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Fatigue and quality of life in rheumatism: Sex and SES differences

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Bachelor thesis

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1. Abstract

1.1 Abstract in English

Fatigue plays an important role in rheumatic diseases as it is a commonly experienced symptom. Because of the great prevalence and importance of fatigue the aim of this study was to gain insight into the relationship of this outstanding symptom and the patients' quality of life. Furthermore the study's aim was to test sex and SES related differences in fatigue and in its impact on quality of life. Previous findings concerning sex and SES related differences in fatigue are often conflicting. The present study assumed that women and patients with a low SES suffer from more fatigue and have a lower quality of life than men and patients with a high SES.

To examine the relation of fatigue and quality of life and to test possible sex and SES differences in fatigue and its impact on quality of life an existing dataset was used. It consisted of data from 207 outpatients of Medical Spectrum Twente, The Netherlands, affected by various forms of rheumatic diseases. The patients filled out the SF-36v2 Health Survey to evaluate their quality of life. The present study made use of five of the eight dimensions of the SF-36v2. Furthermore, the patients indicated their actual pain level by means of a numerical rating scale and stated their current fatigue by means of three visual analogue scales that measure the severity of fatigue, its effect and coping with fatigue.

The results revealed that there were significant sex differences in the severity of fatigue with women rating their fatigue as more severe than men. Furthermore, there was also significant sex difference in pain with women reaching a higher mean score than men. An analysis of covariance showed that the effect of sex on pain outweighed the effect of sex on fatigue so that sex was not significantly related to the severity of fatigue as pain was controlled. On top of this the results revealed significant SES differences in coping with fatigue with patients with low SES coping worse with fatigue than patients with high SES. Moreover the results identified sex and SES differences in some dimensions of quality of life. It was further shown that fatigue, pain and physical functioning were related to all aspects of quality of life that were measured. Because fatigue was shown to be an outstanding symptom among several forms of rheumatism more information about causes and treatment of fatigue is needed so that patients get supported in using self-management strategies. It may be that women and patients with low SES benefit more from special treatment than men and patients with high SES.

1.2 Abstract in Dutch

Vermoeidheid is te zien als een heel belangrijk symptoom onder patiënten met rheumatische aandoeningen. Op grond van de hoge prevalentie en de grote belangrijkheid was het doel van deze studie inzicht te krijgen in de relatie van dit symptoom en de kwaliteit van leven der patiënten. Bovendien was het doel te onderzoeken of er sekse en SES gerelateerde verschillen zijn in vermoeidheid en zijn effecten op de kwaliteit van leven. Hieraan vorafgaande resultaten met betrekking tot sekse en SES gerelateerde verschillen in vermoeidheid zijn vaak inconsistent. Deze studie heeft ondersteld dat vrouwen en patiënten met een lage SES meer last hebben van vermoeidheid dan mannen en patiënten met een hoge SES.

Een bestaande gegvensverzameling is gebruikt worden om het verband van vermoedheid en de kwaliteit van leven te onderzoeken. Dit bevatte data van 207 ambulante patiënten uit het Medical Spectrum Twente, Nederland. De patiënten hebben de SF-36v2 ingevuld om hun kwaliteit van leven te beoordelen. Vijf van totaal acht dimensies van de SF-36v2 zijn voor deze studie gebruikt worden. Bovendien hebben de patiënten hun tegenwoordige level van pijn en vermoedheid aangegeven.

De resulaten hebben overtuigend aangetoond dat er signifikante verschillen waren tussen mannen en vrouwen betrekkelijk de zwaarte van vermoeidheid. Vrouwen hebben vermoeidheid ernstiger geraporteerd dan mannen. Er was ook een signifikant sekse verschil in de pijn scores waarbij vrouwen een hogere gemiddelde score hebben bereikt dan mannen. Een covariantie analyse heeft vervolgens aangetoond dat het effect van sekse op pijn het effect van sekse op vermoeidheid geëgaliseerd heeft zodat sekse niet meer signifikant was gerelateerd aan de zwaarte van vermoeidheid als pijn gecontroleerd werd. Daarboven hebben de resultaten aangetoond dat er signifikante SES verschillen waren in de omgang met vermoeidheid. Patiënten met een lage SES zijn slechter met vermoeidheid omgegaan dan patiënten met een hoge SES. Er waren ook signifiknate sekse en SES gerelateerde verschillen in sommige dimensies van de kwaliteit van leven. Het was verder aangetoond dat vermoeidheid, pijn en fysieke functionering signifikant gerelateerd waren aan alle aspecten van de kwaliteit van leven die opgenomen waren.

Omdat aangetoond wordt dat vermoeidheid een beduidend symptoom is onder verschillende formen van rheumatische aandoeningen is meer informatie nodig over de oorzaken en mogelijke behandelingen van vermoeidheid. Misschien profiteren vrouwen en patiënten met een lage SES meer van speciale behandelingen dan mannen en patiënten met een hoge SES.

2. Introduction

2.1 Aim and relevance of the study

In 1990, an estimated 2. 8 % of the US population (7. 0 million people) had arthritis or other rheumatic conditions as a major or contributing cause of activity limitations (Lawren, Helmick, Arnett, Deyo, Felson, Giannini, et al., 1998). On top of this an estimated 15.0 % of the US population reported having arthritis in 1990 and the prevalence is projected to rise from 15.0 % to 18.2 % of the estimated population (59.4 million) for 2020 (Lawren et al., 1998). This would be an increase of 57% in number of people affected. Regarding that rheumatic diseases lead to limited activity it is no surprise that they have a detrimental effect on quality of life. Examining these effects can reveal new treatment possibilities. Several studies show that fatigue is a frequently reported symptom for individuals with rheumatic diseases. It is experienced by up to 98% of patients, 40% even report to experience it every day (Hewlett et al., 2005; Wolfe, Hawley, & Wilson, 1996). Today, an internationally accepted definition of fatigue in RA does not exist and little is known about possible support by health professionals (Nikolaus, Bode, Taal, & van de Laar, 2010). Specific pharmacologic treatments for RA fatigue have not yet been developed. Therefore ways of enabling patients to manage this symptom themselves are required (Hewlett, et al., 2005). Because of the great prevalence and importance of fatigue several researchers have begun to study particularly the experiences with and effects of this outstanding symptom instead of examining the impact of rheumatic diseases as a whole. The results may lead to even more tightly focused treatment opportunities. Several studies have already focused on sex and SES differences concerning the degree and impact of fatigue, but there are conflicting results. That is why it is interesting to further examine possible differences between men and women and between different SES levels. If it is true that there are in fact differences in the experiences and effects of fatigue, health professionals could identify risk groups that are likely to suffer more from this symptom. Furthermore special treatment could be developed.

The next part deals with a definition of rheumatism. After that some studies that demonstrate the impact on the patients’ quality of life will be described. The following part will give a more detailed description of fatigue. Studies that also examined its impact on quality of life will be presented because these are particularly relevant for the following study. Finally some mixed results concerning sex and SES differences in the experiences and impact of fatigue will be introduced.

2.2 Rheumatism and its impact on quality of life

The World Health Organization (WHO) uses rheumatism as an umbrella term for disorders that affect the bodily motion organs and which cause pain and limitations of activities in most cases (Brückle, 2004).

Today rheumatism is divided into four main groups and a lot of subgroups with several different diseases. The first main group includes the inflammatory rheumatic diseases. The inflammation is not restricted to one or more joints, but as a systemic disease it affects the whole body. The most popular and important inflammatory form of rheumatism is rheumatoid arthritis (RA). Prevalence estimates suggest that approximately 1% of the population has RA (Hazes & Silman, 1990). Further women are affected three times more often than men (Rupp, Boshuizen, Jacobi, Dinant, & van den Bos, 2004). Patients generally feel sick and are limited in activity. Other inflammatory forms are diseases of the connective tissue and the vascular inflammations (vasculitis). As a consequence life-threatening diseases can develop (Brückle, 2004). The second main group of rheumatism includes the degenerative diseases of the joints and the spinal column. Here the articular cartilages are damaged (arthritis). This can be caused by old age or prior damages, for example too heavy strain or an intense defective position. As a consequence people affected experience pain and limited activity. Often they have to give up their work (Brückle, 2004). The third main group is referred to as extra-articular rheumatism. This form of rheumatism is non-inflammable and is caused by overstressing of the muscles and irritation of the sinews or other parts of the soft tissue (Brückle, 2004). An extensive form of extra-articular rheumatism is the fibromyalgia syndrome whereby joint areas and spinal column areas are painfully affected. Pain in the back due to a defective position also ranks among this group. The fourth main group of rheumatism includes metabolic diseases accompanied by rheumatic medical condition. These include metabolic diseases that cause afflictions of the movement organs. A familiar example is bone atrophy which is referred to as osteoporosis. But osteoporosis can also emerge from inflammatory forms of rheumatism where it is an accompanying effect of the inflammatory response (Brückle, 2004). Another example is articular gout whereby the uric acid metabolism is disturbed.

Most rheumatic diseases proceed chronically, are progressive, incurable and the prognosis is uncertain. For that reason treatment sets priorities on managing the symptoms, especially pain and fatigue, and optimizing physical functioning (Pimm & Weimann, 1998).

Considering that rheumatic diseases lead to disability, limited activity and heavy pain it is not surprising that people affected may suffer from difficulties in psychological adjustment, for example depression and reduced life satisfaction (Pimm & Weimann, 1998). The impact of chronic illnesses on quality of life recently aroused interest for both research and clinical care (Persson, Berglund, & Sahlberg, 1999). In recent years many studies have been published in this domain with regard to patients with rheumatoid diseases, particularly focusing on those with rheumatoid arthritis (RA) (Persson, et al., 1999). This focus does not mean that RA differs from other rheumatic diseases in its psychological aspects. That is why several conclusions from the research of psychological consequences of RA also have relevance for other rheumatic diseases (Persson, et al., 1999).

Whalley, McKenna, de Jong en van der Heijde (1997) studied the impact of RA on the patients' quality of life by means of qualitative interviews with 50 respondents. The researchers concluded from these interviews that RA has a damaging impact on many areas of life, including moods, social life, everyday tasks and social relationships. Two of the most important reported stressors are pain and fatigue, because they are related to many restrictions experienced by the patients with RA.

Van Lankveld and colleagues (1993) found similar results. By means of their study they determined pain, limitations, dependence on others and fatigue caused by the disease as the most important stressors shared by all patients with RA. The researchers conducted a second study in which they found a significant relatedness of the stressors pain, limitations and dependence to quality of life. So again we see that RA has a damaging effect on the patients' lives.

Because fatigue is a commonly reported stressor it is worthwhile to study its sole effects on quality of life instead of examining the impact of rheumatic diseases as a whole. This may lead to a better understanding and even more specialized treatment opportunities to manage this symptom. As described in the next part little is now known about the support of health professionals.

2.3 Fatigue and significant predictors

Recently many researchers are already particularly interested in fatigue (Riemsma et al., 1998; Rupp, et al., 2004; Treharne et al., 2008) because it is a frequently occurring symptom in individuals with rheumatic diseases (Riemsma, et al., 1998). Studies have found that the prevalence of fatigue in adults with RA is 80-93% (e.g. Belza, Henke, Yelin, Epstein, Gillis, 1993). An internationally accepted definition of fatigue in RA does not exist and little is known about its aetiology and the possibilities for support by health professionals (Nikolaus, Bode, Taal & van de Laar, 2010). Specific pharmacologic interventions for RA fatigue have not yet been developed (Hewlett, et al., 2005). On top of this Hewlett and colleagues (2005) found out that patients perceive that fatigue is dismissed by professionals. It can be noted that only few studies have focused on the treatment of fatigue (Repping-Wuts, van Riel & van Achterberg, 2008). Quite recently, Hewlett and colleagues (2011) demonstrated that a group cognitive behavioral therapy aiming at improving fatigue yielded promising results among patients with RA. The researchers concluded that it is required to improve access to psychological therapies (Hewlett, et al., 2011). The literature well provides information about the patients' perceptions of fatigue, especially with regard to patients affected by RA. Patients with RA described fatigue for example as an "overall sense of tiredness and heaviness that was associated with a desire to sleep" and as "that kind of fatigue which one never recuperates from" (Tack, 1990). Hewlett and her colleagues (2005) conducted a qualitative study with RA patients to examine their descriptions and perceptions of fatigue. The descriptions of the patients reflected two types of fatigue. The first is referred to as severe weariness and the second type as dramatic overwhelming fatigue. The respondents described their fatigue as different from normal tiredness because it is extreme, often not earned and constant (Hewlett, et al., 2005). The respondents of Nikolaus and colleagues (2010) distinguished between mental and physical fatigue, fatigue with or without prior reason, fatigue in combination with or without pain, with or without dizziness and with or without the desire to go to bed and sleep.

There are some studies providing evidence for significant predictors of fatigue among people with RA. Belza and colleagues (1993) concluded from their study that greater overall pain, less physical activity and more functional limitations count among the most predictive factors for higher levels of RA-related fatigue. Zautra, Fasman, Parish and Davis (2007) also determined increased pain on the same or the previous day as a significant predictor of higher fatigue levels. Likewise, Nicassio, Moxham, Schumann and Gevirtz (2002) identified increased pain on the previous day as being predictable of higher fatigue levels. In the study of Riemsma and colleagues (1998) pain ranks among the most important variables in explaining fatigue too. Repping-Wuts and colleagues (2007) gave evidence that lower general health and greater functional disability are significantly related to higher levels of fatigue. Thus, RA fatigue seems to be a complex symptom that is influenced by different components such as pain and disability. Fatigue in turn influences the patients' quality of life as described in the next part.

2.4 Fatigue and its impact on quality of life

Patients with RA often experience fatigue on a daily basis and rate the impact and importance of fatigue as similar to pain (Wolfe, Hawley & Wilson, 1996). As we saw above RA tends to have a detrimental effect on quality of life because of its chronic and painful character (Rupp, et al., 2004). Furthermore, fatigue was determined as the consequence of RA that distinguished best between RA patients that are doing well and those that are doing less well in relation to quality of life (Suurmeijer et al., 2001). This means that patients who suffer from more fatigue are doing less well with regard to quality of life than patients reporting lower levels of fatigue.

The consequences of fatigue reach every part of life. Activities are reduced and patients are restricted in their ability to perform normal roles in the family, including playing with the children physically (Hewlett, Nicklin, & Treharne, 2008). Fatigue affects social relationships, leading to frustration, irritability and loss of control. Pollard and colleagues (2006) showed with means of their study that HAQ (Health Assessment Questionnaire) scores are positively associated with fatigue scores, indicating that patients with high fatigue levels are markedly disabled. Rupp and her colleagues (2004) also examined the impact of fatigue on health-related quality of life (HRQOL) in RA. They found that physical fatigue had a statistically significant negative impact on HRQOL. Social functioning was negatively influenced by physical fatigue and reduced activity, which is also a dimension of fatigue in the Multidimensional Fatigue Inventory (MFI-20). Mental health was negatively associated with mental fatigue. Reduced motivation is also a dimension of fatigue in the MFI-20 but this was not significantly related to mental health. Further physical fatigue, reduced activity and reduced motivation had a negative impact on vitality of the patients (Rupp, et al., 2004).

All these studies show the complexity and the far reaching consequences of fatigue on quality of life and that is why it can be seen as an outstanding symptom of rheumatic diseases. For that reason it is interesting to examine it further .

2.5 Sex differences in fatigue

The present study also aims at examining the impact of fatigue in rheumatic diseases on the patients' quality of life. Four dimensions of quality of life are of particular interest, namely role-physical, role-emotional and social functioning and mental health. More precisely, the study explores if there are sex related differences in the experience and in the impact of fatigue.

There are already several studies aiming at finding potential differences between men and women with respect to symptoms and impact of rheumatic diseases.

Katz and Criswell (1996) for example were particularly interested in differences in symptom reports between men and women with RA. Their results showed that women were more likely to report severe evaluations for all symptoms, for example the overall pain ratings of female respondents were higher. Furthermore women were more likely to report weakness and fatigue. In particular they rated their fatigue as more severe than men. The researchers concluded that these more severe evaluations of women may be the result of a more severe disease, because when they adjusted their analysis for disease severity, they were able to explain the excess of severe symptom evaluation among women. Furthermore differences in depressive symptoms also explained some of the differences between the symptom evaluations of men and women (Katz & Criswell, 1996). As described earlier pain has a significant correlation to fatigue and if women show higher pain ratings they may also experience the impact of fatigue as more damaging. Furthermore the fact that women suffer from a more severe disease may also be an explanation for a more damaging impact on their quality of life.

The study of van Lankveld and colleagues (1993), which has been mentioned earlier already, also showed a difference between reports of men and women with RA. The researchers determined pain, limitations and dependence on others as the most important stressors of RA. In fact women reached higher scores on all scales striking these three stressors (van Lankveld, Näring, van der Staak, van 't Pad Bosch, & van de Putte, 1993). Again the women seem to suffer more from pain and limitations than men and these two factors have been shown to be predictable of fatigue. That is why the impact of fatigue may be more detrimental for women.

Huyser and colleagues (1998) also determined female sex and higher levels of pain among the best predictors of fatigue among individuals with RA.

Nikolaus and colleagues (2010) also found differences in the experience of RA related fatigue between men and women with means of their qualitative study. Most negative emotions were reported by female respondents. Especially younger women with multiple daily roles experienced negative emotions related to fatigue. Moreover no men, but several women reported consequences of fatigue for social relationships. Additionally, only women reported that their ability to successfully cope with fatigue varied from time to time. The researchers conclude from their results that the amount of daily roles may be responsible for the different experiences of fatigue. Women often fulfill multiple daily roles (Nikolaus, et al., 2010). That is why they might experience the impact of fatigue as more severe than men.

In contrast to these results Riemsma, Taal, Griep, Wouters and Wiegman (1998) did not find a significant correlation between fatigue and sex.

Hewlett, Nicklin and Treharne (2008) state in their report about fatigue in musculoskeletal conditions that there are only a few studies showing higher fatigue descriptions of women with RA and they additionally indicate that many studies recruit mainly women, so there is the risk that men’s evaluations of fatigue are underestimated. But women are in fact three times more affected by RA so it is not surprising that the majority of respondents are mostly female.

All in all the study results about sex differences in the impact of fatigue on quality of life are mixed. In fact, these differences are rarely found and sometimes explained by other factors, such as depression symptoms, severity of the disease, varying coping styles or multiple daily roles which are fulfilled by women. Further level of pain and physical functioning may also be explaining factors for differences between men and women. Regardless of these explicatory factors women may actually suffer from more damage to their quality of life. Thus, the potential difference between men and women in the impact of fatigue on quality of life is still an interesting topic to study. The present study is interested in particular aspects of quality of life which are role-physical, role-emotional and social functioning and mental health.

2.6 Fatigue and SES differences

Besides sex related differences this study also aims at examining potential SES (socioeconomic status) related differences in the experience of fatigue and the impact of fatigue on quality of life.

Socioeconomic status is defined by material wealth, occupation and participation in educational and social institutions (Oakes & Rossi, 2003). It is usually measured by determining education, income, occupation or a composite of these dimensions (Winkleby, Jatulis, Frank, & Fortmann, 1992). It has been shown that SES is linked to the likelihood of health- and mood-related vulnerabilities (Adler et al., 1994). This means that rheumatic patients with a lower SES may be more vulnerable to the effects of fatigue.

Former studies about people with rheumatic diseases already included some SES variables. For example, Pincus and Callahan (1985) studied 75 RA patients over a nine year period and found that patients with lower formal education levels showed significantly higher morbidity and mortality rates than patients with higher formal education levels. This is consistent with reports of higher mortality in general in individuals with low levels of formal education (Kitagawa & Hauser, 1973; Stockwell, 1963). In the study of van Lankveld and colleagues (1993) low level of education was related to the pain scores of people affected by RA, but not to the dependence and limitation scores. Because pain is significantly related to fatigue, patients with low level of education may suffer from higher levels of fatigue and therefore from a more damaging effect on quality of life. Brekke, Hjortdahl, Thelle, Kvien (1999) studied the relationship between disease activity and severity of RA and socioeconomic inequalities. The results showed substantial differences in all dimensions of health status and quality of life between two groups of patients living under different socioeconomic conditions in the same city. Patients living under affluent socioeconomic conditions reported a better health status and more confidence in ability to influence the disease compared to people living under less affluent conditions (Brekke, Hjortdahl, Thelle, & Kvien, 1999)

Finally and particularly interesting for the present study, Huyser and his colleagues (1998) found that SES correlates with increased fatigue levels among individuals with RA. However, Riemsma and colleagues (1998) did not find a significant relation between fatigue and income or education. The study results concerning SES differences in fatigue are mixed, too. So testing potential SES related differences in the experience of fatigue and its impact on quality of life is still interesting. Again the dimensions role physical, role emotional and social functioning and mental health are of particular interest.

2.7 Research questions

The present exposition of the facts with respect to fatigue as an outstanding symptom, its impact on quality of life and possible sex and SES related differences leads to the following research questions:

1. To what extend are there sex and SES related differences in fatigue?
2. To what extend are there sex and SES related differences in pain and physical functioning and does controlling for these two factors change the relation between sex/SES and fatigue?
3. To what extend are there sex and SES related differences in the patients’ quality of life?
4. How do sex and SES influence the relation between fatigue and the patients’ quality of life?

Different assumptions can now be formulated. First, it is assumed that women and patients with low SES experience fatigue as more severe, as more damaging and also cope worse with fatigue than men and patients with high SES. On top of this it is estimated that women and patients with low SES suffer from more pain or physical limitations than men and patients with high SES and that these possible differences have influence on the relation between sex/SES and fatigue. A further assumption is that women and patients with low SES score lower on one or more dimensions of quality of life than men and patients with high SES. Finally it is expected that fatigue is related to the patients’ quality of life and that this relation is in turn influenced by the factors sex and SES.

3. Methods

3.1 Patients

All data was gathered from 207 patients affected by rheumatic diseases of which 69 were male and 138 were female. This means that the majority of patients were women (66.7%). But this imbalance is not surprising regarding the fact that women are more often affected by rheumatic diseases than men. The mean age was 56.2 years (SD 14.9) and the mean duration of the disease was 12 years (SD 11.5). Table 1 shows a detailed distribution of the different rheumatic diseases. It can be seen that the majority of patients (66.6%) are affected by one of the inflammatory forms of rheumatism. In addition to data of the disease and its consequences, the dataset contains information about demographic characteristics such as education level, working situation and family status. On top of this the patients indicated their alcohol consumption and were asked if they smoke or not. All this information is subsumed in table 2. It can be seen that the majority of patients (64.6%) has a lower or middle apprenticeship or has graduated from general-education secondary school. Similar to Singh and Siahpush (2002), the patients' education level is used to stratify the population in three SES (socioeconomic status) categories, which are also shown in table 2. Further it can be seen that 38.8 % of the sample have a fulltime or part time job while 44.1% of the patients are unemployed, incapable of work or already retired. Additionally it can be seen that most patients (64.6%) are married. The majority of patients (82.0%) does not smoke and many of them do not drink alcohol (45.1%).

Table 1

Distribution of rheumatic diseases

Rheumatic disease	n	%
Inflammatory forms of rheumatism	137	66.6%
- Rheumatoid arthritis (RA)	106	51.5%
- Arthritis psoriatic	15	7.3%
- Ancylosans spondylitis (Morbus Bechterew)	11	5.3%
- Scleroderma	1	0.5%
- Systematic lupus erythematosus	1	0.5%
- Tendinitis	1	0.5%
- Reiter’s syndrome	1	0.5%
Degenerative forms of rheumatism	43	20.9%
- Osteoarthritis	43	20.9%
Extra-articular forms of rheumatism	25	12.2%
- Fibromyalgia syndrome	15	7.3%
- Severe pain in the back	10	4.9%
Metabolic disease with rheumatic condition	23	11.7%
- Gout	14	6.8%
- Osteoporosis	9	4.4%
Else/Unknown	39	18.9%

Note. One system-missing value was detected.

Table 2

Individual Characteristics

Characteristic	n	%
Sex		
- Men	69	33.3%
- Women	138	66.7%
Age		
- 19-29 years	9	4.3%
- 30-50 years	58	28.1%
- 51-71 years	110	53.1%
- 72-93 years	30	14.5%
Education level		
- **Low SES (basic education or lower)**	23	11.2%
- no education	2	1.0%
- basic education	21	10.2%
- **Middle SES (vocational high school or lower)**	106	64.6%
- lower apprenticeship	48	23.3%
- General-education secondary school; vocational high school	41	19.9%
- middle apprenticeship	44	21.4%
- **High SES (secondary school diploma or higher)**	50	24.4%
- Secondary school; university entrance diploma	17	8.3%
- Higher apprenticeship; business school	23	11.2%
- Academic education (university)	10	4.9%

Table 2 continued

Characteristic	n	%
Working situation		
- Fulltime work	40	19.4%
- Part time work	40	19.4%
- Housekeeping	31	15.0%
- School or university	4	1.9%
- Unemployed	5	2.4%
- Incapable of work	32	15.5%
- Retired	54	26.2%
Family status		
- Unmarried, not living together	21	10.2%
- Unmarried, living together	18	8.7%
- Married	133	64.6%
- Widowed	24	11.7%
- Divorced	10	4.9%
Alcohol consumption		
- No consumption	93	45.1%
- Yes, on average one consumption per day	85	41.3%
- Yes, on average more than one consumption per day	28	13.6%
Smoking		
- No	169	18.4%
- Yes	37	18.0%

Note. One system-missing value was detected.

3.2 Procedure

All of the patients were recruited in an outpatient clinic for rheumatology in the region of Twente in the Netherlands. The patients came to this clinic because they had an appointment there. They were then locally asked to participate. In 2008, a total of 202 patients (97, 6%) of the sample were asked to fill out the different data entry forms asking about disease information, consequences, fatigue and some demographic variables (e.g. family status and education level). Four patients (1, 9 %) were additionally recruited in 2010 and one patient (0, 5%) participated in 2011. All of the patients entered their answers by means of computers with touch-screens.

3.3 Measurements

Quality of life: The patients' quality of life was measured by the SF-36v2 Health Survey (version 2). The SF-36 is a multi-purpose, short-form health survey with only 36 questions (Ware, 2004). It consists of eight scales that can be summarized in two measures, namely physical health and mental health. The second version, which will be used in the present study, was introduced in 1996 to correct deficiencies identified in the original version. The instructions and questionnaire items were for example improved to shorten and simplify the wording and to make it less ambiguous for the respondents (Ware, 2004). Furthermore, the SF-36v2 has a five-level response format available for all scales, whereas the first version used dichotomous response choices for items in the two role functioning scales (Ware, 2004). The present study is particularly interested in four of the eight scales of the SF-36v2. These are the role-physical scale, the social functioning scale, the role-emotional scale and the mental health scale. Furthermore the study will make use of the physical functioning scale because these scores may correlate with fatigue and therefore mediate the relation between fatigue and quality of life as measured by the four dimensions mentioned above. The role-physical scale consists of four items, the social functioning scale is built up of two items and the role-emotional scale consists of three items. Finally, the physical functioning scale comprises ten items (Ware, 2000). Low scores on the physical functioning scale indicate that the patient is limited in performing all physical activities while low scores on the role-physical scale indicate that the patient is limited with work and other daily activities due to physical problems (Ware, 2000). From low scores on the social functioning scale it can be concluded that the patient experiences extreme and frequent interference with normal social activities due to physical and emotional problems. Low scores on the role-emotional scale indicate that the patient has problems with work or other daily activities as a result of emotional problems. Finally, low scores on the mental health scale lead to the conclusion that the patient experiences feelings of nervousness and depression very often (Ware, 2000).

The scoring of the second version uses norm-based scoring algorithms for all of the eight scales (T-transformation with mean, 50±10 [SD]) (Ware, 2000).To transform the scores to a mean of 50 and a standard deviation of 10 in the general US population, linear transformations were performed. That has made the SF-36 summary measures much easier to interpret. Norm-based scoring has for example been very useful when interpreting differences across scales in the SF-36 profile and for monitoring disease groups over time (Ware, 2000). Overall, the SF-36 has proven to be useful in surveys of general and specific populations, comparing the relative burden of diseases, and in differentiating the health benefits produced by a wide range of different treatments (Ware, 2004). In the majority of cases published reliability statistics have exceeded the minimum standard of 0, 7 recommended for measures used in group comparisons in more than 25 studies (Tsai, Bayliss, & Ware, 1997). Most have even exceeded 0, 8 (McHorny, Ware, Lu, & Sherbourne, 1994; Ware, Snow, Kosinski, & Gandek, 1993). In the present study reliability analyses were performed to check the internal consistency of the role-physical, the role-emotional, the social functioning and the mental health scale. The Cronbach's alpha was very high for all of the five scales (physical functioning = 0.908; role-physical= 0.937; social functioning = 0.845; role-emotional= 0.947; mental health = 0.800). On top of this several studies have yielded content, concurrent, criterion, construct and predictive evidence of validity (Ware, 2004). The full version of the SF-36v2 can be found in the appendix.

Pain: The patients indicated their level of pain by means of a numerical rating scale. They stated their level of pain of the last seven days in terms of numbers ranging from 0-10. 10 represents unbearable pain and 0 stands for no pain at all. There is evidence that an 11-point (0-10) numerical rating scale as used in this study performs better than both a 4-point simple descriptive scale and a continuous (visual analogue) scale (Downie et al., 1978).

Fatigue: By means of a visual analogue scale the patients indicated their degree of fatigue over the last seven days. The left side of the line represents no fatigue at all (0) and the right side indicates being totally tired out (100). Further the patients stated the effect of fatigue over the last seven days. Here, the left side of the line indicates no effect of fatigue (0) and the right side displays a strong effect of fatigue (100). Finally, the patients report their coping with fatigue also with a visual analogue scale. The left side reports bad coping over the last seven days (0) and the right side represents good coping with fatigue (100). Pollard and colleagues (2005) stated that visual analogue scales are a simple and easily reproducible method for measuring fatigue. As Dittner, Wessely and Brown (2004) put it, a lengthy questionnaire is not always necessary or desirable to gain an understanding of the main fatigue issues. A single-item VAS for fatigue has proven to perform equally as well as existing longer questionnaires that give global scores, and patients prefer brevity (Bengtsson, Ohlsson, Ulander, 2007). Further, Nicklin and colleagues (2010) concluded that VAS for fatigue severity, effect and coping are RA specific and have evidence to support validity.

3.4 Statistical analysis

Statistical analyses will be performed using SPSS version 16. 0. First of all, the different distributions (e.g. fatigue scores, education level) get tested by means of the Kolmogorov-Smirnov test to see if they are normally distributed. If these results reveal that some variables are not normally distributed the skewness of them will be analyzed. Potentially some variables will be transformed to normalize them in order that they are applicable to the different parametric tests. Then bivariate tests of correlation will be performed which indicate the relation between two variables by means of the Pearson correlation coefficient or the Spearman's rank correlation coefficient. These correlation coefficients can show the relation between the variables fatigue, SES, sex and quality of life. For testing sex differences in fatigue, pain, physical functioning and quality of life an independent sample t-test will be performed. Additionally, several analyses of variance will be used to test SES differences in fatigue, pain, physical functioning and quality of life. Afterwards an analysis of covariance will be performed, whereby pain and physical functioning will be included as covariates. Because they might mediate the relation between fatigue and quality of life it is important to control these variables by means of the analysis of covariance. After that, multiple linear regression analyses will be performed which assess the linear relation between a dependent variable and one or more independent variables. In this case the dependent variables are role-physical functioning, social functioning, role-emotional functioning and mental health. The independent or explicatory variables are physical functioning, pain, fatigue, sex, SES and finally the interaction of fatigue and sex or SES. These independent variables will be entered block wise to test the possible added explained variance.

4. Results

To test if the variables of interest are normally distributed several Komogorov-Smirnov tests were performed. It was shown that only the three indicators of fatigue and the physical functioning scale were normally distributed. The scores of the role-physical scale, the role-emotional scale, the social functioning scale and the mental health scale were not normally distributed. This was also the case for the pain scores. Then bivariate tests of correlation were performed to get an idea of the relation between fatigue and quality of life and between the control variables pain and physical functioning and their relation to fatigue and quality of life. By means of these bivariate tests of correlation Pearson’s correlation coefficient was calculated for the normally distributed variables. In cases of non normal distributions Spearman’s rank correlation coefficient was calculated. The results are shown in table 3.

Table 3

Summary of intercorrelations, means, and standard deviations for scores on the four dimensions of quality of life (role-physical, social functioning, role-emotional, mental health), fatigue, pain and physical functioning

	Fatigue severity	Fatigue effect	Fatigue coping	RP	SF	RE	MH	Pain	PF	Mean	Standard Deviation
Fatigue severity	—	.78*^{a}	-.37*^{a}	-.45*	-.44*	-.31*	-.37*	.53*	-.32*^{a}	48.86	24.66
Fatigue effect	—	—	-.32*^{a}	-.51*	-.49*	-.36*	-.46*	.56*	-.36*^{a}	48.87	28.69
Fatigue coping	—	—	—	.36*	.33*	.39*	.37*	-.34*	.26*^{a}	60.88	24.89
RP	—	—	—	—	.66*	.60*	.52*	-.54*	.61*	36.28	10.29
SF	—	—	—	—	—	.56*	.58*	-.50*	.43*	42.96	10.92
RE	—	—	—	.—	.—	—	.54*	-.36*	.34*	38.71	13.06
MH	—	—	—	.—	—	.—	—	.38*	.34*	48.53	10.32
Pain	. —	—	—	—	—	—	—	—	-.36*	4.95	2.72
PF	—	—	.—	—	—	—	—	—	—	37.71	11.04

Note. RP = role-physical; SF = social functioning; RE = role-emotional; MH = mental health; PF = physical functioning

*=Correlation is significant at the 0.01 level (2-tailed)

^{a}*= Pearson’s correlation coefficient instead of Spearman’s rho*

As we can see in table 3, there was a very strong correlation between fatigue severity and fatigue effect. This means that these two indicators of fatigue overlap to some extend and thus tap the same concept. Accordingly they measure the same thing to a certain degree. However, fatigue severity and fatigue effect both had moderate correlations to fatigue coping. Thus, fatigue coping measures something different than fatigue severity and fatigue effect. It can be seen that fatigue severity and fatigue effect often had more strong correlations to the four dimensions of quality of life (role-physical, role-emotional, social functioning and mental health) and also to pain and physical functioning than fatigue coping, but still all correlations were moderate. The four dimensions of quality of life all showed moderate to strong correlations between each other. The strong correlations can be seen between the role-physical scale and the social functioning scale and between the role-physical and the role-emotional scale and finally between the role-physical scale and the physical functioning scale. Pain and the physical functioning scale, which are used as control variables in this study, both showed moderate correlations to the role-physical scale, the social functioning scale, the role-emotional scale and the mental health scale. The correlation between physical functioning and the role-physical scale even was a strong one. On top of this pain is shown to be stronger related to fatigue than physical functioning.

The next step was to perform an independent sample t-test for testing possible differences between men in women in fatigue, quality of life, pain and physical functioning. The results are shown in table 4. The Kolmogorov-Smirnov tests have already revealed that some variables were not normally distributed so the degree of skewness of these variables got analyzed by means of a descriptive analysis. In fact the t-test presumes that the variables are normally distributed. Values of less than two standard errors of skewness were accepted. Thereupon, the role-emotional scores and the pain scores were not transformed because their values of skewness lied within the accepted range. But variables with values of two standard errors or more are probably skewed to a significant degree (Brown, 1997), so positively skewed variables were transformed by means of calculating the square root of each data point. In cases of negatively skewed variables a new variable was created where the original value of the variable was subtracted from a constant (constant was calculated by adding 1 to the largest value of the original variable) and then the square root of each data point was calculated. The variables that were transformed are the social functioning scores, the mental health scores and the role-physical scores. Thereupon, Kolmogorov-Smirnov tests were again performed to test if the variables are normally distributed after the transformation. The results revealed that these variables were still not normally distributed, but the degree of skewness showed that they now fall within the accepted range including values of less than two standard errors.

Table 4

Sex differences in fatigue, quality of life, pain and PF (t-test for equality of means)

	Men n= 69		Women n=138		t	df	P	Mean Difference	95% CI of the difference
	Mean	SD	Mean	SD					
Fatigue severity	42.75	25.48	51.91	23.74	-2.493	127.874	0.014[a]	-9.16	[-16.43, -1.89]
Fatigue effect	43.55	31.32	51.53	27.00	-1.807	119.744	0.073	-7.98	[-16.72, 0.77]
Fatigue coping	61.91	26.99	60.36	23.89	0.406	122.582	0.686	1.56	[-6.04, 9.15]
SF	44.29	10.70	42.34	11.01	-1.193	103.805	0.235	-0.31	[-0.83, 0.21]
MH	49.86	10.24	47.90	10.34	-1.298	100.431	0.197	-0.30	[-0.75, 0.16]
RP	38.92	11.30	35.02	9.57	2.166	97.084	0.033	0.31	[0.026, 0.59]
RE	40.68	12.48	37.77	13.28	1.403	114.836	0.163	2.91	[-1.20, 7.01]
Pain	4.37	2.88	5.24	2.60	-2.099	123.093	0.038	-0.87	[-1.69, -.050]
PF	39.07	12.44	37.07	10.31	1.047	91.85	0.298	2.00	[-1.80, 5.80]

Note. RP = role-emotional; SF = social functioning; RE = role-emotional; MH = mental health; PF = physical functioning; CI = confidence interval

As we can see in table 4, men and women did not differ in fatigue effect and fatigue coping but there was a sex difference in fatigue severity with women reaching a higher mean score than men. The 95% confidence interval of the difference also shows that men averagely reached lower scores on fatigue severity. This means that women rated their fatigue as more severe. Furthermore the only difference between men and women in quality of life is seen in the role-physical scale, in which men reached a higher mean score than women, which is also demonstrated in the 95% confidence interval. Finally, the independent sample t-test for the control variables pain and physical functioning showed that there was a significant difference between men and women in the pain scores, with women reaching a higher mean score than men. Thus, women reported more pain than men. Because men reported less pain than women the values of the 95% confidence interval are negative. But there was no statistical significant difference between men and women in physical functioning.

To test SES related differences in fatigue, quality of life, pain and PF an analysis of variance was performed. SES got operationalized with the patients' education level. Just as in the t-test for sex differences the transformed variables were used in the analysis of variance whereby it also is required that the variables are normally distributed. The results are shown in table 5.

Table 5

Analysis of variance for testing education differences in fatigue and quality of life

	Low education level n = 71		Middle education level n = 85		High education level n = 50		df	F	p	95% CI for the difference
	Mean	SD	Mean	SD	Mean	SD				
Fatigue severity	51.18	24.42	48.79	25.19	45.68	24.72	2	0.726	0.485[a]	
Fatigue effect	52.70	27.34	47.88	29.50	44.42	29.00	2	1.289	0.278	
Fatigue coping	52.76[a]	2.86	62.13	2.63	70.48[a]	3.41	2	8.094	0.000	[-28.47, -6.97] MD = 17.72
SF	3.60	1.51	3.54	1.65	3.40	1.58	2	0.215	0.807	
MH	4.01	1.44	3.78	1.32	3.70	1.37	2	0.724	0.486	
RP	5.78[a]	0.77	5.95	0.83	6.21[a]	0.94	2	3.283	0.040	[-0.84, -0.02] MD = -0.43
RE	34.43[a]	12.51	39.30	12.53	43.09[a]	13.20	2	5.939	0.003	[-14.81, -2.51] MD = -8.66
Pain	5.14	2.72	5.07	2.67	4.40	2.80	2	1.254	0.288	
PF	35.84	11.09	37.80	11.73	39.92	11.29	2	1.733	0.180	

Note. [a]= *mean with the same subscript differ significantly ($p < 0.05$); MD = mean difference*

As shown in table 5, there was a significant difference between the three education levels in fatigue coping, with patients with a high education level reaching a significant higher mean score than patients with a low education level. With regard to quality of life, there was a significant difference in the role-physical scale with high educated patients reaching a significant higher mean score than patients with lower education. Furthermore, there was a significant difference in the role-emotional scores with patients with a high education reaching a significant higher mean score than patients with a low education. Finally, there were no education related differences in the control variables pain and PF. The Bonferroni comparisons for the significant education differences in coping with fatigue, in role-physical functioning and in role-emotional functioning revealed that the only significant mean difference was the difference between low educated and high educated patients. Thus, with regard to coping with fatigue and role-physical and role-emotional functioning, patients with a high education level significantly reached higher scores than patients with a low education level.

To conclude, there was a sex difference in the scores of the role-physical scale, whereby women reached statistically significantly lower scores than men. Further women showed significantly higher pain scores and higher scores on fatigue severity than men. On top of this, there was an education related difference in coping with fatigue whereby lower educated patients reached a significant lower mean score than high educated patients. Besides, lower educated patients scored significantly lower on the role-emotional scale and on the role-physical scale than high educated patients.

As already mentioned in the introduction, the different indicators of fatigue may also be influenced by pain and physical functioning and these variables were not included in the analysis of variance for testing education differences or in the t-test for testing sex differences in fatigue. That is why an analysis of covariance was performed which allows to include pain and physical functioning as covariates. Table 6 shows the results for the analysis of covariance for testing sex differences in the three indicators of fatigue including pain and physical functioning as covariates. Table 7 shows the results for the analysis of covariance for testing SES differences in fatigue, also including pain and physical functioning as covariates.

Table 6

Analysis of covariance for testing sex differences in fatigue with pain and physical functioning as covariates

		Sex	Pain (covariate)	PF (covariate)	Men n = 56		Women n = 118	
					Mean	SD	Mean	SD
Fatigue	Df	1	1	1				
severity	F	3.472	43.041	5.001	42.30	23.93	51.98	23.47
	p	0.064[a]	0.00	0.027				
Fatigue	Df	1	1	1				
effect	F	0.755	65.726	6.88	43.20	29.62	51.05	26.52
	p	0.386	0.00	0.009				
Fatigue	DF	1	1	1				
coping	F	0.734	20.783	1.470	66.30	23.56	60.78	22.95
	p	0.393	0.00	0.227				

Note. SD = standard deviation; PF = physical functioning.

Means may differ from table 4 due to respondent attrition.

The independent sample t-test for testing differences between men and women in the fatigue scores showed a significant difference in fatigue severity whereby women reached a higher mean score than men. As we can see in table 4, controlling for pain and physical functioning canceled out this sex effect on fatigue severity. The relationship between sex and fatigue severity was thus no longer significant when pain and physical functioning were included as covariates. However, the covariates pain and physical functioning both had a significant effect on fatigue severity. Furthermore, pain and physical functioning were both significantly related to fatigue effect. Finally, pain had a significant effect on fatigue coping but physical functioning did not.

Table 7

Analysis of covariance for testing education differences in fatigue with pain and physical functioning as covariates

		Education level	Pain (covariate)	PF (covariate)	Low education level n = 57		Middle education level n = 72		High education level n = 45		95% CI for the difference
					Mean	SD	Mean	SD	Mean	SD	
Fatigue severity	Df	2	1	1							
	F	0.303	45.184	5.156	51.37	23.82	47.50	24.59	47.89	23.50	
	p	0.739	0.00	0.024							
Fatigue effect	Df	2	1	1							
	F	0.195	167.444	6.920	51.42	25.43	47.36	28.92	46.71	28.82	
	p	0.823	0.00	0.009							
Fatigue coping	DF	2	1	1							
	F	5.021	21.950	0.808	54.53^a	23.38	64.65^a	22.71	69.38^a	21.32	[-18.22, -0.17]
	p	0.008	0.00	0.370							MD = -9.19
											[-22.74, -2.30]
											MD= -12.52

Note. SD = standard deviation; PF = physical functioning; MD = mean difference; $^{a=}$ *mean with the same subscript differ significantly (p< 0.05).*

Means may differ from table 5 due to respondent attrition.

The analysis of variance for testing education related differences in fatigue, quality of life, pain and physical functioning revealed that there was a statistically significant difference between the three education levels regarding fatigue coping. As shown in table 5 this effect of education on fatigue is not reduced or canceled out when pain and physical functioning are included as covariates. This means that the patients' education level is still significantly related to fatigue coping. The Bonferroni comparisons for education differences in coping with fatigue revealed that the mean differences between low and middle educated patients and between low and high educated patients were significant. Thus, patients with either a high-level education or a mid-level education coped with fatigue better than patients with a low education level. The covariates pain and physical functioning both had a significant effect on fatigue severity and on fatigue effect. Besides pain had a significant effect on fatigue coping but physical functioning did not.

To test the relation between the four dimensions of quality of life and the independent variables pain, physical functioning, education level, sex and the three indicators of fatigue, multiple linear regression analyses have been performed. The correlation analysis showed a great overlap of fatigue severity and fatigue effect. Therefore it is shown that they are tapping the same construct and that is why only fatigue severity is used in the following regression analyses. On top of this the transformed instead of the original variables were used again. The results are shown in table 8 to 11.

Table 8

Summary of hierarchical regression analyses for variables predicting scores on the role-physical scale

	Model 1			Model 2		
Variable	B	SE B	β	B	SE B	β
Pain	-0.116	0.019	-0.364***	-0.080	0.021	-0.250***
PF	0.038	0.005	0.485***	0.035	0.004	0.443***
Fatigue severity				-0.005	0.002	-0.152*
Fatigue coping				0.004	0.002	-0.152
Sex				-0.101	0.099	-0.056
Education level				0.085	0.062	0.076
Sex*Fatigue severity						
Sex*Fatigue coping						
EL*Fatigue severity						
EL*Fatigue coping						
R²	0.488			0.535		
ΔR²				0.047		
F for change in R²	81.011^{a}			4.153^{a}		

Note. PF = physical functioning; EL = education level.

* = $p<0.05$; **$p<0.01$; ***$p<0.001$; ^{a} = sig. F change < 0.05

It is shown that pain and physical functioning were significantly related to the scores of the role-physical in both models. Further the relation of fatigue severity to role-physical functioning was also significant. It can be seen that both pain and fatigue severity had a negative relation to role-physical functioning. Thus, higher levels of pain and fatigue severity were related to lower scores on role-physical functioning. In contrast, physical functioning had a positive relation to role-physical functioning. This means that better physical functioning involved higher scores on the role-physical scale. Neither sex nor education level were related to the role-physical scores. The high beta value of physical functioning implies that it was the most meaningful variable in the different models. The explained variance of the role-physical scores rose from 48.8% in the first model to 53.5% in the second model. In fact, the second model was extended by including the interaction of sex and fatigue and the interaction of SES and fatigue but it has been proven that this extension did not lead to a statistically significant improvement (significance of F change > 0.05). That is why this model is not displayed in the table.

Table 9

Summary of hierarchical regression analyses for variables predicting scores on the social functioning scale

	Model 1			Model 2		
Variable	B	SE B	β	B	SE B	β
Pain	0.237	0.039	0.404***	0.151	0.043	0.257**
PF	-0.043	0.010	-0.297***	-0.037	0.009	-0.257***
Fatigue severity				0.016	0.005	0.244**
Fatigue coping				-0.007	0.005	-0.107
Sex				-0.051	0.208	-0.015
Education level				0.076	0.130	0.037
Sex*Fatigue severity						
Sex*Fatigue coping						
EL*Fatigue severity						
EL*Fatigue coping						
R^2	0.333			0.394		
ΔR^2				0.061		
F for change in R^2	42.424^a			4.154^a		

Note. PF = physical functioning; EL = education level.

** = $p<0.05$; **$p<0.01$; ***$p<0.001$; ^{a} = sig. F change<0.05*

It is shown that both pain and physical functioning were again significantly related to the social functioning scores in both models. Fatigue severity was also significantly related to the social functioning scores. Furthermore, pain and fatigue severity showed a positive relation to social functioning whereas physical functioning was negatively related to social functioning. This is a consequence of the transformation of the social functioning scores. High scores of the transformed variable now indicate low scores of the original variable of social functioning. Thus, higher pain levels and higher scores of fatigue severity were related to lower scores of social functioning. Furthermore, higher scores on physical functioning were related to higher scores on social functioning. It is shown that pain, physical functioning and fatigue severity were similarly important in explaining the scores of the social functioning scale. Again, neither sex nor education level were significantly related to social functioning. A total of 33.3% of the variance of the social functioning scores was explained in the first model and 39.4% of this variance was explained in the second model. The extension of the model by means of including the interaction of sex and fatigue and the interaction of education level with fatigue did not significantly lead to an improvement (significance of F change > 0.05).

Table 10

Summary of hierarchical regression analyses for variables predicting scores of the role-emotional scale

	Model 1			Model 2		
Variable	B	SE B	β	B	SE B	β
Pain	-1.411	0.358	-0.289***	-0.774	0.389	-0.159*
PF	0.290	0.088	0.243**	0.229	0.084	0.192**
Fatigue severity				-0.045	0.044	-0.082
Fatigue coping				0.142	0.042	0.250**
Sex				-0.228	1.863	-0.008
Education level				2.630	1.164	0.154*
Sex*Fatigue severity						
Sex*Fatigue coping						
EL*Fatigue severity						
EL*Fatigue coping						
R^2	0.190			0.295		
ΔR^2				0.105		
F for change in R^2	19.966[a]			6.166[a]		

Note. PF = physical functioning; EL = education level

** = $p<0.05$; **$p<0.01$; ***$p<0.001$; [a] = sig. F change< 0.05*

Both pain and physical functioning were significantly related to the scores on the role-emotional scale in the two models. In the second model coping with fatigue and education level were also significantly related to the role-emotional scores. Furthermore, it is shown that pain was negatively related to the scores of the role-emotional scale whereas physical functioning, coping with fatigue and education level were positively related to the role-emotional scores. Thus, higher pain levels were related to lower scores on mental health whereas higher scores on physical functioning, higher scores on coping with fatigue and a higher education level were related to higher scores on mental health. It can be seen that coping with fatigue was most important in explaining the variance of the role-emotional scores. The overall explained variance of the mental health scores rose from 19.0% in the first model to 29.5% in the second model. Again, the second model was extended by including the interaction of sex with fatigue and the interaction of SES and fatigue but this extension did not lead to a statistically significant improvement (significance of F change > 0.05).

Table 11

Summary of hierarchical regression analyses for variables predicting scores of the mental health scale

	Model 1			Model 2		
Variable	B	SE B	β	B	SE B	β
Pain	0.149	0.037	0.293***	0.070	0.042	0.139
PF	-0.028	0.009	-0.224**	-0.022	0.009	-0.178*
Fatigue severity				0.010	0.005	0.179*
Fatigue coping				-0.012	0.005	-0.202**
Sex				0.023	0.200	0.008
Education level				0.017	0.125	0.009
Sex*Fatigue severity						
Sex*Fatigue coping						
EL*Fatigue severity						
EL*Fatigue coping						
R^2	0.182			0.252		
ΔR^2				0.069		
F for change in R^2	19.080[a]			3.872[a]		

Note. PF = physical functioning; EL = education level.

** = $p<0.05$; **$p<0.01$; ***$p<0.001$; [a] = sig. F change < 0.05*

Pain and physical functioning were both significantly related to the mental health scores in the first model. In the second model physical functioning was still significantly related to the mental health scores but pain was no longer significant. Instead, fatigue severity and coping with fatigue were significantly related to the mental health scores. Pain and fatigue severity were positively related to mental health whereas physical functioning and coping were negatively related to the mental health scores. This is again the consequence of the transformation of the mental health scores. High scores of the transformed variable indicate low scores on the original variable of mental health. Thus, high levels of pain and higher scores of fatigue severity were related to lower scores on mental health. In contrast, higher scores of physical functioning and better coping were related to higher scores of mental health. Neither sex nor education level were significantly related to mental health. In the second block, a total of 25.2% of the variance in the mental health scores was explained. Fatigue coping was the most important variable in explaining the scores of the mental health scale. The extension of the second model by means of including the interaction of sex and fatigue and the interaction of SES and fatigue did not lead to a statistically significant improvement (significance of F change > 0.05).

5. Discussion

A number of significant findings are revealed by the present study whereby some of the assumptions were supported while others were not confirmed. In the following part the findings will be discussed per research question.

5.1 Sex and SES differences in fatigue

Sex differences

First of all this study has tested sex differences in the severity of fatigue, in its effect and in coping with fatigue. The assumption was that women experience fatigue as more severe, as more influential and also cope worse with fatigue. The results of this study showed that this hypothesis is only partly supported insofar as it was shown that the female respondents experienced fatigue as more severe than the male respondents. But it has been shown that men and women did not differ significantly in coping with fatigue and in its effect. Many other studies do not distinguish severity of fatigue, its effect and coping with fatigue (e.g. Pollard, Choy, Scott, 2005; Riemsma et al., 1998). Instead an overall score of fatigue is used in the analyses. This overall score often indicates the level of fatigue but not the coping with it. This makes it partly difficult to compare the results. Riemsma and colleagues (1998) also stated that studies on fatigue are difficult to compare due to differing measurement methods, scales and numbers of cases. However, it can be noted that Katz and Criswell (1996) found similar results as women in their study were also more likely to report fatigue as more severe than men. But controlling for disease severity and depressive symptoms canceled out this effect of sex on fatigue severity. Although these factors seem to be influential on the severity of fatigue and are explicatory in explaining the prior sex difference, women may actually suffer from more severe fatigue. Huyser and colleagues (1998) also concluded that female sex ranks among the best predictors of fatigue among patients with RA. However, Riemsma and colleagues (1998) did not find a significant effect of sex on fatigue. They concluded that fatigue could be explained by pain, self-efficacy expectations and problematic social support. Self-efficacy expectations and problematic social support were not considered in the present study. But Riemsa and colleagues (1998) even found no significant effect of sex on fatigue when they left out self-efficacy expectations. A reason for the differences in the results may then be the variable of problematic social support which was included in the study of Riemsma and colleagues (1998). This variable expresses itself in lack of sympathy or understanding from the social network. It can now be assumed that there is a significant difference between men and women in problematic social support and that this difference outweighs the influence of sex on fatigue. Anson and colleagues (1993) found similar results, but not for patients with rheumatic diseases. They studied men and women with mild hypertension and the female respondents reported more symptoms than men and rated their health twice as poor. But women also reported higher levels of distress and dissatisfaction with family functioning which can also be seen as indicators of problematic social support. In multivariate analyses these factors outweighed the influence of sex on symptom reporting (Anson, Paran, Neumann & Chernichovsky, 1993). To conclude, sex differences may exist but are often explained by other factors such as disease severity and depressive symptoms. There may also be sex differences in factors related to problematic social support that outweigh the effect of sex on fatigue.

SES differences

Besides testing sex differences the present study also tested SES differences in fatigue. The assumption was that patients with low SES experience fatigue as more severe, as more influential and cope worse with fatigue than patients with high SES. SES got measured with the education level of the patients. The results revealed that this assumption is only partly supported. It has been shown that patients with low SES significantly coped worse with fatigue than patients with high SES. There were no differences between the different SES levels in severity of fatigue and in its effect. There is a similarity between this study and the study of Brekke, Hjortdahl, Thelle and Kvien (1999). They also found evidence that people affected by RA and living under affluent conditions reported more confidence in the ability to cope with the disease compared to patients living under less affluent conditions. Thus, patients living under affluent conditions reported better ability to cope with the disease and in this study people with high SES reported better coping with fatigue. But in the study of Brekke and colleagues (1999) the patients with high SES also reported a better health status than patients with low SES. It could now be reasoned that patients with low SES therefore have higher levels of fatigue severity which contributes to a worse health status than patients with high SES. This was not the case in the present study. The various education levels did not differ in the severity of fatigue and in its effect. But fatigue is only one symptom of the disease and maybe cannot provide much information about the overall health status of the patients. Furthermore, it has to be noted that Brekke and colleagues (1999) ranked districts according to socioeconomic variables such as income, education level, employment, housing standard and number of third world citizens. The patients' SES was thus defined from the

SES of the whole district. In the present study the education level of the patients was used to stratify the patients in different SES categories. Thus, there are similarities between the studies but is has to be kept in mind that different procedures were used. Consistent with the present study is also the finding of Huyser and colleagues (1998). In their study SES was also related to fatigue. Huyser and colleagues (1998) used an overall score of fatigue that also included a dimension that measures the emotional meaning attributed to fatigue. This dimension may predicate the coping with fatigue to some degree. Folkman and Lazarus (1988) posited that emotion and coping occur in a dynamic mutually reciprocal relationship. Thus, emotions are associated to coping and vice versa. People use cognitive modes of coping to change the meaning of a situation (Lazarus & DeLongis, 1983). But emotion can impair adaption by interfering with cognitive functioning (Folkman & Lazarus, 1988). Thus, some patients who attribute a negative emotional meaning to fatigue may not be able to change this meaning by use of cognitive modes of coping. Again it has to be noted that Huyser and colleagues (1998) determined the patients' SES differently. They made use of the Hollingshead Index which includes education, occupation, sex and marital status. Occupation, sex and marital status were not used in the present study. Thus, although the results are similar it has to be taken into consideration that SES was determined in different ways. In contrast, Riemsma and colleagues (1998) did not find a significant relation between fatigue and income or education. However, Riemsma and colleagues (1998) used an overall score of fatigue that predicates mostly the level of fatigue but not the coping with it. Further it can be said that Riemsma and colleagues (1998) used a lot of factors that were not used in the present study (e.g. self-efficacy expectations, problematic social support) and this again makes it harder to compare these studies. There may be SES differences in these factors and these differences might outweigh the effect of SES on fatigue as it may also be the case concerning sex differences in fatigue. Some data already suggested that lower SES individuals tend to have social relationships of lesser quality (Belle, 1982; Dohrenwend & Dohrenwend, 1970). Further Fischer (1982) found higher income and education to be associated with more participation in voluntary associations, larger networks and more contact with network members. Thus, there may be an effect of SES on problematic social support. Further it can be assumed that there are also SES differences in self-efficacy expectations. Grembowski and colleagues (1993) in fact found a positive association between SES and self-efficacy. Similarly to the sex differences in fatigue, SES differences may in fact exist but may be outweighed or explained by other factors such as problematic social support or self-efficacy expectations. Other factors that also may explain sex and SES differences in fatigue are pain and physical functioning. Some other studies already identified pain and limited physical functioning as being predictable of higher levels of fatigue (Belza et al., 1993; Riemsma et al., 1998; Nicassio et al., 2002). In the correlation analysis of this study it was shown that pain and physical functioning were both moderately correlated to fatigue severity, effect of fatigue and coping with fatigue. That is why it seemed to be important to include these variables in the analyses. The present study tested sex and SES differences in pain and physical functioning and examined how these factors influence the relation between sex/SES and fatigue. The following part will discuss these results.

5.2 Sex and SES differences in pain and physical functioning

It was assumed that women suffer from more pain and are more limited in their physical functioning than men. Some other researchers already found support for the hypothesis that women suffer from more pain and more limitations (e.g. Huyser et al., 1998). The results of the present study have shown that there was a significant difference between men and women in the pain scores whereby women had higher pain ratings than men. In contrast there was no significant effect of sex on physical functioning. These findings are consistent with the results of the study of Katz and Criswell (1996) which was already mentioned. The female respondents in their study also had higher pain ratings than the male respondents. Similarly, the female respondents in the study of van Lankveld and colleagues (1993) also reached higher pain scores than the male respondents. In contrast, van Lankveld and colleagues (1993) also found that women suffer from more physical limitations. This was not the case in the present study. It can be noted that van Lankveld and colleagues (1993) focused exclusively on patients affected by RA while this study focused on several forms of rheumatism. The several forms of rheumatism may be accompanied by different comorbidities that were not taken into account. The different comorbidities may lead to similar physical limitations among men and women.

The next assumption was that patients with low SES have higher pain ratings and experience more physical limitations than patients with high SES. The results of the present study indicated that there were no SES differences in pain and physical functioning. In contrast, van Lankveld and colleagues (1993) found that education level is related to the pain scores, but in their study education level was also not related to limitation scores, which expresses itself among other things through physical functioning. Again the fact that van Lankveld and colleagues (1993) focused exclusively on patients affected by RA may be responsible for the differing results.

On top of this the present study examined how pain and physical functioning influence the relation between sex and fatigue and between SES and fatigue respectively. Interestingly, the results revealed that the effect of sex on fatigue severity was canceled out when pain and physical functioning were controlled. Thus, it seems that the effect of sex on pain outweighs the effect of sex on severity of fatigue. As mentioned earlier other studies also found other factors to be explicatory of sex differences in fatigue, for example depressive symptoms or disease severity. Again it can be said that although these factors are explicatory the sex differences in fatigue may still exist and women may actually suffer from more severe fatigue. Furthermore, physical functioning and pain both showed a significant effect on fatigue severity and effect of fatigue. This is not surprising as it has been shown that fatigue severity and fatigue effect are highly correlated and therefore measure the same construct to a certain degree. This effect of pain and physical functioning on fatigue was already assumed a priori because other studies already identified pain and physical functioning as being predictable of higher fatigue levels (Belza et al., 1993; Riemsma et al., 1998; Nicassio et al., 2002).

Further the results revealed that the patients’ education level was significantly related to coping with fatigue even though pain and physical functioning were controlled. It was shown that patients with a high SES coped significantly better with fatigue than patients with a low SES. The fact that there were no SES differences in pain and physical functioning may explain that the significant effect of SES on coping with fatigue was not canceled out. In contrast to the results concerning sex differences there is now no difference between the different SES levels that could outweigh the significant relation between SES and coping with fatigue. These findings are again in accordance with the results of Huyser and colleagues (1998) who already found SES to be related to fatigue. As mentioned earlier Huyser and colleagues (1998) also included an affective dimension of fatigue that covers the emotional meaning attributed to fatigue. This emotional meaning might be related to coping with fatigue as explained earlier.

5.3 Sex and SES differences in the patients' quality of life

Some data already suggest that people with musculoskeletal diseases experience a worse health related quality of life, especially in the areas of pain, physical functioning and role limitations due to physical health problems (Picavet & Hoeymans, 2004). Thereupon the present study hypothesized that there are sex and SES differences in the patients' quality of life. The results revealed that there were sex differences in one dimension of quality of life. Women significantly scored lower on role-physical functioning than men. This means that women experience more problems with work and other daily activities due to physical limitations. Bingefors and Isacson (2004) also showed that women have a lower quality of life as measured by the SF-36, too. The difference is that women scored lower on all dimensions of the SF-36 than men while this study found sex differences in only one dimension. But Bingefors and Isacson (2004) did not focus on a population affected by rheumatic diseases. The researchers concluded that there may be differences in symptom reporting behavior that lead to differences in reported health related quality of life. However, they state that it could also be assumed that the lower health reported quality of life among women is an indication that women in fact have more medical problems and impairment than men. Further, they found pain to be a consequence for an impaired quality of life. The present study found sex differences in the pain which may be an explanation for the worse role-physical functioning among women. Van Lankveld and colleagues (1993) also found pain to be related to quality of life. The fact that the present results did not show a significant effect of sex on mental health, on role-emotional functioning and on social functioning is still surprising and hard to explain because other findings already pointed out sex differences in these aspects of quality of life among patients with RA. Nikolaus and colleagues (2010) for example found that women unlike men reported consequences of fatigue for social relationships. On top of this they also found that women were more likely to report negative emotions with regard to fatigue (Nikolaus et al., 2010). Further Katz and Criswell (1996) found that women suffered from more depressive symptoms (Katz & Criswell, 1996). Mental health and role-emotional functioning both cover the patients' emotional state, therefore also depressive symptoms. Nevertheless, no differences were found in the present study.

To get on to differences in quality of life with regard to the patients' SES, the present study revealed that there were significant SES differences in role-physical functioning and in role-emotional functioning. More precisely, it was shown that patients with high SES did better concerning role-physical and role-emotional functioning than patients with low SES. These results can be related to the finding that there were also SES differences in coping with fatigue. Because patients with low SES cope worse with fatigue they may also cope worse with the problems they experience due to physical limitations and emotional problems. Thus, they experience them as more severe as more influential with regard to their quality of life. Burckhardt (1985) already found that the psychological mediators positive self-esteem, internal control over health, perceived support and low negative attitude towards arthritis contributed directly to a higher quality of life. It may be that patients with low SES have lower scores on these psychological mediators compared to high SES patients and that this explains the difference in their quality of life. As stated earlier Fischer (1982) found higher income and education to be associated with more participation in voluntary associations, larger networks and more contact with network members. Thus high SES patients may perceive more support than low SES patients and this contributes to a higher quality of life. Because patients with low SES cope worse with fatigue than patients with high SES they probably also have a lower positive self-esteem which Burckhardt (1985) also found to be related to quality of life. Zuckerman (1989) already suggested that greater self-esteem reduces stress by fostering social resources and effective coping. Because patients with high SES showed better coping with fatigue it can now be reasoned that they also have a higher self-esteem.

5.4 How sex and SES influence the relation between fatigue and quality of life

The present study assumed that fatigue has a significant relation to the patients' quality of life. Additionally it was assumed that sex and SES have an effect on the relationship between fatigue and the patients' quality of life. It was shown that fatigue is in fact significantly related to all aspects of quality of life that were measured. Furthermore, different aspects of fatigue were related to different aspects of quality of life. Coping with fatigue was related to emotional and cognitive well-being, including mental health and emotional functioning whereas the severity of fatigue was related to aspects of quality of life concerning everyday functioning with regard to physical health and social functioning. On top of this, physical functioning and pain were also significantly related to quality of life. These findings are in line with the results of Rupp and colleagues (2004). In their study fatigue and pain were also significantly related to the patients' quality of life. They also showed that different aspects of fatigue are related to different aspect of quality of life. The difference is that they focused exclusively on patients affected by RA while this study takes various forms of rheumatism into account. Thus, it was shown that fatigue has a major unique contribution to quality of life among several forms of rheumatism as it led to improvement of the explained variance in all domains of quality of life. Therefore it is an important symptom to address in all patients affected by rheumatism. It can be said that sex and SES were not as much related to quality of life as it was expected. Sex was not significantly associated with one of the domains of quality of life. Because the present study found sex differences in pain it can be assumed that this difference outweighs the effect of sex on quality of life. Furthermore, SES was associated with the patients' role-emotional functioning, which provides information about problematic functioning in everyday lives due to emotional problems. Thus, patients with a higher SES experience fewer problems with regard to their emotional state than patients with a lower SES. This is consistent with the finding that there was also a SES difference in role-emotional functioning and a SES difference in coping with fatigue. But SES was not associated with the other domains of quality of life.

To conclude, it was shown that fatigue has a detrimental effect on many aspects of quality of life which is also consistent with the finding of Hewlett and colleagues (2008). It is no surprise that patients rate the impact and importance of fatigue as similar to pain (Wolfe, et al., 1996). Both pain and fatigue are significantly associated with quality of life. Thus, it is important to treat fatigue as an outstanding symptom. As Rupp and colleagues (2004) already suggested, with fatigue intervention strategies improvement in the patients' quality of life can be gained. The problem is that it was already found that patients perceive fatigue to be dismissed by health professionals and for that reason most patients do not discuss fatigue with their healthcare professionals or they simply accept fatigue as part of the disease (Repping-Wuts, van Riel & van Achterberg, 2008). Furthermore, most of the rheumatologists pay attention to fatigue during the first consultation but less often during follow-up consultations. Repping Wuts and colleagues (2008) additionally found that rheumatologists perceive a lack of knowledge about the aetiology and evidence-based interventions to prevent and treat fatigue. Besides Repping-Wuts and colleagues (2008) state that only few studies have focused on the treatment of fatigue. Newly, Hewlett and colleagues (2011) conducted a study aiming at investigating the effect of group cognitive behavioral therapy (CBT) for fatigue self-management. It has been shown that RA patients who participated in CBT reported better scores for fatigue impact. Furthermore, perceived fatigue severity, coping and disability were also better in CBT participants compared to a control group. Fatigue severity and coping with fatigue were both significantly related to quality of life in the present study. Thus, concentrating on fatigue improvement may lead to improvement in well-being. Hewlett and colleagues (2011) recommend improvement of access to psychological therapies given that trained CB therapists are not readily available to most team within the clinical rheumatology. The present findings pointed out that some groups may benefit more from psychological therapies than others. Women showed higher ratings of fatigue severity. Although the effect of sex on pain outweighed the effect of sex on fatigue severity women may nonetheless profit more from psychological therapies than men. On top of this psychological interventions could be especially important for patients with a low SES because SES was significantly associated with fatigue coping.

It can now be reasoned that fatigue is an outstanding symptom among several forms of rheumatism and as Rupp and colleagues (2004) already concluded, it appears to be a feasible and treatable target in the clinical management of rheumatism. It seems interesting to further examine the effects of psychological interventions aiming at improving fatigue and to examine differences between certain groups in the effects of such interventions.

5.5 Limitations of the present study

This study is not without limitations. First of all four dimensions of the SF-36 were used to assess the patients’ quality of life. Physical functioning was used as an independent variable that has influence on the other dimensions although this dimension actually belongs to the SF-36. So this study broke the health related quality of life concept that got measured by the SF-36 apart into dependent and independent variables. Further it can be said that some variables that were important in other studies, such as disease activity and duration or psychological factors such as self-esteem were not included in the analyses of the present study. SES and sex differences in psychological factors would be interesting to examine because some psychological factors turned out to have an influence on fatigue. These possible SES and sex differences may outweigh the effect of sex and SES on fatigue or quality of life. Another limitation is that the study did not take into account possible comorbidities of the patients. Because the study included several forms of rheumatism there may be many different comorbidities that could also be associated with quality of life. There may also be SES differences in comorbidities as Pincus and Callahan (1985) found that RA patients with lower formal education levels showed significantly higher morbidity rates than RA patients with higher formal education levels. On top of this, most of the literature about fatigue focused exclusively on patients affected by RA. Thus, not much is known about the prevalence and aetiology of fatigue in other forms of rheumatism. Not much is either known about the meaning and impact of fatigue to patients affected by other forms of rheumatism. All this could only be generalized from studies focusing on patients affected by RA.

Furthermore, the present study used a cross-sectional design. Thus, the results can be seen as a snapshot of a single moment in time and cannot provide definite information about cause-and- effect relationships. It can for example not be concluded that fatigue causes lower scores on quality of life. In contrast, a longitudinal study extends beyond a single moment in time as it involves the collection of data at different points in time. By means of longitudinal studies it is for example possible to examine possible changes in quality of life over the duration of the disease.

6. Conclusion

To conclude, some of the proposed assumptions of the present study were supported while others could not be supported. The present study found sex differences in pain and fatigue severity and SES differences in coping with fatigue. On top of this there were sex and SES differences in some dimensions of quality of life. Furthermore, fatigue, pain and physical functioning were found to be significantly related to quality of life. Because it was shown that fatigue is an outstanding symptom it is important to address it in all forms of rheumatism.

What is needed now is more information about causes and treatment of fatigue so that patients get supported in using self-management strategies. Rheumatologists need enough knowledge of fatigue to explain this symptom to the patients directly. Repping-Wuts (2008) also states that fatigue should be addressed and explored systematically in clinical practice. It is also important to further study the impact of fatigue on quality of life. It might be that people with low SES and women need more support than patients with high SES and men which might then contribute to a higher quality of life. Hewlett and colleagues (2011) demonstrated that a group cognitive behavioral therapy aiming at improving fatigue yielded promising results. That is why it is important to further examine the effects of psychological therapies and additionally examine possible sex and SES differences in these effects. Women or patients with low SES might benefit more from such interventions than men or patients with a high SES.

7. References

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8. Appendix

Questions:

Vraag 1

Wat is uw geboortedatum?

Vraag 2

Wat is uw geslacht?

Vraag 3

Wat is uw burgerlijke staat?

Vraag 4

Wat is uw hoogst genoten opleiding?

Vraag 5

Wat is de beste omschrijving van uw huidige situatie?

Vraag 6

Gebruikt u alcohol?

Vraag 7

Rookt u?

Vraag 8

Welke vorm(en) van reuma heeft u?

Vraag 9

Sinds wanneer heeft u last van uw reumatische aandoening?

Hoe zou u over het algemeen uw gezondheid noemen?

uitstekend
zeer goed
goed
matig

slecht

Vraag 10

Hoe beoordeelt u nu uw gezondheid over het algemeen, vergeleken met een jaar geleden?

veel beter nu dan een jaar geleden
wat beter nu dan een jaar geleden
ongeveer hetzelfde nu als een jaar geleden
wat slechter nu dan een jaar geleden
veel slechter nu dan een jaar geleden

Vraag 11

De volgende vragen gaan over uw bezigheden die u misschien doet op een doorsnee dag.

Wordt u door uw gezondheid op dit moment beperkt bij deze bezigheden? Zo ja, in welke mate?

mogelijke antwoorden	ja, ernstig beperkt	ja, een beetje beperkt	nee, helemaal niet beperkt
Forse inspanning, zoals hardlopen, tillen van zware voorwerpen, een veeleisende sport beoefenen			
Matige inspanning, zoals een tafel verplaatsen, stofzuigen, zwemmen of fietsen			
Boodschappen tillen of dragen			
Een paar trappen oplopen			
Eén trap oplopen			
Bukken, knielen of hurken			
Meer dan een kilometer lopen			

Een paar honderd meter lopen
Ongeveer honderd meter lopen
Uzelf wassen of aankleden

Vraag 12

Hoe vaak heeft u in de afgelopen 4 weken één van de volgende problemen bij uw werk of andere dagelijkse bezigheden gehad, ten gevolge van uw lichamelijke gezondheid?

mogelijke antwoorden	altijd	meestal	soms	zelden	nooit

U besteedde minder tijd aan werk of andere bezigheden
U heeft minder bereikt dan u zou willen
U was beperkt in het soort werk of andere bezigheden
U had moeite om uw werk of andere bezigheden uit te voeren (het kostte u bijvoorbeeld extra inspanning)

Vraag 13

Hoe vaak heeft u in de afgelopen 4 weken één van de volgende problemen ondervonden bij uw werk of andere dagelijkse bezigheden, ten gevolge van emotionele problemen (zoals depressieve of angstige gevoelens)?

mogelijke antwoorden	altijd	meestal	soms	zelden	nooit

U besteedde minder tijd aan werk of andere bezigheden
U heeft minder bereikt dan u zou willen
U deed uw werk of andere bezigheden niet zo zorgvuldig als gewoonlijk

Vraag 14

In hoeverre hebben uw lichamelijke gezondheid of emotionele problemen u gedurende de afgelopen 4 weken gehinderd in uw normale omgang met familie, vrienden of buren, of bij activiteiten in groepsverband?

helemaal niet
enigszins
nogal
veel
heel erg veel

Vraag 15

Hoeveel lichamelijke pijn heeft u de afgelopen 4 weken gehad?

geen
heel licht
licht
nogal
ernstig
heel ernstig

Vraag 16

In welke mate bent u de afgelopen 4 weken door pijn gehinderd in uw normale werk (zowel werk buitenshuis als huishoudelijk werk)?

helemaal niet
een klein beetje
nogal
veel
heel erg veel

Vraag 17

Deze vragen gaan over hoe u zich voelt en hoe het met u ging in de afgelopen 4 weken.

Wilt u alstublieft bij elke vraag het antwoord geven dat het best benadert hoe u zich voelde?

mogelijke antwoorden	altijd	meestal	soms	zelden	nooit

Hoe vaak gedurende de afgelopen 4 weken ...

Voelde u zich levenslustig?
Was u erg zenuwachtig?
Zat u zo in de put dat niets u kon opvrolijken?
Voelde u zich rustig en tevreden?
Had u veel energie?
Voelde u zich somber en neerslachtig?
Voelde u zich uitgeput?
Voelde u zich gelukkig?
Voelde u zich moe?

Vraag 18

Hoe vaak hebben uw lichamelijke gezondheid of emotionele problemen u gedurende de afgelopen 4 weken gehinderd bij uw sociale activiteiten (zoals vrienden of familie bezoeken etc.)?

altijd
meestal
soms
zelden
nooit

Vraag 19

Hoe JUIST of ONJUIST is elk van de volgende uitspraken voor u?

mogelijke antwoorden	volkomen juist	grotendeels juist	weet ik niet	grotendeels onjuist	volkomen onjuist

Ik lijk wat gemakkelijker ziek te worden dan andere mensen
Ik ben even gezond als andere mensen die ik ken
Ik verwacht dat mijn gezondheid acheruit zal gaan
Mijn gezondheid is uitstekend