with Parkinson's disease (PD) and to identify different classes of HRQoL decline.	At baseline,3, 6, 12, 24 and 36 months. Mean duration of disease was 9.3 years.	QoL: - EQ – 5D-3 levels questionnaire - Parkinson-specific questionnaire (PDQ-39) Other: - disease severity: H&Y – scale, UPDRS parts 2-5 - depressive symptoms: BDI - cognitive impairment: MMSE
Health related quality of life in Parkinson's disease: a prospective longitudinal study Karen H Karlsen, Elise Tandberg., et al 2000 Neurol Neurosurg Psychiatry,	A prospective longitudinal study Norway	Baseline: 233 Final follow – up: 111	To examine the change over time in health-related quality of life (HRQL) of patients with Parkinson's disease.	At baseline and 4 years later. Mean duration of disease was 8.5 years.	QoL: - Nottingham health profile, part I (NHP) Other: - disease severity: H&Y-scale, UPDRS and Schwab and England scale - depressive symptoms: BDI - cognitive impairment: MMSE - presence of insomnia
The non-motor side of the honeymoon period of Parkinson's disease and its relationship with quality of life: a 4-year longitudinal study R. Erro, M. Picillo, et al 2016 European Journal of Neurology,	A prospective longitudinal study Italy	Baseline : 91 Final follow-up: 61	This study present the 4-year follow-up NMS data of an ongoing observational study and their relationship with QoL.	At baseline, 2 and 4 years.	QoL: - PD Questionnaire-39 (PDQ-39) Other: - disease severity: UPDRS (part 3) - non-motor symptoms: Non-motor symptoms questionnaire (NMSQuest) - data about dopaminergic replacement therapy (DRT)
Predictors and Course of Health-Related Quality of Life in Parkinson's Disease Elin Bjelland Forsaa, Jan Petter Larsen, et al 2008 Movement disorder society,	A prospective longitudinal study Norway	Baseline : 227 Final follow up : 82	This study investigated how health related quality of life changes over time in patients with PD, and which factors predict a lower level of HRQoL.	At baseline, 4 and 8 years.	QoL: - The Nottingham Health Profile (NHP) Other: - disease severity: UPDRS, Schwab and England scale and H&Y-staging - depressive symptoms: Montgomery and Aasberg Depression Rating Scale (MADRS) - cognitive impairment: MMSE

Cognitive decline and quality of life in incident Parkinson disease: The role of attention Rachael A. Lawson, Alison J. Yarnall, et al 2016 Elsevier,	A prospective longitudinal study United Kingdom	Baseline: 219 Final follow-up: 158	This study investigated the longitudinal relationship between cognitive function and QoL from PD diagnosis to 36-month follow-up. A secondary aim was to determine whether there was an optimal measure of cognition which would predict QoL.	At baseline, 18 months and 36 months.	QoL: - PD Questionnaire-39 (PDQ-39) Other: - demographic characteristics - disease severity: Movement Disorder Society Unified Parkinson's Disease (MDS-UPDRS) - pre-morbid IQ: National Adult Reading Test and The Geriatric Depression Scale (GDS-15) - neuropsychological tests (attention, memory, executive function, language and visuospatial function)

Title / Authors / Journal	Results	discussion	Conclusion
Trajectory classes of decline in health-related quality of life in Parkinson's disease: a pilot study Jens Klotsche, Jens Peter Reese, Et al 2011 Elsevier,	The estimated mean of the EQ-5D index was 0.85 adjusted for UPDRS III, UPDRS IV and BDI at baseline. It showed a nearly constant course from TO to T2 and a significant decrease in quality of life from T2 to T5. - class I => high EQ-5D at baseline with a non-significant decrease over time. - class II => baseline EQ-5D is lower than in class 1 but there was also a non-significant decrease over time - class III => high EQ-5D at baseline and a significant decrease over time. - class IV => moderate EQ-5D at baseline and a significant decrease over time. <u>class I:</u> - less impaired and had a short disease duration (mean=7.0 years) <u>class II and III:</u> - comparable by clinical characteristics and HRQol at baseline, all patiënts in class 3 passed away resulting in a significant decrease in HRQol over time. These classes were comparable in baseline clinical and socio-demographic parameters. <u>class IV:</u> - high UPDRS, a long disease duration and older The pattern of EQ-VAS and PDQ-39 was comparable to the EQ-5D index with latent classes.	Patiënts do not deteriorate in the first 6 months according to the PDQ-39 and the EQ-5D. PD patiënts were split into patiënts with a decline in HRQol (latent classes 3 and 4) and those with a stable HRQol (latent classes 1 and 2) over time. We cannot rule out the possibility that other covariates that were not included in the model may have influenced the HRqol trajectories. In particular non-motor symptoms, psychiatric complications, sleep disturbances end autonomic disturbances that are known to reduce HRqol.	Different classes or groups were identified with substantial differences in the evolution of HRQoL over time. Interestingly, there are groups of patients whose HRQoL remains stable over longer periods of time. The classification of HRQoL subgroups may help to explain the response of PD patients to the natural history of the disease. Future research is required to identify the potential responder subgroups in terms of HRQoL on different treatment regimens.
Health related quality of life in Parkinson's disease: a prospective longitudinal study Karen H Karlsen, Elise Tandberg., et al 2000 Neurol Neurosurg Psychiatry,	NHP - scores: - increased by a mean of 56 points (from 120.0 until 176.0) => 60 % had an increase of 30% in NHP-score after 4 years. - The dimensions with the highest deterioration were physical mobility, emotional reactions, pain and social isolation <u>factors associated with an increase in NHP-score:</u> - No association with age, sex, duration of dopaminergic therapy, levodopa, depressive symptoms, MMSE, total UPDRS OR H&Y. - There was a clear association between increased parkinsonism and increased NHP score during the follow-up period.	We found a significant deterioration in several domains, not only decreased physical mobility, but also an increase in distress in the areas of pain, social isolation and emotional reactions. We did not find any association between any demographic or clinical findings in 1993 and reduced HRQoL during the follow-up period. However, there was a clear association between progression of the disease (UPDRS and H&Y), and an increased NHP-score.	This study shows that parkinson's disease has a substantial impact on HRQL and that despite treatment there is a significant deterioration over time.

The non-motor side of the honeymoon period of Parkinson's disease and its relationship with quality of life: a 4-year longitudinal study R. Erro, M. Picillo, et al 2016 European Journal of Neurology,	Non-motor symptom progression: - The large majority of NMSs significantly increased in prevalence at 4 years, including those that were first reduced at 2 years. - NMSs showing the highest percentage change between 2 and 4 years were swallowing difficulties, nausea/vomiting, nocturia, hallucinations, sex drive, dizziness, daytime sleepiness and restless leg syndrome. - There were no associations between NMSs and motor disability. <u>Motor and non-motor correlations with quality of life:</u> - The PDQ-39 total score did not increase significantly from 2 to 4 years (197.3 versus 205.3) => a significant reduction of the 'stigma' dimension, whereas the 'bodily discomfort' dimension score significantly increased. - There was a significant difference in the motor burden among PDQ-39 quartiles, and this was driven by lower motor scores in the first quartile compared with all others. - Higher non-motor scores being associated with higher PDQ-39 quartiles. - The total NMS score and female gender were independently associated with higher PDQ-39 (worse QoL) scores at 4 years.	The main findings are that NMSs tend to increase significantly during the early stage of PD despite patients being on 'best medical treatment' and especially NMSs but not motor features, affect QoL during the honeymoon period of PD. The finding that QOL scores were relatively stable between 2 and 4 years could be surprising. We found that the 'stigma' dimension significantly improved, whereas 'bodily discomfort worsened. This finding might imply that, through the early phase of the disease, patients accepted their diagnosis, reducing the fear of social stigma. The 'bodily discomfort' dimension reflects QoL correlates of symptoms/signs such as rigidity and pain.	We demonstrated that NMSs significantly increase over time and affect in a major way the QoL of patiënts with PD, who are otherwise pharmacologically well compensated from the motor point of view. This implies that the term 'honeymoon period' is only applicable to the motor features and does not depict the entire nature of PD.
Predictors and Course of Health-Related Quality of Life in Parkinson's Disease Elin Bjelland Forsaa, Jan Petter Larsen, et al 2008 Movement disorder society,	A significant increase in impact was found for the NHP sections energy ($p<0.05$), pain ($p<0.01$), emotional reactions ($p<0.001$), social isolation ($p<0.001$) and physical mobility ($p<0.001$), as well as the NHP total score ($p<0.001$) <u>Predictors of poorer HRQOL:</u> - Higher MADRS-scores at baseline => energy, emotional reactions and sleep - More advanced disease severity and disability => physical mobility and social isolation - Presence of insomnia => social isolation - higher MMSE scores => social isolation - Female gender => sleep - Higher age => energy, social isolation and physical mobility	HRQOl is poorer in patients with PD compared with the healthy control subjects. Scores in all dimensions of NHP except the dimension sleep, as well as the NHP total score, increased throughout the study period in our cohort. Problems with the section physical mobility increased with highest rates, indicating that decline in physical mobility has to be considered the most important single factor contributing to decline in HRQOL.Nevertheless, distress of nonmotor character, most prominent in the dimensions social isolation and emotional reactions as a whole outweighed the effect of physical mobility on HRQOL Follow-up time remained a significant predictor of lower levels of HRQOl as measured by the NHP total score. The decline in HRQOl may only to some extent be explained by increasing age, as age at baseline was not significantly	PD has an increasing impact on HRQOl as the disease progresses. Deterioration in physical mobility was the most important single factor contributing to decline in HRQOL, although distress of nonmotor character as a whole outweighed the impact of distress in physical mobility on overall HRQOl. More advanced disease, higher severity of depressive symptoms, and presence of insomnia were found to be

	Poorer overall HRQOL was predicted by the H&Y ($p<0.01$), higher MADRS scores ($p<0.001$), presence of insomnia ($p<0.001$) and follow-up time ($p<0.001$).	associated with poor HRQOl in several NHP dimensions nor with the total score.	important and independent predictors of poor HRQOL.
Cognitive decline and quality of life in incident Parkinson disease: The role of attention Rachael A. Lawson, Alison J. Yarnall, et al 2016 Elsevier,	At baseline 21 % were classified as PD-MCI. By 36 months, 14 participants (9%) had developed PD (Parkinson's disease dementia) and 27 % were classified as PD-MCI. Participants with cognitive impairment were significantly older, fewer years of education, lower pre-morbid IQ and had more severe motor disease. PDQ-39 scores were significantly higher in those with PD-MCI compared to PD-CN at baseline, 18 months and 36 months. PDQ-39 scores significantly increased over time in participants with PD-MCI at baseline <u>Baseline predictors of quality of life:</u> - Fewer years in education, higher baseline motor severity and higher baseline depression were significant predictors of poorer QoL 36 months later. Longitudinal analyses of cognition and quality of life: - Being younger, female, fewer years of education, higher LED and persistent depression predicted poorer QoL over 36 months. - The model also suggested that was associated with an improvement in QoL. - Decreasing MoCA scores, the interaction of PDD with time and declining attention over time.	We have demonstrated that cognitive impairment contributes to longitudinal QoL change in people with PD, and that decline in attention has the greatest predictive power. Participants with PD-MCI at baseline reported a mean increase of 9 points in PDQ-39 scores over 36 months, indicating that QoL deteriorated over time. This was 3 times greater compared to participants classified as PD-CN at baseline, which would not be regarded as clinically meaningful change. A small but significant change in QoL at 36 months was predicted by lower MoCA scores at diagnosis. Declining MoCA scores of 36 months predicted decreasing QoL. Attention was the only significant predictor of QoL, either as a baseline predictor or using multilevel modelling.	Cognitive impairment had a significant role in determining QoL. Over three years following diagnosis, most patients were cognitively stable and for them QoL was not greatly influenced by cognition. Patients who were categorized as having PD-MCI had worse QoL scores. A minority of people developed PDD over three years, where cognition had a much greater impact on QoL. Pharmacological and non-pharmacological interventions, such as cognitive rehabilitation focused on attention, may be useful in improving attention and concentration in PD patiënts and therefore QoL.

Table 6: List of abbreviations

Abrreviation	Full Term
QoI	Quality of life
ZOL	Ziekenhuis Oost-Limburg
PD	Parkinson's disease
MS	Multiple sclerosis
SCI	Spinal cord injury
TBI	Traumatic brain injury
WHO	World Health Organization
RR	Relapsing Remitting
MESH	Medical Subject Headings
WOK	Web of Knowledge
MDD	Minimum duration of disease
LSQ	Life Situation Questionnaire
QLI-MS	Quality of Life Inventory-Multiple Sclerosis
AQoL	Assement of Quality of Life
WHOQOL-BREF	World health Organization Quality of Life (abbreviated)
MSQL-54	Multiple Sclerosis Quality of Life-54
LSI-A	Life Situation Index-A
SWLS	Satisfaction With Life Scale
PDQ-39	Parkinson's Disease Questionnaire
NHP	Nottingham Health Profile
SIP-68	Sickness Impact Profile-68
SF-36	Short Form-36 health survey
EQ-5D	EuroQol-5D
PO	Power output
VO_2	Oxygen Uptake
FIM	Functional Independence Measure
EDSS	Expanded Disability Status Scale
UPDRS	Unified Parkinson's Disease Rating Scale
H&Y	Hoehn & Yahr
MADRS	Montgomery Asberg Depression Rating Scale
LED	Levodopa Equivalent
MoCA	Montreal Cognitive Assessment
SDMT	Symbol Digit Modalities Test
TIA	Transient Ischemic Attack
QALY'S	Quality Adjusted Life Years
PHSS	Physical Health Summary Scale
MHSS	Mental Health Summary Scale
PF	Physical Functioning
RP	Role-Physical functioning
BP	Bodily Pain
GH	General Health
ADL	Activities of Daily Living
IADL	Instrumental Activities of Daily Living
ISS	Injury Severity Score
PwMS	Persons with Multiple Sclerosis
ICF	International Classification System

PART 2: RESEARCH PROTOCOL

Context

The suggestion for the second part of this Master's thesis was made to us on 07/06 by our promotor Prof. dr. Peter Feys, who had received the proposal for this topic from Ziekenhuis Oost-Limburg (ZOL) only two days earlier. Informative documents on the subject and already collected patient data were provided by mail. A meeting took place in ZOL with Prof. Dr. Jan Vandevenne (neuroradiologist), Dr. Alain Wibail (neurologist), Prof. dr. Feys and dr. Ilse Lamers on 09/06. After the meeting, we decided to continue with this protocol, even though the time window was short. The topic of this study formed an interesting continuation of our literature search in part 1. The baseline data of more than 150 patients with stroke are available since end of 2015. We will perform measurements in a longitudinal perspective, being about 2 years after baseline.

1. Introduction

In the literature search, we examined the longitudinal course of QoL in patients with five neurological disorders: stroke, spinal cord injury, traumatic brain injury, Parkinson's disease and multiple sclerosis. The factors influencing this QoL in a longitudinal perspective were under study as well. In part 2, the focus will shift to the course of acute stroke in particular. In the setting of ZOL Genk, we will retrospectively examine patients included in the care-pathway 'acute stroke' of which the origin is described below.

Annually, 15.000.000 people are being diagnosed with acute stroke every year. This acute disorder leads to 5.000.000 deaths each year, another 5.000.000 people remain care-dependent post-stroke. In Belgium, acute stroke is the 4th most common cause of death and the most important cause leading to persistent disability and reduced quality of life (QoL). These numbers illustrate the importance of a rapid diagnosis followed by immediate intervention, as well as the early identification and treatment of risk-factors (prevention).

In acute stroke, the blood circulation in the brain is affected. Stroke can be of a haemorrhagic or an ischemic origin. However, 80% of strokes have an ischemic cause. In this case, an occlusion of a blood vessel is caused by thrombosis or embolism in the brain. This occlusion leads to oxygen defience in the brain tissue behind this 'hold-up'. This oxygen defiency, on its turn, may result in persistent brain damage. Therefore, rapid and efficient interventions are crucial. Time is brain.

Treatment of acute stroke was mainly pharmacological until a few years ago. Several studies found a beneficial effect of intravenous thrombolysis using rt-PA (recombinant tissue plasminogen activator) in comparison with conservative treatment. However, thrombolysis has several disadvantages such as the risk of intracranial bleedings and the short term in which it can be injected (4.5h post-stroke). In 2015, other studies examined a new intervention technique in treatment of stroke patients: mechanic thrombectomy. This invasive, endovascular intervention restores the blood flow by removal or

fragmentation of the thrombus. Thrombectomy may be useful for patients with contra-indications for pharmacological treatment, with large or proximal occlusions, after failure of rt-PA.

Multiple double-blind randomized studies showed clinical benefits of mechanic thrombectomy (whether or not in combination with thrombolysis), when compared with thrombolysis or conservative treatment. However, this only applies in an acute setting with a rapid and efficient diagnosis and intervention. It is unclear what are the long-term benefits of these innovative treatments, and which are the effects of the functioning of the persons with stroke at different levels of the ICF.

On the basis of these promising results, ZOL developed the multidisciplinary care-pathway for patients diagnosed with acute stroke. The aim is to evaluate the program.

2. Objectives study

The primary objective of this study is to assess the QoL of patients in this care-pathway for acute stroke and to compare the QoL between patients who received different interventions 1.5 to 2 years earlier.

Secondary objectives are: (1) to compare the course of National Institute of Health Stroke Scale (NIHSS) and Modified Rankin Scale (MRS) over 1.5 to 2 years in the different treatment groups. (2) to assess additional functional limitations, mobility, self-care and cognitive function in these different treatment groups by adding other (rehabilitation) scales and questionnaires.

2.1. Research questions

Primary research question: How do the NIHSS and MRS at baseline predict the quality of life after 1.5 to 2 years? And are these predictions different in the treatment groups?

Secondary research question: Did a correlation appear between these scales and functional outcomes in the domains of functioning on cognitive and physical level as well as ADL (added scales/questionnaires)?

2.2. Hypothesis

We formulated the following hypothesis: patients with acute stroke who received intervention (or thrombolysis, or thrombectomy, or a combination of both) will show more positive outcomes concerning QoL, disabilities and re-integration in society, compared to a conservative treatment patient group.

3. Methods

3.1. Research design

Observational longitudinal study. In the emergency unit, a clinical analysis was made at baseline to decide if the patient was eligible for one of the possible interventions. After the intervention (or conservative treatment), measurements were performed at 24h and at three to seven days. Data of these measurements were already avalaible. This study will perform the same measurements again at M18-24 with the addition of other functional measurements.

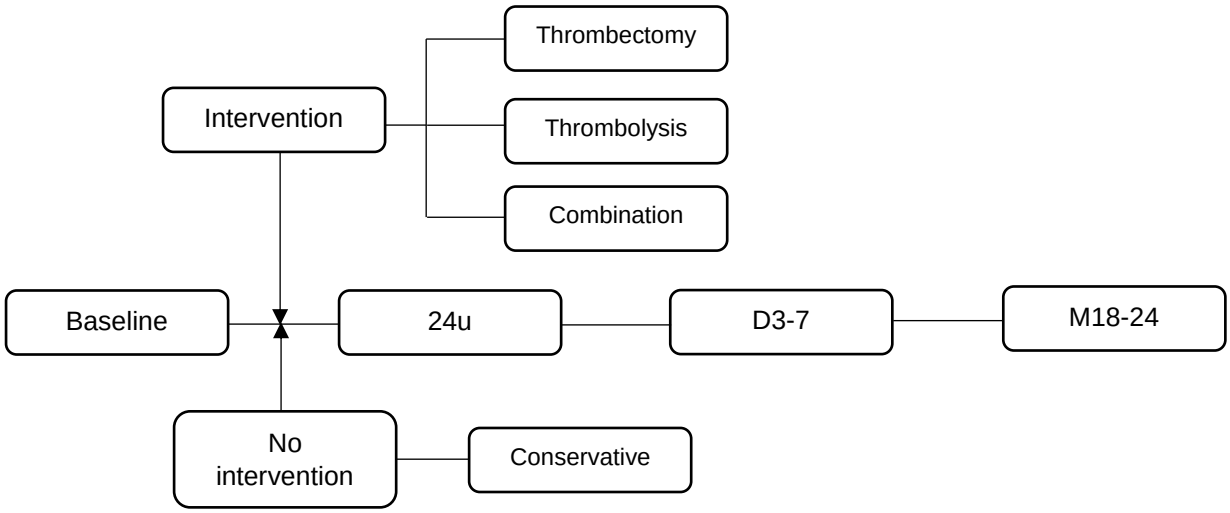


Figure 3: flowchart

- Baseline (neurologist, neuro-radiologist)
  - Patient demographics (age, gender)
  - Risk facors (family history, hypertension, smoking habit, diabetes mellitus, alcohol and drug abuse)
  - Type of stroke (hemorrhagic, ischemic), location of stroke
  - MRS and NIHSS
- 24h (neurologist, neuro-radiologist)
  - NIHSS
  - Volume of infarct, succesfull reperfusion
- D3–7 (neurologist, neuro-radiologist)
  - NIHSS and MRS
  - Volume of infarct, succesfull reperfusion
- M18-24
  - NIHSS and MRS (neurologist)
  - EQ-5D, SF-36 and SSQoL
  - FAC and TUG
  - Barthel Index
  - Box to Block test
  - HADS, CDT and MMSE

3.2. Participants

From January 2016 to October 2016, the data of patients examined according to the new care-pathway ‘acute stroke’ in ZOL Genk were collected. The 150 patients examined and treated in this pathway were included in this retrospective study.

3.2.1. Inclusion criteria

Patients with acute stroke, included in the care-pathway of ZOL.

3.2.2. Exclusion criteria

Minor patients (< 18 years).

3.2.3 Recruitment

After hospitalization, diagnosis of acute stroke and inclusion in the care-pathway in ZOL Genk, information about the study was given to patients. When receiving informed consent, the patients were included in the study.

3.3. Medical ethics

Approval for follow-up of these 150 patients (NIHSS and MRS) was already given by the medical committee of ZOL. A 2-year expansion of this study will be requested. The medical commitees of UHasselt and ZOL will be contacted in September.

3.4. Intervention

Thrombolysis: anticoagulants are injected (e.g. rtPA: recombinant-tissue plasminogen activator). The objective is to restore normal blood flow in the brain dissolving the occlusion causing ischemia. The most important disadvantage of this intervention is the risk of intracranial bleedings. The medication is administered intravenous and disrupts the systemic coagulation. A history of previous intracranial or gastro-intestinal bleedings is an absolute contra-indication. A selective thrombolysis is also possible: thrombolysis is administered through an IA-catheter. At this time, intravenous thrombolysis is the standard therapy for patients with acute stroke, if the patient can be treated within 4.5 hours after the first symptoms occurred.

Thrombectomy: this intervention removes the thrombus from the intracranial blood vessel using catheter angiography. This method is only executed within 6u after the first symptoms occurred. Thrombectomy has existed for a long time, however, until 2015 its relevance was never approved. The evidence regarding thrombectomy, as mentioned above, initiated a total revision of ‘acute stroke care’.

Thrombolysis & Thrombectomy: a combination of both (thrombectomy after thrombolysis).

No intervention (conservative treatment): absolute contra-indications for thrombolysis, the patients isn't eligible for thrombectomy, patients were too late (>6 hours after stroke).

3.5. Outcome measures

To ensure a holistic evaluation of the overall health status of stroke patients at 1.5 to 2 years after hospital discharge, we included other measurements beside the NIHSS and MRS. To us, it's of great importance to assess the patient's health in all three major ICF-categories (body function, activities, participation). The proposed additional questionnaires and tests for assessment of outcome measures are categorized by the ICF-model in the table below.

Table 1: Classification of outcome measures

Body function (impairments)	Activities (disabilities)	Participation (handicap)
The National Institute of Health Stroke Scale (NIHSS)	Barthel-Index (BI):	EuroQoL- 5 Dimensions (EQ-5D)
Modified Rankin Scale (MRS)	Functional ambulation categories (FAC)	Medical Outcomes Study Short-Form (SF-36)
The hospital anxiety and depression scale (HADS)	Timed Up and Go (TUG)	Stroke-Specific Quality of Life scale (SSQOL)
Clock Drawing Test (CDT)	The Box and Block Test (BBT)	
The Mini-Mental State Examination (MMSE)		

3.5.1. Primary outcome measures

The primary outcome measure of this retrospective study is quality of life (QoL). To assess the QoL 1.5 to 2 years after hospital-discharge in acute-stroke patients, several questionnaires will be used. QoL is a multidimensional, subjective concept with many subcomponents. Therefore, it's important to use an adequate measurement instrument to assess all these components of QoL in acute stroke patients (Wilson & Cleary, 1995).

EuroQoL- 5 Dimensions (EQ-5D): this standardized instrument consists of five dimensions (mobility, self-care, daily activities, pain/discomfort, anxiety/depression). A health index for the individual or the population can be deduced from the EQ-5D score. Evidence supports the EQ-5D-5L descriptive system as a valid generic health outcome measure in patients experiencing acute stroke, with some psychometric advantages in comparison with the EQ-5D-3L (Golicki et al., 2015).

Medical Outcomes Study Short-Form (SF-36): 36 items divided over several scales measure the QoL. Physical functioning (10 items), role limitations due to physical health problems (4 items), bodily pain (2 items) and general health perceptions (5 items). These 4 scales can be converted to a subscale for physical health (PHSS). The mental health subscale (MHSS) consists of vitality (4 items), social

functioning (2 items), role limitations due to personal or emotional problems (2 items) and emotional well-being (5 items). The scores of these two subscales are converted to a total score ranging from 0 (low QoL) to 100 (high QoL) (Hobart, Williams, Moran, & Thompson, 2002). The SF-36 is a widely used, standardized questionnaire for health-related quality of life (HRQoL) after acute stroke. This was also confirmed in our literature search.

Stroke-Specific Quality of Life scale (SSQOL): a measurement instrument recommended by KNGF-guidelines (the Netherlands) for evaluation of QoL after stroke. It contains 49 items divided over different subcategories: mobility (6 items), energy (3 items), arm-hand dexterity (5 items), work-productivity (3 items), mood (5 items), self-care (5 items), social roles (5 items), family roles (3 items), vision (3 items), language (5 items), thinking (3 items) and personality (3 items). Each item is ordinally scaled from 1 to 5. Compared to other common generic HRQOL measures, the SS-QOL has a broader coverage of functions typically affected by stroke and asks questions in these areas in a way that is meaningful to stroke patients. For example, the SF-36 and the EuroQol are commonly used in stroke trials but do not assess language, hand function, cognition, or vision. Consequently, the SS-QOL should be better able than current generic HRQOL instruments to assess meaningful post stroke HRQOL changes across the continuum of stroke symptoms (Williams, Weinberger, Harris, Clark, & Biller, 1999).

3.5.2. Secondary outcome measures

The National Institute of Health Stroke Scale (NIHSS): The NIHSS is a 15-item impairment scale, which provides a quantitative measure of key components of a standard neurological examination. The scale assesses level of consciousness, extraocular movements, visual fields, facial muscle function, extremity strength, sensory function, coordination (ataxia), language (aphasia), speech (dysarthria), and hemi-inattention (neglect). The NIHSS has established reliability and validity for use in prospective clinical research, and predictive validity for long-term stroke outcome (Kasner, 2006).

Modified Rankin Scale (MRS): The MRS attempts to measure functional independence, incorporating the WHO components of body function, activity, and participation. The scale is defined categorically with seven different grades: 0 indicates no symptoms, 5 indicates severe disability, and 6 indicates death. The MRS offers an easy and rapid assessment in clinical practice of the effect of a patient's stroke on their activities and participation in a social context. The validity in stroke outcome and inter-rater reliability have been well documented for the MRS. However, the simplicity of the MRS as a 6-point scale can affect its reliability because rating scales with more items or rankings generally offer higher reliability (Kasner, 2006).

Barthel-Index (BI): The BI is a scale that measures ten basic aspects of activity related to self-care and mobility. The normal score is 100, lower scores indicate greater dependency. In patient care, the BI can be used repeatedly to assess improvement in patients over time, as was its original purpose, and can therefore be used to establish the effectiveness of rehabilitative therapies. The BI has established reliability and validity in people with stroke (Kasner, 2006).

Functional ambulation categories (FAC): The FAC is a functional walking test that evaluates ambulation ability. This 6-point scale assesses ambulation status by determing how much support the patient requires during walking activities. Personal walking aids are allowed during this test (Teasdall et al., 2011). The FAC has excellent test-retest and interrater reliability, has good concurrent and predictive validity, and is sensitive to change in patients with stroke (Mehrholz, Wagner, Rutte, Meissner, & Pohl, 2007).

Timed Up and Go (TUG): The TUG is easy to administer compared with performance measures and provides information on the abilities for living safely at home. The TUG requires participants to stand up from a chair, walk 3 meters, turn around, return to the chair, and sit down again. The time required to complete the test is recorded in seconds using a stopwatch. A participant may walk with a cane or other walking aids. TUG has excellent reliability, good convergent validity and is sensitive to small changes in the basic functional mobility after stroke (Hafsteinsdottir, Rensink, & Schuurmans, 2014). In our study, we will follow the KNGF-guidelines (2014) to administer the TUG only in patients with an FAC ≥ 3.

The Box and Block Test (BBT): The BBT was designed as an evaluation method to test individuals with manual dysfunction. The aim is to evaluate and measure dexterity as well as the functions of grasping, holding and throwing. The evaluation is performed with the individual seated in front of a box with a large divider separating it into two equal squares. The patient is instructed to transport small wooden blocks from one side to the other for one minute. Following three trials performed with each hand, the number of blocks is recorded for the right and left hands separately. The BBT is considered a fast, simple, reliable test that is often used for stroke survivors in the evaluation of arm and hand function (Santos Oliveira et al., 2016).

The hospital anxiety and depression scale (HADS): The HADS is widely used as a measure of mood, emotional distress, anxiety, depression and emotional disorder in patients with stroke. It is useful because it is quick to use and easily acceptable to patients who may be quite unwell. With only 14 items each answered on a four-point verbal rating scale, it can be used to give measures of anxiety (7 items), depression (7 items) or emotional distress (all 14 items). Previous psychometric investigations have shown that the HADS has good internal consistency and test-retest reliability, is sensitive to change and gives valid assessments (Johnston, Pollard, & Hennessey, 2000). Anxiety and depression in stroke were found to be significant related factors of QoL in our literature search as well.

Clock Drawing Test (CDT): The CDT provides a quick assessment of visuospatial and praxis abilities and may reflect both attention and executive dysfunction. the CDT is a simple task completion test requiring the individual to draw a clock face, place the numbers on the clock and point the hand to a given time. The CDT is an extremely brief and very simple tool that can be used to supplement other cognitive assessments. the psychometric properties of the CDT systems seem quite consistent and correlates strongly with other cognitive measures (Mc Dowell et al. 1996).

The Mini-Mental State Examination (MMSE): The MMSE was developed as a brief screening tool to provide a quantitative assessment of cognitive impairment and to record cognitive changes over time. The MMSE consists of 11 simple questions or tasks. Typically, these are grouped into 7 cognitive

domains; orientation to time, orientation to place, registration of three words, attention and calculation, recall of 3 words, language, and visual construction. Levels of impairment have also been classified as none (24-30); mild (18-24) and severe (0-17) (Tombaugh & McIntyre 1992).

3.6. Data-analysis

SAS JUMP software will be used for the analyses. Significance level is set at $p<0,05$.

Normality of data distribution will be investigated for each parameter applying the Shapiro-Wilk test. Given the sample size, we expect that normality requirements will be fulfilled. Homoscedasticity of data will be investigated using the Brown-Forsythe test. Therefore, we describe here exclusively parametric data analyses.

To investigate the differences in quality of life and all functioning measures at 2 years follow-up, we will apply a one-way ANOVA including three groups (1x,2x, control). In case of significance, we will apply Tukey post-hoc tests between groups. To investigate the factors underlying quality of life, we will perform regression analyses at 2 years follow-up taken all parameters and socio-demographic variables into account. To investigate changes over time in NIHSS and MRS at 2 years compared to baseline, in the different groups, we will perform 2 time by 3 group ANOVA. Tukey post-hoc tests will be applied when appropriate.

4. Time planning

Data collection will take place between October 2017 and March 2018. The plan is to finish data-analysis by mid april. Academic writing of the introduction and the method will be finished before February, the sequel will be written in May and June 2018.

4. List of references

Golicki, D., Niewada, M., Buczek, J., Karlinska, A., Kobayashi, A., Janssen, M. F., & Pickard, A. S. (2015). Validity of EQ-5D-5L in stroke. *Qual Life Res, 24*(4), 845-850. doi:10.1007/s11136-014-0834-1

Hafsteinsdottir, T. B., Rensink, M., & Schuurmans, M. (2014). Clinimetric properties of the Timed Up and Go Test for patients with stroke: a systematic review. *Top Stroke Rehabil, 21*(3), 197-210. doi:10.1310/tsr2103-197

Hobart, J. C., Williams, L. S., Moran, K., & Thompson, A. J. (2002). Quality of life measurement after stroke: uses and abuses of the SF-36. *Stroke, 33*(5), 1348-1356.

Johnston, M., Pollard, B., & Hennessey, P. (2000). Construct validation of the hospital anxiety and depression scale with clinical populations. *J Psychosom Res, 48*(6), 579-584.

Kasner, S. E. (2006). Clinical interpretation and use of stroke scales. *Lancet Neurol, 5*(7), 603-612. doi:10.1016/s1474-4422(06)70495-1

Mehrholz, J., Wagner, K., Rutte, K., Meissner, D., & Pohl, M. (2007). Predictive validity and responsiveness of the functional ambulation category in hemiparetic patients after stroke. *Arch Phys Med Rehabil, 88*(10), 1314-1319. doi:10.1016/j.apmr.2007.06.764

Williams, L. S., Weinberger, M., Harris, L. E., Clark, D. O., & Biller, J. (1999). Development of a stroke-specific quality of life scale. *Stroke, 30*(7), 1362-1369.

Wilson, I. B., & Cleary, P. D. (1995). Linking clinical variables with health-related quality of life. A conceptual model of patient outcomes. *Jama, 273*(1), 59-65.

6. Appendices part 2 – research protocol

- National Institute of Health Stroke Scale (NIHSS)
- Modified Rankin Scale (MRS)
- Progress report UHasselt

NIH STROKE SCALE

Patient Identification. ___ ___-___ ___ ___-___ ___ ___

Pt. Date of Birth ___ ___/___ ___/___ ___

Hospital _____(___ ___-___ ___)

Date of Exam ___ ___/___ ___/___ ___

Interval: [ ] Baseline [ ] 2 hours post treatment [ ] 24 hours post onset of symptoms ±20 minutes [ ] 7-10 days
[ ] 3 months [ ] Other _____(___ ___)

Time: ___ ___:___ ___ [ ]am [ ]pm

Person Administering Scale _____

Administer stroke scale items in the order listed. Record performance in each category after each subscale exam. Do not go back and change scores. Follow directions provided for each exam technique. Scores should reflect what the patient does, not what the clinician thinks the patient can do. The clinician should record answers while administering the exam and work quickly. Except where indicated, the patient should not be coached (i.e., repeated requests to patient to make a special effort).

Instructions	Scale Definition	Score
1a. Level of Consciousness: The investigator must choose a response if a full evaluation is prevented by such obstacles as an endotracheal tube, language barrier, orotracheal trauma/bandages. A 3 is scored only if the patient makes no movement (other than reflexive posturing) in response to noxious stimulation.	**0 =** Alert; keenly responsive. **1 =** Not alert; but arousable by minor stimulation to obey, answer, or respond. **2 =** Not alert; requires repeated stimulation to attend, or is obtunded and requires strong or painful stimulation to make movements (not stereotyped). **3 =** Responds only with reflex motor or autonomic effects or totally unresponsive, flaccid, and areflexic.	_____
1b. LOC Questions: The patient is asked the month and his/her age. The answer must be correct - there is no partial credit for being close. Aphasic and stuporous patients who do not comprehend the questions will score 2. Patients unable to speak because of endotracheal intubation, orotracheal trauma, severe dysarthria from any cause, language barrier, or any other problem not secondary to aphasia are given a 1. It is important that only the initial answer be graded and that the examiner not "help" the patient with verbal or non-verbal cues.	**0 =** Answers both questions correctly. **1 =** Answers one question correctly. **2 =** Answers neither question correctly.	_____
1c. LOC Commands: The patient is asked to open and close the eyes and then to grip and release the non-paretic hand. Substitute another one step command if the hands cannot be used. Credit is given if an unequivocal attempt is made but not completed due to weakness. If the patient does not respond to command, the task should be demonstrated to him or her (pantomime), and the result scored (i.e., follows none, one or two commands). Patients with trauma, amputation, or other physical impediments should be given suitable one-step commands. Only the first attempt is scored.	**0 =** Performs both tasks correctly. **1 =** Performs one task correctly. **2 =** Performs neither task correctly.	_____
2. Best Gaze: Only horizontal eye movements will be tested. Voluntary or reflexive (oculocephalic) eye movements will be scored, but caloric testing is not done. If the patient has a conjugate deviation of the eyes that can be overcome by voluntary or reflexive activity, the score will be 1. If a patient has an isolated peripheral nerve paresis (CN III, IV or VI), score a 1. Gaze is testable in all aphasic patients. Patients with ocular trauma, bandages, pre-existing blindness, or other disorder of visual acuity or fields should be tested with reflexive movements, and a choice made by the investigator. Establishing eye contact and then moving about the patient from side to side will occasionally clarify the presence of a partial gaze palsy.	**0 =** Normal. **1 =** Partial gaze palsy; gaze is abnormal in one or both eyes, but forced deviation or total gaze paresis is not present. **2 =** Forced deviation, or total gaze paresis not overcome by the oculocephalic maneuver.	_____

NIH STROKE SCALE

Patient Identification. ___ ___-___ ___ ___-___ ___ ___

Pt. Date of Birth ___ ___/___ ___/___ ___

Hospital _____(___ ___-___ ___)

Date of Exam ___ ___/___ ___/___ ___

Interval: [ ] Baseline [ ] 2 hours post treatment [ ] 24 hours post onset of symptoms ±20 minutes [ ] 7-10 days
[ ] 3 months [ ] Other _____(___ ___)

3. Visual: Visual fields (upper and lower quadrants) are tested by confrontation, using finger counting or visual threat, as appropriate. Patients may be encouraged, but if they look at the side of the moving fingers appropriately, this can be scored as normal. If there is unilateral blindness or enucleation, visual fields in the remaining eye are scored. Score 1 only if a clear-cut asymmetry, including quadrantanopia, is found. If patient is blind from any cause, score 3. Double simultaneous stimulation is performed at this point. If there is extinction, patient receives a 1, and the results are used to respond to item 11.	**0 = No visual loss.** **1 = Partial hemianopia.** **2 = Complete hemianopia.** **3 = Bilateral hemianopia** (blind including cortical blindness).	_____
4. Facial Palsy: Ask – or use pantomime to encourage – the patient to show teeth or raise eyebrows and close eyes. Score symmetry of grimace in response to noxious stimuli in the poorly responsive or non-comprehending patient. If facial trauma/bandages, orotracheal tube, tape or other physical barriers obscure the face, these should be removed to the extent possible.	**0 = Normal** symmetrical movements. **1 = Minor paralysis** (flattened nasolabial fold, asymmetry on smiling). **2 = Partial paralysis** (total or near-total paralysis of lower face). **3 = Complete paralysis** of one or both sides (absence of facial movement in the upper and lower face).	_____
5. Motor Arm: The limb is placed in the appropriate position: extend the arms (palms down) 90 degrees (if sitting) or 45 degrees (if supine). Drift is scored if the arm falls before 10 seconds. The aphasic patient is encouraged using urgency in the voice and pantomime, but not noxious stimulation. Each limb is tested in turn, beginning with the non-paretic arm. Only in the case of amputation or joint fusion at the shoulder, the examiner should record the score as untestable (UN), and clearly write the explanation for this choice.	**0 = No drift;** limb holds 90 (or 45) degrees for full 10 seconds. **1 = Drift;** limb holds 90 (or 45) degrees, but drifts down before full 10 seconds; does not hit bed or other support. **2 = Some effort against gravity;** limb cannot get to or maintain (if cued) 90 (or 45) degrees, drifts down to bed, but has some effort against gravity. **3 = No effort against gravity;** limb falls. **4 = No movement.** UN = Amputation or joint fusion, explain: _____ **5a. Left Arm** **5b. Right Arm**	_____ _____
6. Motor Leg: The limb is placed in the appropriate position: hold the leg at 30 degrees (always tested supine). Drift is scored if the leg falls before 5 seconds. The aphasic patient is encouraged using urgency in the voice and pantomime, but not noxious stimulation. Each limb is tested in turn, beginning with the non-paretic leg. Only in the case of amputation or joint fusion at the hip, the examiner should record the score as untestable (UN), and clearly write the explanation for this choice.	**0 = No drift;** leg holds 30-degree position for full 5 seconds. **1 = Drift;** leg falls by the end of the 5-second period but does not hit bed. **2 = Some effort against gravity;** leg falls to bed by 5 seconds, but has some effort against gravity. **3 = No effort against gravity;** leg falls to bed immediately. **4 = No movement.** UN = Amputation or joint fusion, explain: _____ **6a. Left Leg** **6b. Right Leg**	_____

Rev 10/1/2003

NIH STROKE SCALE

Patient Identification. ___ ___-___ ___ ___-___ ___ ___

Pt. Date of Birth ___ ___/___ ___/___ ___

Hospital _____(___ ___-___ ___)

Date of Exam ___ ___/___ ___/___ ___

Interval: [ ] Baseline [ ] 2 hours post treatment [ ] 24 hours post onset of symptoms ±20 minutes [ ] 7-10 days
[ ] 3 months [ ] Other _____(___ ___)

7. Limb Ataxia: This item is aimed at finding evidence of a unilateral cerebellar lesion. Test with eyes open. In case of visual defect, ensure testing is done in intact visual field. The finger-nose-finger and heel-shin tests are performed on both sides, and ataxia is scored only if present out of proportion to weakness. Ataxia is absent in the patient who cannot understand or is paralyzed. Only in the case of amputation or joint fusion, the examiner should record the score as untestable (UN), and clearly write the explanation for this choice. In case of blindness, test by having the patient touch nose from extended arm position.	**0 = Absent.** **1 = Present in one limb.** **2 = Present in two limbs.** **UN = Amputation or joint fusion, explain: _____**	_____
8. Sensory: Sensation or grimace to pinprick when tested, or withdrawal from noxious stimulus in the obtunded or aphasic patient. Only sensory loss attributed to stroke is scored as abnormal and the examiner should test as many body areas (arms [not hands], legs, trunk, face) as needed to accurately check for hemisensory loss. A score of 2, "severe or total sensory loss," should only be given when a severe or total loss of sensation can be clearly demonstrated. Stuporous and aphasic patients will, therefore, probably score 1 or 0. The patient with brainstem stroke who has bilateral loss of sensation is scored 2. If the patient does not respond and is quadriplegic, score 2. Patients in a coma (item 1a=3) are automatically given a 2 on this item.	**0 = Normal; no sensory loss.** **1 = Mild-to-moderate sensory loss; patient feels pinprick is less sharp or is dull on the affected side; or there is a loss of superficial pain with pinprick, but patient is aware of being touched.** **2 = Severe to total sensory loss; patient is not aware of being touched in the face, arm, and leg.**	_____
9. Best Language: A great deal of information about comprehension will be obtained during the preceding sections of the examination. For this scale item, the patient is asked to describe what is happening in the attached picture, to name the items on the attached naming sheet and to read from the attached list of sentences. Comprehension is judged from responses here, as well as to all of the commands in the preceding general neurological exam. If visual loss interferes with the tests, ask the patient to identify objects placed in the hand, repeat, and produce speech. The intubated patient should be asked to write. The patient in a coma (item 1a=3) will automatically score 3 on this item. The examiner must choose a score for the patient with stupor or limited cooperation, but a score of 3 should be used only if the patient is mute and follows no one-step commands.	**0 = No aphasia; normal.** **1 = Mild-to-moderate aphasia; some obvious loss of fluency or facility of comprehension, without significant limitation on ideas expressed or form of expression. Reduction of speech and/or comprehension, however, makes conversation about provided materials difficult or impossible. For example, in conversation about provided materials, examiner can identify picture or naming card content from patient's response.** **2 = Severe aphasia; all communication is through fragmentary expression; great need for inference, questioning, and guessing by the listener. Range of information that can be exchanged is limited; listener carries burden of communication. Examiner cannot identify materials provided from patient response.** **3 = Mute, global aphasia; no usable speech or auditory comprehension.**	_____
10. Dysarthria: If patient is thought to be normal, an adequate sample of speech must be obtained by asking patient to read or repeat words from the attached list. If the patient has severe aphasia, the clarity of articulation of spontaneous speech can be rated. Only if the patient is intubated or has other physical barriers to producing speech, the examiner should record the score as untestable (UN), and clearly write an explanation for this choice. Do not tell the patient why he or she is being tested.	**0 = Normal.** **1 = Mild-to-moderate dysarthria; patient slurs at least some words and, at worst, can be understood with some difficulty.** **2 = Severe dysarthria; patient's speech is so slurred as to be unintelligible in the absence of or out of proportion to any dysphasia, or is mute/anarthric.** **UN = Intubated or other physical barrier, explain: _____**	_____

Rev 10/1/2003

N I H STROKE SCALE

Patient Identification. ___ ___-___ ___ ___-___ ___ ___

Pt. Date of Birth ___ ___/___ ___/___ ___

Hospital _____(___ ___-___ ___)

Date of Exam ___ ___/___ ___/___ ___

Interval: [ ] Baseline [ ] 2 hours post treatment [ ] 24 hours post onset of symptoms ±20 minutes [ ] 7-10 days
[ ] 3 months [ ] Other _____(___ ___)

11. Extinction and Inattention (formerly Neglect): Sufficient information to identify neglect may be obtained during the prior testing. If the patient has a severe visual loss preventing visual double simultaneous stimulation, and the cutaneous stimuli are normal, the score is normal. If the patient has aphasia but does appear to attend to both sides, the score is normal. The presence of visual spatial neglect or anosagnosia may also be taken as evidence of abnormality. Since the abnormality is scored only if present, the item is never untestable.	**0 = No abnormality.** **1 = Visual, tactile, auditory, spatial, or personal inattention or extinction to bilateral simultaneous stimulation in one of the sensory modalities.** **2 = Profound hemi-inattention or extinction to more than one modality; does not recognize own hand or orients to only one side of space.**	_____

_____

_____

Rev 10/1/2003

Modified Rankin Scale

Rater Name: _____

Date: _____

Score Description

0 No symptoms at all

1 No significant disability despite symptoms; able to carry out all usual duties and activities

2 Slight disability; unable to carry out all previous activities, but able to look after own affairs without assistance

3 Moderate disability; requiring some help, but able to walk without assistance

4 Moderately severe disability; unable to walk without assistance and unable to attend to own bodily needs without assistance

5 Severe disability; bedridden, incontinent and requiring constant nursing care and attention

6 Dead

TOTAL (0–6): _____

Progress report UHasselt

universiteit hasselt | FACULTEIT GENEESKUNDE EN LEVENSWETENSCHAPPEN
www.uhasselt.be/glw
postadres: Universiteit Hasselt | Martelarenlaan 42 | BE-3500 Hasselt
bezoekadres: Universiteit Hasselt | Agoralaan, gebouw D | BE-3590 Diepenbeek
T +32(0)11 26 85 36 | F +32(0)11 26 85 99 | E-mail: glw@uhasselt.be

VOORTGANGSFORMULIER WETENSCHAPPELIJKE STAGE DEEL 1

DATUM	INHOUD OVERLEG	HANDTEKENINGEN
20/10	→ 1ste contact met promotor → uitleg thesisonderwerp → bijeen naar opgezochte studies	Promotor: Copromotor: Student(e): Student(e):
31/10	→ uitwerking onderzoeksvraag + in / exclusiecriteria → brainstormen onderdelen data extractie	Promotor: Copromotor: Student(e): Student(e):
13/11	→ feedback data-extractie	Promotor: Copromotor: Student(e): Student(e):
13/1	→ uitwerking in / exclusiecriteria → uitleg Resultaten, Inleiding en discussie	Promotor: Copromotor: Student(e): Student(e):
30/3	→ laatste feedback op inleiding → verdere uitwerking resultaten, discussie	Promotor: Copromotor: Student(e): Student(e):
8/5	→ feedback Resultaten, discussie	Promotor: Copromotor: Student(e): Student(e):
29/5	→ feedback uitgeschreven deel → info protocol MP II	Promotor: Copromotor: Student(e): Student(e):
7/6	→ feedback totale MP I → info protocol MP II	Promotor: Copromotor: Student(e): Student(e):
		Promotor: Copromotor: Student(e): Student(e):
		Promotor: Copromotor: Student(e): Student(e):

Auteursrechtelijke overeenkomst

Ik/wij verlenen het wereldwijde auteursrecht voor de ingediende eindverhandeling:
Longitudinal observation of quality of life and domain-specific impairments in persons with neurological conditions

Richting: **master in de revalidatiewetenschappen en de kinesitherapie-revalidatiewetenschappen en kinesitherapie bij musculoskeletale aandoeningen**
Jaar: **2017**

in alle mogelijke mediaformaten, - bestaande en in de toekomst te ontwikkelen - , aan de Universiteit Hasselt.

Niet tegenstaand deze toekenning van het auteursrecht aan de Universiteit Hasselt behoud ik als auteur het recht om de eindverhandeling, - in zijn geheel of gedeeltelijk -, vrij te reproduceren, (her)publiceren of distribueren zonder de toelating te moeten verkrijgen van de Universiteit Hasselt.

Ik bevestig dat de eindverhandeling mijn origineel werk is, en dat ik het recht heb om de rechten te verlenen die in deze overeenkomst worden beschreven. Ik verklaar tevens dat de eindverhandeling, naar mijn weten, het auteursrecht van anderen niet overtreedt.

Ik verklaar tevens dat ik voor het materiaal in de eindverhandeling dat beschermd wordt door het auteursrecht, de nodige toelatingen heb verkregen zodat ik deze ook aan de Universiteit Hasselt kan overdragen en dat dit duidelijk in de tekst en inhoud van de eindverhandeling werd genotificeerd.

Universiteit Hasselt zal mij als auteur(s) van de eindverhandeling identificeren en zal geen wijzigingen aanbrengen aan de eindverhandeling, uitgezonderd deze toegelaten door deze overeenkomst.

Voor akkoord,

Moelans, Wim **Douwen, Yannick**