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*How is the impact of RA
related to social participation
in the context of treatment?*

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Abstract

Objectives. The first objective of this longitudinal study was to investigate among patients with recently diagnosed rheumatoid arthritis (RA) if the improvement of social participation after one year of medical treatment was related to improvements in disease activity, pain and fatigue as well as to improvements in activity limitations. A second objective was to examine if patients who showed a relative high baseline of depressive symptoms before the onset of treatment improved less in social participation after one year of treatment than those who showed nor or few depressive symptoms. A further purpose of this study was to figure out if women participated less than men, even before treatment started. Additionally, this study aimed to find out if women increased less in social participation than men after one year of treatment.

Methods. Data was collected right before treatment began as well as one year after treatment with the use of the 'Short Form Health Survey' (SF36) and the DAS28 and was acquired from altogether 302 patients recently diagnosed with RA. Social participation was assessed with three subscales (Social Functioning, Role-emotional, Role-physical) of the SF36. The Impairment related variables were measured by a pain score (Bodily Pain), a fatigue score (Vitality scale) of the SF36 as well as by a disease activity score (DAS28). Activity limitations (Physical Functioning) as well as depressive feelings (Mental Health) were also measured with the SF36.

Results. Findings supported the assumption that especially improvements in pain and fatigue are related to improvements in social participation. Changes in activity limitations were only associated with improvements in two domains of social participation (Role-emotional and Role-physical). Other than expected, it could not be confirmed that changes in disease activity contributed to an improvement in social participation. A further inference that can be drawn from the results is that depressive feelings at baseline mainly seemed to hamper treatment effects on social participation after one year of treatment. The study also offered insight into gender differences. Women appeared to be more restricted in social participation both before and after one year of treatment, probably resulting from severe experience of impairments and activity limitations.

Conclusion: The study stresses the importance of a necessary alignment of treatment to several factors, such as depressive feelings in patients or gender, in order to account not only for an improvement of functionality.

Samenvatting

Doel. Het eerste doel van deze longitudinale studie was te onderzoeken of onder patiënten die recentelijk voor RA gediagnosticeerd werden een verbetering van de sociale participatie na één jaar behandeling gerelateerd was aan verbeteringen van de ziekte activiteit, pijn en vermoeidheid, zoals aan verbeteringen van fysieke beperkingen. Een verder doel was uit te vinden of patiënten die depressieve symptomen voor het begin van de behandeling lieten zien minder verbeterden in sociale participatie na één jaar dan de participanten die geen of alleen weinig depressieve symptomen hadden. Bovendien werd geïntendeerd te achterhalen of vrouwen al voor het begin van de behandeling minder participeerden in sociale activiteiten dan mannen. Een laatst onderwerp van deze studie was of vrouwen minder in sociale participatie zijn verbeterd dan mannen na één jaar behandeling.

Methoden. De data werd verzameld voordat de behandeling begon zoals één jaar na de behandeling met behulp van de 'Short Form Health Survey' (SF36) en de DAS28 en werd verkregen van in totaal 302 patiënten die recentelijk voor RA gediagnosticeerd werden. Sociale participatie werd gemeten met behulp van drie subschalen (Social Functioning, Role-emotional, Role-physical) van de SF36. De variabelen die gerelateerd zijn aan fysieke beperkingen werden gemeten met een pijn score (Bodily Pain) en een vermoeidheids score (Vitality Score) van de SF36 en bovendien met een ziekte activiteiten score (DAS28). Beperkingen van activiteiten (Physical Functioning) en depressieve gevoelens (Mental Health) werden gemeten met behulp van de SF36.

Resultaten. De resultaten ondersteunden de assumptie dat de verbeteringen van pijn en vermoeidheid gerelateerd zijn aan verbeteringen in sociale participatie. Veranderingen in beperkingen van activiteiten waren alleen geassocieerd met verbeteringen in twee domeinen van sociale participatie (Role-emotional en Role-physical). In tegenstelling tot de verwachtingen werd niet bewezen dat veranderingen in ziekte activiteit samenhangen met een verbetering in sociale participatie. Een verdere conclusie die kan worden getrokken uit de resultaten was dat depressieve gevoelens die patiënten voor begin van de behandeling hadden, de behandelings-effecten op sociale participatie na één jaar negatief beïnvloedden. Bovendien kond met behulp van de resultaten meer inzicht worden verkregen over verschillen tussen mannen en vrouwen. Uit de resultaten bleek dat vrouwen minder sociaal participeerden dan mannen, zowel voor begin van de behandeling als ook één jaar daarna. Deze bevinding kan worden toegeschreven aan het feit dat vrouwen waarschijnlijk meer fysieke beperkingen en beperkingen in activiteiten ervaren.

Conclusie: Deze studie accentueert een noodzakelijke aanpassing van de behandeling van RA aan bepaalde factoren zoals depressieve gevoelens die patiënten kunnen hebben of aan het geslacht, om niet alleen functionele verbeteringen te bereiken.

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Introduction

Rheumatoid arthritis (RA) is a chronic disease leading to disabilities in several areas and is associated with negative impacts on the patient's life. Women are two to three times more affected than men and it has been stated that the disease primarily occurs between the age of 50 and 70 (Zink, Mau, & Schneider, 2001). Further, the disease affects about 0.5-1% of the adult population worldwide (Kvien, 2004) and is related to decreased life time expectancy of about 15-20% (Zink et al., 2001). RA is characterized by its progressive, inflammatory course of disease that leads sooner or later to destructions of the cartilage and symptoms of impairments in body functions like pain, joint stiffness and irreversible joint damage (Kuhlow et al., 2010). Even in an early stage of RA, the disease causes inflammations of the joints, which ultimately result in the deformation of those (Zink et al., 2001).

The impact of RA is not only associated with impairments of body functions and structures but also with individual and societal burdens such as a decrease in quality of life, loss of financial well-being and a loss of mobility (Jaarsveld, Jacobs, Schrijvers, Albada-Kuipers, Hofman, & Bilsma, 1998; Talamo, Frater, Gallivan, & Young, 1997). For many patients with RA the functional disabilities in their everyday life are related to the disability to manage their own lives. According to Zink, Minden, and List (2010) 26% of the patients who already suffered from RA 5 years needed help in the accomplishment of daily activities and 4% were in need for care. In addition, these percentages increased with duration of the disease.

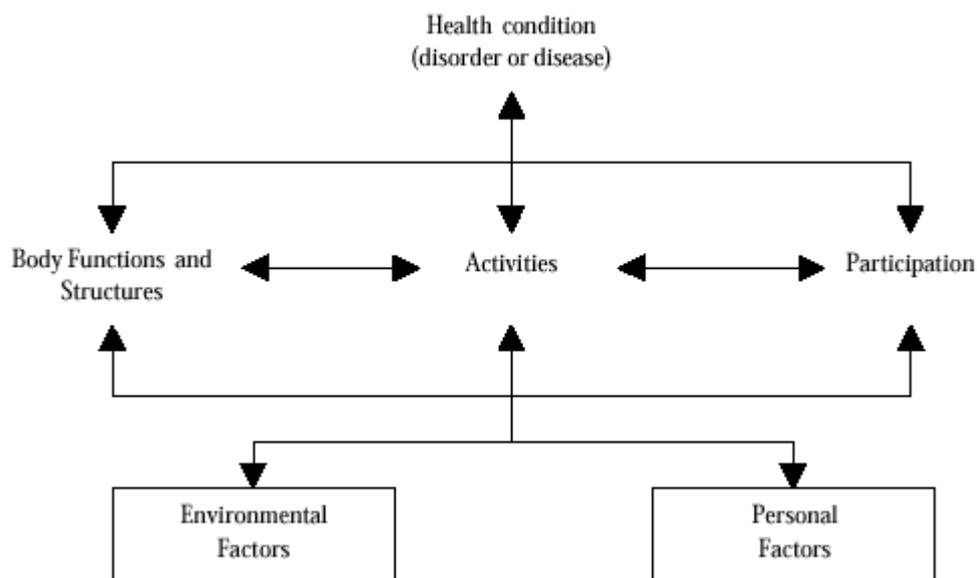


Figure 1. Bio psychosocial model of the interaction between the components of the ICF
Adapted from "World Health Organization (WHO)" (2001). International Classification of Functioning, Disability and Health. Geneva, Switzerland: WHO

The consequences of a chronic disease, such as RA are depicted by the model International Classification of Functioning (ICF) conceptualized by the World Health Organization (WHO) (figure 1). The ICF allows the integration of biological, psychological, social and individual perspectives. It is a framework that focuses on the patients functioning and its impairments due to health status and disease (Kuhlow et al., 2010). According to the Bundesarbeitsgemeinschaft für Rehabilitation (BAR) (2010), functionality in this framework is a generic term that comprises body functions and structures, activities and participation. Functionality of an individual results from an interaction between the health status and these three components as well as from the background of the individual (environmental and personal factors).

Body Functions and structures include physical functions, the anatomy of the body, including limbs and organs, but also mental health and functioning. Activity refers to the execution of a task or daily duties whereas participation is related to the social involvement in the social environment/ life, taking part in social activities (Rentsch & Bucher, 2005). The ICF also represents contextual factors including environmental and personal factors. Environmental factors constitute life circumstances, social support as well as the social environment and the financial situation. The second component, Personal factors, include e.g. age, sex, lifestyle, education as well as the attitude of the individual (BAR, 2010). Negative consequences of a disease such as RA and its status can occur in every component and can result in impairments (pain, joint stiffness, joint swelling and destruction), activity limitations (walking, climbing stairs, self-care) and participation restrictions (involvement in family or social activities, loss of mobility and unemployment) (Kuhlow et al., 2010). The negative consequences of RA on a person's functionality are the result from an interaction between the disease, the body functions and –structures, activities and social participation. Furthermore, it is important to mention that on the one hand, the relationship between the three components of functioning can be influenced by the disease activity itself (Stucki et al., 2004) but on the other hand, contextual factors have an impact on these components as well (BAR, 2010). Supporting the role of the contextual factors, Scott et al. (2005) ascertained that patients with established RA who did not feel supported after their diagnosis experienced more pain. Additionally, it was discovered that, as a consequence of RA, the financial situation of 67% of the patients with RA suffered due to the disease (Jaarsveld et al., 1998). Following Pollard et al., (2005), the impact of the rheumatic disease on patients depends on several personal factors. Among other things, it was ascertained that age has a negative influence on bodily functioning (Morfeld, Bullinger, Nantke, & Brähler, 2005).

According to the ICF, social participation is defined as someone's involvement in life situations. Being involved includes taking part in social activities, being engaged in life situations and fulfilling social roles (Rentsch & Bucher, 2005). Additionally, social participation can be seen as a kind of access to required resources (Chang, Coster, & Helfrich, 2013). As already described, RA can also affect social participation. In a cross sectional study conducted by Fransen et al. (2002), it was found out that impairments, measured with the Disease activity Score 28 (DAS28), are related to activity limitations, measured with the scale Physical Functioning of the Short Form Questionnaire (SF) 36. Activity limitations, in turn, were related to social participation, assessed with the subscales Role-physical, Role-emotional and Social Functioning of the SF-36. In addition, this study showed that bodily pain, as a factor of the component impairments, is directly related to participation restrictions. As a result, patients with RA have to redefine their social roles. Many studies also found that RA is related to the ability to work and to social participation (Jaarsveld et al., 1998; Kuhlow et al. 2010). Especially the impact of persistent pain and fatigue appeared to restrict participation (Whalley, McKenna, De Jong, & v.d. Heijde, 1997; Pollard, Choy, & Scott, 2005).

Even though there is an interactive relationship between the components of the ICF, these interactions are not sustained directly. This implies that an increase of impairments in patients suffering from RA does not ultimately lead to a stronger limitation of activities. In addition, an increase in activity limitations does not necessarily result in participation restrictions (Hagens, 2008).

For most patients seeking treatment, their primary aim is to reduce symptoms of pain and fatigue. Both are common consequences of RA which are associated with disability and reduced quality of life. Typical medical treatment implies anti-inflammatory and disease modifying anti-rheumatic drugs (Pollard et al., 2005). New treatments of RA, using the treat-to-target strategy (T2T) has delivered promising outcomes because the ultimate goal of remission was achieved. This strategy consists out of controlling the disease activity by assessing it in regular time intervals with the DAS28. Based on this measure the medication is adjusted to the actual disease activity. (Vermeer et al., 2012). Based on these findings, this study assumes to find an improvement in participation restrictions after impairments are treated successfully and activity limitations improved.

According to the ICF, depression is a factor belonging to body functions and structures (Rentsch & Bucher, 2005) and is a prevalent symptom in RA patients (Nicassio & Irani, 2012). The relationship between RA and depression, however, is reciprocal. One view explaining this relationship is that depression results from impairments such as pain, activity

limitations and participation restrictions. If social participation is diminished, the resulting restriction is often related to the appearance of depressive symptoms and activity limitations (Chang, Coster, & Helfrich, 2013). In addition, it was investigated that a decline in the ability to engage in activities as well as a decline in social participation due to RA is a significant predictor of developing depressive symptoms (Katz & Yelin, 2001). Additional findings supported that depression in RA patients can be explained by social inactivity and decreased physical functioning (Kuhlow et al., 2010). It is also stated that disease activity, pain and disability contribute to the onset of depressive symptoms. The relationship of these components with depressive symptoms can be described as a downward spiral. Suffering from a high disease activity leads to more pain which, in turn, is related to impairments in functioning. These impairments may cause restrictions in social participation and activity limitations and therefore contribute to depressive symptoms. The depressive mood may eventually affect coping with the disease and the spiral will be sustained (Nicassio & Irani, 2012). In accordance with that, Bair et al. (2003) found out that many patients with chronic pain reported feelings of depression. Moreover, Scott et al. (2005) declared that, from a clinical point of view, this is especially true for patients with pain in an early state of RA. In addition to that, it has not only been detected that pain is associated with depression, but that patients become more depressed over the years (Sharpe, Sensky, & Allard, 2001). However, another way of explaining the relationship is that depression itself can strengthen symptoms of RA (Nicassio & Irani, 2012). It was stated that depressed patients complained about more pain and a higher degree of dissatisfaction after they underwent surgery on their back (Onderwater in Morrison & Bennett, 2010). Morris et al. (2011) investigated in a longitudinal study that RA patients with depressive symptoms showed poorer functional outcomes and more disabilities than non-depressed patients. Further, depression can also affect social relationships leading to less social contact aggravating depressive symptoms (Subodh, Avasthi, & Chakrabarti, 2008). Nevertheless, there is no clarity about the causality. Depression itself appears to be accompanied by inactivity and decreased energy, which restrains a depressed person from engaging in social and physical activities (Vandereycken, Hoogduin, & Emmelkamp, 2008). Taking these findings into account, this study will examine if symptoms of depression before the start of treatment on patients with RA will affect treatment effects on social participation.

There has not been much research up until now regarding gender differences in relation to social restrictions. Sex is one aspect included in the component personal factors of the ICF model (BAR, 2010). With the use of the SF36 it is well established that women suffering from RA score lower on mental scales (Morfeld et al., 2005; Talamo et al., 1997). In Addi-

tion, it is acknowledged that women suffering from a chronic disease display less subjective mental health (Morfeld et al., 2005). Further, there has been research conducted to figure out general sex differences in RA. It was found that women scored poorer on disease activity measures in comparison to men, indicated greater disability as well as more inability to work due to RA (Makinen, Hannonen &, Sokka, 2008). Moreover, Sokka et al. (2009) figured out that women and men showed differences in physical functioning in respect to experiencing more functional impairment. However, it is not clear how these findings can be interpreted. On the one hand, the difference can be caused by a different course of disease. But on the other hand, another possible explanation is the ability to adjust to the functional impairments due to the fact that men have more muscle strength as well as a possible difference in the ability of women to compensate for these functional impairments (Vollenhoven, 2009). The study of Sokka et al. (2009) concluded that sex differences in the disease activity originate from the measurement of disease activity rather than from the disease activity of RA itself. In addition, it has been determined that, independent from the state of disease, women experience a greater burden from RA than men and therefore women report more symptoms and show poorer scores for pain (Keogh & Herdenfeldt, 2002). This can be due to the fact that women have a lower threshold for pain and therefore experience more pain than men (Vollenhoven, 2009; Unruh, 1996). Another finding supporting a gender difference in RA is that the male sex is a predictor of remission as well as positive response to medical treatment of RA compared to women (Forslind, Hafstrom, Ahlem, & Svensson, 2007). In general, it is acknowledged that especially women define their social roles and relationships based on their role as a mother, as a caretaker of the family or as a wife which in a way constitutes their social participation. Men, in contrast, define their roles in respect to their functionality and success predominantly based on accomplishments in the workplace (Otto, 2006).

Based on the aforementioned facts, this study aims to explore if there is a gender difference in social participation. More precisely, it is assumed that women have lower scores on social participation both before and after treatment.

As can be seen, RA is a disabling disease which leads to impairments in several areas and therefore does not only result in physical symptoms. Many studies examined the association between impairments, activity limitations and participation restriction as well as the consequences of those. Furthermore, many studies have been conducted to examine the impact of contextual factors on RA. But to date, there are only a few studies concentrating on the effects of treatment on social participation, which represents an important factor because the social restriction of patients depicts a negative, social and individual consequence of the dis-

ease. RA leads to changes in the original individual roles of the patients. Additionally, social participation can be seen as a resource for individuals (Chang et al., 2012). If the access to that resource is not available, this can have negative consequences on the individual because resources are a necessary factor that counteracts stress (Nerdinger, Blickle, & Schape, 2011). As a further consequence, restricted participation does not only limit the individual's involvement in social activities but can also affect the subjective quality of life (Morrison & Bennett, 2010). Therefore, it is important to see if these negative influences of RA can be diminished through therapy. On top of that, there is not much research established referring to (psycho-) social variables in rehabilitation (Kuhlow et al., 2010), however, these factors also play an important role in therapy of chronic diseases such as RA. Although RA is irreversible, this is a further argument for the need of more investigation of this disease to find factors important to integrate into rehabilitation and treatment. More investigation to improve treatment is also necessary in order to have appropriate ways to minimize the negative consequences as well as direct and indirect costs of RA and to provide patients with the possibility of having an adequate life quality.

Therefore, the purpose of this study is to examine how treatment of RA is related to social participation and to find out which factors impact social participation. According to the aim of figuring out this relationship, this study addresses the following hypotheses:

- 1) Social participation increases after successful treatment of impairments (disease activity, pain and fatigue) and activity limitations (physical function) caused by RA.
- 2) Patients with RA who show a relative high baseline of depressive symptoms before treatment, improve less in social participation after one year of treatment than those who show no or few depressive symptoms.
- 3) Women scored, even before treatment has started, lower on scores assessing social participation than men.
- 4) Women increase less in social participation than men after one year of treatment.

Methods

Participants

The data of this study was acquired from altogether 302 patients suffering from RA of whom 198 participants were female and 104 were male. The average age was 63 with a SD of ± 13 . Most of the participants were married. The educational level ranged from no education up to scientific education (indicated with tertiary education). The participants predominantly visited secondary school ($n=203$, 79.3%). Regarding the employment status of the sample, no distinct tendency can be announced. 19.5% of the participants ($n=50$) reported

working fulltime, 20.7% indicated to work part-time (n=17.5), 19.9% were housekeeping (n=51), only 3.9% were unemployed (n=10), 8.6% was unable to work (n=22) and 27.3% were retired (n=70).

Table 1

Characteristics of the sample

Gender (Female), <i>n</i> (%)	198 (65.6)
Age, median (years)	63 (13.3)
Marital Status, <i>n</i> (%)	
Unmarried – Living alone	27 (10.5)
Unmarried – Living together	17 (6.6)
Married	186 (72.7)
Widowed	19 (7.4)
Divorced	7 (2.7)
Missing	46
Educational Level, <i>n</i> (%)	
No Education	3 (1.2)
Elementary School	15 (5.9)
Secondary Education	203 (79.3)
Tertiary Education	35 (13.7)
Missing	46
Employment Status, <i>n</i> (%)	
Fulltime	50 (19.5)
Parttime	53 (20.7)
Housekeeping	51 (19.9)
Unemployed	10 (3.9)
Unable to Work	22 (8.6)
Retired	70 (27.3)
Missing	46

Note. Standard Deviations appear in parentheses

The participants of this study were patients recently diagnosed with RA. Inclusion criteria were a minimum age of 18 years as well as duration of symptoms of one year or less prior to the diagnosis of RA. Further, the participants had a disease activity score of at least 2.6 and were not treated for RA till now. Treatment began ever since this study started according to a treat-to-target (T2T) strategy which includes follow-up visits at weeks 8, 12, 20, 24, 36 and 52, as well as every 3 months thereafter and protocolled adjustment of the treatment aiming at remission. Remission is defined by having a disease activity score of less than 2.6 (Fransen, & van Riel, 2005). Data was collected right before treatment began as well as one year after treatment with the use of the SF36 and the DAS28.

Measures

Participation restrictions

Social participation was assessed with the Short Form Health Survey 2.0 consisting out of 36 questions (SF36). The SF36 is an adequate and responsive instrument in measuring Social Functioning (Veehof, 2008). This is a valid and reliable instrument, measuring eight aspects of the general health status, including not only pain and activity limitations, but also the general mental health. It can also be used to implicate progress of the disease, health status and health care effects (Talamo et al., 1997). The SF36 consists of two distinct summary measures (physical and mental health) aggregating overall eight subscales (Ware, n.d.). To describe possible changes in social participation after one year of treatment the following three subscales were used. The first subscale called Social Functioning (SF) figures out the limitations in Social Functioning of patients as a result of physical or emotional problems. This subscale consists of the two items social extent (During the past 4 weeks, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbors or groups?) and social time (During the past 4 weeks how much of the time has your physical health or emotional problems interfered with your social activities like visiting friends, relatives etc.?). Both items are rated on a 5-choice response scale ranging from 1 (Not at all/All of the time) to 5 (Extremely/ None of the time). The ratings on both items are then summed up and transformed to an overall score ranging from 0-100, a low score indicating worse Social Functioning. Because a low response option of the item social extent was positively formulated, in contrast to the low response option of the item social time, the former mentioned item was recoded. In this sample, the items of the subscale of Social Functioning at baseline yielded a Cronbach's alpha of .81 and the internal consistency of the items of Social Functioning after one year amounted to .78. The second is called Role-emotional subscale (RE), consisting out of three items and is utilized to depict limitations in the usual role functioning (work or other daily activities) as a result of emotional problems (During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?), including the statements "Cut down the amount of time you spent on work or other activities", "Accomplished less than you would like" and "Didn't do work or other activities as carefully as usual" which can be rated from 1 (All of the time) to 5 (None of the time). Again, all scores were transformed to a scale from 0-100, a low score representing a high degree of restrictions. In this study, Cronbach's alpha of the items of this scale at baseline was .93. The internal consistency of the items of this subscale after one year was .96.

Third, social restriction was assessed with the Role-physical subscale (RP) examining limitations in the usual role functioning as a result of physical health problems concerning four items (During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health?). Here, the participants had to rate the following statements: “Cut down the amount of time you spent on work or other activities”, “Accomplished less than you would like”, “Were limited in the kind of work or other activities” and “Had difficulty performing the work or other activities” with response options ranging from all of the time – none of the time. The ratings then were summed up and transformed to a score from 0-100, a low score indicating a poor health status (Talamo et al., 1997). For the total sample, items of the Role-physical subscale reached a Cronbach’s alpha of .93 at baseline and .94 after one year.

Impairments

Impairments are described in scores of disease activity, pain intensity and fatigue (Hagens, 2008). The Disease Activity Score (DAS28) is a widely used, quantitative measurement that is utilized to assess disease activity in patients suffering from RA. Additionally, decisions about clinical treatment can be based on the DAS28-scores and those scores can also be used to ascertain treatment effects. Disease activity is calculated by the following components: 28 tender joint counts as well as 28 swollen joint counts, a score of the global health of the patient, a visual analogue scale (VAS) and erythrocyte sedimentation rate (ESR) (Inoue, Yamanaka, Hara, Tomatsu & Kamatani, 2007). The DAS28 was calculated from these measurements and is used to estimate the disease activity. A score < 2.6 implies that a patient is in remission, a DAS28 < 3.2 is related to a low disease activity and a DAS28 > 5.1 denotes a high disease activity with many affected joints and a high value of inflammation in the blood (ESR) (Fransen, Creemers, & van Riel, 2004). Therefore, the DAS28 was used to assess if impairments improved after one year of treatment. Pain, also belonging to impairments, is assessed with the subscale Bodily Pain (BP) of the SF36, consisting out of two items. This subscale asks the participants to indicate the experienced pain magnitude (How much bodily pain have you had during the past 4 weeks?) with a 6-choice response scale ranging from 1 (Not at all) to 6 (Extremely), as well as they had to rate their pain interfere (During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?) with five response options ranging from 1 (Not at all) to 5 (Extremely). After the scores were summed up, they were transformed to a scale ranging from 0-100. A low score stands for a high amount of pain. Items of this sub-

scale showed good internal consistency in this the sample, with a Cronbach's alpha of .84 at baseline and .83 after one year. Fatigue, as a third impairment-related variable, was figured out with the four item Vitality Scale (VT) consisting out of two items with a positive wording (Did you feel full of pep?, Did you have a lot of energy?) as well as two negative formulated items (Did you feel worn out? and Did you feel tired?). The items were rated on a 5-choice response scale ranging from 1 (All of the time) to 5 (None of the time). The assessed scores were all summed up and converted into a total scale with a range from 0-100, a low score representing a high degree of fatigue. The items with a positive wording were recoded. Items of the Vitality Scale reached good internal consistency at baseline (Cronbach's alpha .84) as well after one year of treatment (Cronbach's alpha .79)

Activity limitations

To describe activity limitations, this study made use of the Physical Functioning subscale (PF) of the SF36 which measures limitations in physical activities caused by RA. This scale includes ten items (The following items are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?) such as vigorous activities (such as running or lifting heavy objects), moderate activities (like moving a table, bowling or playing golf), lifting or carrying groceries, climbing stairs, bending or stooping, walking several blocks or rather one block, bathing or dressing (Ware, n.d.). Relating to these items, it is asked if the disease limits the person in the cited activities. The patients have the following three response options: yes, limited a lot; yes, limited a little and no, not limited at all. The gathered ratings were subsequently summed up and transformed into a scale from 0-100, a low score interpreted as a worse activity limitation. Items on the SF-36 Physical Functioning subscale at baseline delivered a Cronbach's alpha of .91. The internal consistency of the items of this subscale after one year also reached a remarkable Cronbach's alpha of .93

Depressive Feelings

Affective states are classified as a factor of the component body functions and structures. In this study the SF36 was also used to measure depressive symptoms. As a consequence, depressive feelings in the participants were figured out with the general Mental Health subscale (MH) of the SF36 including five items with each having again a 5-choice response scale ranging from 1 (All of the time) to 5 (None of the time):

“These questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time during the past 4 weeks...“: „Have you been nervous?“, “Have you felt so down in the dumps that nothing could cheer you up?“, “Have you felt calm and peaceful?“, “ Have you felt downhearted and blue?“ and “ Have you been happy?“. The positive worded items “Have you felt calm and peaceful?“ and “ Have you been happy?“ were recoded. All assessed scores were summed up and subsequently transformed into a scale ranging from 0-100. A low score on the scale indicated a high degree of depressive feelings. This subscale reached an acceptable internal consistency at baseline (Cronbach’s alpha .83) as well as after one year (Cronbach’s alpha .75).

Demographic variables

Information about demographic data was assessed with a particular questionnaire. Here, the participants had to indicate their gender, age, education, marital status as well as their duration of disease. To examine if there are any sex differences related to changes in social participation after one year of treatment the demographic variable gender was used.

Statistical Analysis

The analysis was conducted with SPSS 20. At first a descriptive analysis was generated, calculating means and frequencies for the demographic variables gender, marital status, educational level and employment, or in the case of not normal distributed variables like the demographic variable age, a median as well as an interquartile range (IQR) was calculated to get an impression of the characteristics of the sample. Additionally, measures of skewness and kurtosis were applied in order to check for normal distribution. If the variables of the subscales of the SF36 and the scores of the DAS28 as well as their standardized residuals delivered values between 1 and -1 of skewness and kurtosis, these were assumed to be normally distributed. Histograms were made in order to show graphically both skewness and kurtosis. It was shown that all variables used in this study were normally distributed.

Further, correlational analyses were conducted between the independent (gender, change scores of the disease activity, pain, fatigue and activity limitations) and the dependent variables (change scores of the three domains of social participation) of the first and fourth hypotheses before carrying out the regression analysis in order to ascertain if those variables

covary in a systematic fashion. For all examined relationships Pearson correlations were computed to reveal insight into the relationship between the continuous variables.

Besides, internal consistency was calculated for all items of the subscales of the SF36 at baseline and after one year of treatment that were used in this analysis with Cronbach's alpha coefficient. Moreover, a paired sample t-test was conducted in the assessment of changes in the scores of the subscales of the SF36 as well as those of the DAS28 using the scores yielded at baseline and those after one year of treatment. Subsequently, the effect size (Cohen's *d*) of these differences was calculated to assess the magnitude of the treatment effect.

As a preliminary preparation of the main analysis, change scores of the independent variables pain (Bodily Pain), fatigue (Vitality Scale) and activity limitations (Physical Functioning) were created as well as change scores of the three dependent variables of social participation (Social Functioning, Role-emotional, Role-physical) representing a change in the scores over the course of treatment by subtracting the baseline scores on these subscales from those after one year of treatment. Because of the fact that, unlike the SF36, a lower DAS28 represents a better health, a change score for the independent variable of the DAS28 was also calculated but in this case, the scores after one year of treatment were subtracted from scores at baseline.

To test the first hypothesis of this study, multivariate regression analysis was used. Regression analysis assesses the predictive value of independent variables in respect to a dependent variable. Assumptions for regression analysis are normally distributed variables, as well as normally distributed residuals (Moore & McCabe, 2009). Therefore, before carrying out regression analysis, normal distribution of the variables as well as their standardized residuals was assessed with the aforementioned Histogram. It was additionally tested for multicollinearity with the use of the Variance Inflation Factor (VIF), as well as for linearity and homoscedasticity by performing scatter plots. To test the first hypothesis, that social participation increases after successful treatment of impairments (pain, fatigue and disease activity) and activity limitations (Physical Functioning) caused by RA as well as the fourth hypothesis, assuming that women increase less in social participation after one year of treatment, separate hierarchic regression analyses were conducted with four blocks. The first block containing the variable social participation at baseline, the second block consisting out of the variable gender, the third out of the variables representing changes in scores on the DAS28, pain- and fatigue-scales and at last, the fourth block was composed of activity limitations to check for the extent to which the particular factors contribute to a change in social participation. The

calculated scores of the change in social participation after one year of treatment were used as the dependent variables. Further, a common two-sided significance level at $p < 0.05$ was applied in all regression analyses.

The second hypothesis implied that depressive symptoms at baseline will hamper the treatment effect on social participation after one year of treatment. The subscale mental health of the SF36 was used in measuring depressive feelings. In line with this statistical analysis, the variables representing social participation at baseline were used as the independent variable in a first block and depressive feelings at baseline in a second block. The change scores of social participation over the course of treatment were the dependent variables.

In order to investigate that women suffering from RA were more restricted in social participation even before treatment started, a t-test was applied. More precisely, to test the third hypothesis, if there is a gender difference in social participation in general, a t-test of independent samples was conducted with gender as the independent variable and the subscales of social participation at baseline as the dependent variables. Additionally, to control for possible influences of the disease activity, pain and fatigue at baseline as well as for activity limitations at baseline, a covariate analysis was executed. With this type of analysis, the influence of a third variable, called the covariate, on the dependent variable is deducted (Rey, n.d.). Here, gender was used as the independent variable, impairment variables as well as activity limitations at baseline as the covariates and social participation at baseline as the dependent variable.

Results

Improvements in scores of the SF36 and the DAS28 over the course of treatment

The results of the conducted t-test of paired samples, depicted in table 2, indicated that an improvement took place on all scales that were used in this study. Further, the expected improvement of all scores was significant, $p < .00$. For all levels of significance, the p -value of the two tailed test was reported because of the alternative hypothesis which stated that there are differences in the mean value between both groups (Huizingh, 2010). Additionally, Cohen's d was calculated in order to estimate the difference between the mean values at baseline and after one year of treatment. In general, an effect size of $d = .2$ is defined as small, an effect size of $d = .5$ as moderate and an effect size of $d = .8$ as high (Cohen, 1988).

Examining the improvement on the scores of the subscales Bodily Pain as well as the DAS28 after one year of treatment showed a noticeable high improvement. This result denoted that experienced pain as well as the disease activity of the patients improved most after one year of treatment. Furthermore, statistics about frequencies showed that 57.2 % of the

participants yielded a DAS28 < 2.6, on average a score of 2.54, which indicated that more than the average was in remission after one year. Besides, the average score of 81.60 on the subscale Social Functioning was the highest after one year of treatment. Based on the scoring of the SF36, ranging from 0-100, this can be regarded as a relatively high score.

Table 2
Improvements in scores

Variable	Mean (SD)			T-value	Cohen's <i>d</i>
	Baseline	After one year	Improvement		
<u>Social Participation</u>					
Social Functioning	70.52 (24.76)	81.60 (21.10)	11.09 (24.75)	7.77**	.48
Role-emotional	66.81 (28.89)	74.17 (27.12)	7.36 (30.35)	4.21**	.26
Role-physical	43.15 (26.81)	62.00 (26.07)	18.85 (28.79)	11.36**	.71
<u>Impairments</u>					
DAS28	4.48 (1.41)	2.54 (1.01)	1.95 (1.42)	23.18**	1.58
Bodily Pain	42.84 (20.40)	64.65 (20.45)	21.81 (23.24)	16.28**	1.07
Vitality Scale	52.87 (20.04)	60.92 (19.55)	8.06 (19.80)	7.06**	.41
<u>Activity Limitations</u>					
Physical Functioning	54.93 (25.06)	68.70 (25.12)	13.77 (22.89)	10.44**	.55
<u>Depressive Feelings</u>					
Mental Health	71.33 (18.00)	76.65 (17.05)	5.32 (18.69)	4.93**	.30

* $p < .05$, ** $p < .01$.

However, regarding the magnitude of the treatment effect, cohen's *d* denotes only a moderate improvement. The scores on the subscales Mental Health and Role-emotional indicated the lowest improvement after one year. All other scores improved moderately to highly, indicated with a cohen's *d* value of about .5.

Correlations between variables of the study's interest

Pearson Correlation Coefficients were used in the assessment of the relationships between variables representing changes in impairments, activity, variables measuring changes in social participation (social functioning, role-emotional, role-physical) as well as the variable gender. The correlational relationships are depicted in Table 3. Regarding the correlational values, intercorrelations are moderately high except for the variable gender. This variable is only related to changes in fatigue.

Table 3
Pearson Correlations Between Gender, Improvements in Impairments, Activity Limitations, and Social Participation

Variables	2	3	4	5	6	7	8
1 Gender	-.07	-.11	-.13*	-.05	-.11	-.03	-.07
<u>Impairments</u>							
2 DAS28		.59**	.29**	.30**	.30**	.23**	.32**
3 Bodily Pain			.40**	.43**	.48**	.40**	.49**
4 Vitality Scale				.37**	.48**	.42**	.43**
<u>Activity Limitations</u>							
5 Physical Functioning					.35**	.38**	.46**
<u>Social Participation</u>							
6 Social Functioning						.46**	.41**
7 Role-emotional							.47**
8 Role-physical							

Note. The variable gender is coded with 1= male, 2= female

* $p < .05$, ** $p < .01$.

With respect to correlations between changes in impairments and in social participation after one year of treatment, there was a significant relationship between all aforementioned variables. Decreased disease activity was found to be associated with more social participation among the patients with RA. Additionally, there were also significant correlations between changes in pain intensity and fatigue and changes in the three variables assessing social participation (less experienced pain and less symptoms of fatigue were accompanied by less social restrictions). Further, the relationship between changes in activity limitations (Physical Functioning) and changes in social participation delivered a substantial significant correlation (less activity limitations were related to more social participation).

Assessment of the Predictive Value of Gender and Improvements in Disease Activity, Pain, Fatigue, Activity Limitations on Social Restrictions

As assumed in the first and fourth research question, this study hypothesized an increase in social participation after 12 months of treatment in respect to less impairments (decreased disease activity, less pain and fatigue) as well as to less activity limitations. Further, it was presumed that females would show less improvement in social participation over the

course of treatment. Therefore, hierarchical, multivariate regression analyses were conducted to explore the predictive value of the aforementioned variables on the three domains of social participation (Social Functioning, Role-emotional and Role-physical). The preconditions of regression analysis, a normal distribution of the variables and their standardized residuals, were tested and confirmed beforehand. On top of that, the criteria of linearity, homoscedasticity and the absence of multicollinearity (Pearson’s correlation coefficient < 0.9) were met. According to Urban and Mayerl (2006) the value of tolerance should be above .25, which was the case and the VIF-value should be below 5, a criteria which was met as well.

Social Functioning

Table 4 lists the results received after a multivariate regression analysis was conducted in order to investigate possible influences on changes in social participation, measured by the subscale Social Functioning (SF) after one year of treatment.

Table 4
Hierarchical Regression Analysis with Changes After One Year in Social Functioning as Dependent Variable

Variable	Model 1		Model 2		Model 3		Model 4	
	<i>B (SE B)</i>	β						
Social Functioning at baseline	-.63(.05)	-.63**	-.66(.05)	-.66**	-.52(.04)	-.52**	-.52(.04)	-.52**
Gender			-9.64(2.4)	-.18**	-5.90(2.12)	-.11**	-5.94(2.1)	-.11**
Changes in DAS28					-.34(.85)	-.02	-.41(.85)	-.02
Changes in Bodily Pain					.26(.06)	.24**	.23(.06)	.22**
Changes in Vitality Scale					.32(.06)	.25**	.30(.06)	.23**
Changes in Physical Functioning							.08(.05)	.08
ΔR^2	.40**		.03**		.14**		.01	
R^2	.40**		.43**		.57**		.58**	

* $p < .05$, ** $p < .01$.

To control for the scores on the subscale Social Functioning at baseline, this variable was added in the first block and explained about 40% of the variance in changed participa-

tion. Gender was entered in a second block, the variables related to changes in impairments in a third block. A change in activity limitations, assessed with the subscale Physical Functioning, was included in the last model.

The results confirmed the hypotheses for the most part. The findings indicated that 3% of the explained variance of a change in Social Functioning was attributed to gender and therefore gender made a larger contribution than expected. Although the individual predictive value of gender decreased, it remained significant in all blocks. The third model denoted that both improvements in experienced pain and fatigue contributed to an increase in social participation (SF) after one year of treatment. On top of that, this block added with 14% the highest amount to the explanation of variance in Social Functioning after one year of treatment. However, an improvement in Disease Activity (DAS28) had no significant predictive value for a change in social functioning, although correlations (Table 3) indicated a significant relationship with changes in the subscale Social Functioning. Other than expected though, changes in Physical Functioning did not enter in the last model as an individual predictor. Additionally, the results indicated that the last model added no significant explanation of changes in social functioning after one year of treatment, $\Delta R^2=.01$, $\Delta F(1,276)=2.94$, *ns*.

Role-emotional

Role-emotional at baseline, representing the second domain of social participation, was entered in the first block to adjust for the scores on this subscale (Table 5). This variable explained 34% of the variance in Role-emotional after one year of treatment. The following three blocks contained the same variables as in the analysis step before.

Inspection of the variable gender indicated a noticeable predictive value. Further, Gender added 2% to the explanation of variance in the subscale Role-emotional after one year. Based on this result, the fourth hypothesis was confirmed, although gender as a single variable did not contribute to changes on the subscale Role-emotional in the following two blocks. Therefore, women participated less after one year of treatment, but this difference was explained by more experienced pain, fatigue and activity limitations. It could be further noted that that the third block, containing changes in the impairment related variables, explained most of the variance and added 10% to the explanation of a change in social participation after one year despite the fact that the DAS28 had no individual predictive value. Additionally, it was conspicuous that improvements in activity limitations as a single variable, entered in the last block, contributed, as assumed, a significant proportion to changes in the subscale Role-emotional after one year of treatment. However, after this variable was en-

tered, a decrease of the β -value of changes in pain was observed. Although the direct impact of changes in pain decreased, it remained significant. Despite the significance of the last model, it added only 3% to the explanation of variance in social participation after one year. Nonetheless, taken all results the first hypothesis was confirmed for the most part.

Table 5
Hierarchical Regression Analysis with Changes After One Year in Role-emotional as Dependent Variable

Variable	Model 1		Model 2		Model 3		Model 4	
	<i>B (SE B)</i>	β						
Role-emotional at baseline	-.62(.05)	-.59**	-.64(.05)	-.60**	-.54(.05)	-.50**	-.53(.05)	-.50**
Gender			-8.01(3.14)	-.12**	-4.18(3)	-.07	-4.3(2.89)	-.07
Changes in DAS28					-1.20(1.2)	-.06	-1.38(1.16)	-.06
Changes in Bodily Pain					.26(.08)	.20**	.19(.08)	.14*
Changes in Vitality Scale					.35(.08)	.23**	.28(.08)	.18**
Changes in Physical Functioning							.25(.07)	.19**
ΔR^2	.34**		.02**		.10**		.03**	
R^2	.34**		.36**		.46**		.48**	

* $p < .05$, ** $p < .01$.

Role-physical

Table 6 represents the results of a third stepwise, multivariate regression analysis to test the first and fourth hypothesis of this study. Again it was controlled for social participation at baseline. This time, the variable Role-physical, representing scores on this subscale that were assessed before treatment started, was added in the first model and accounted for 31% of the variance of an increase in scores in Role-physical after one year of treatment. Examination of the second block illustrated that the variable gender added 2% to the explanation of the total variance. This amount of explained variance was remarkable and therefore the assumption of a gender influence on changes in social participation after one year of treatment was confirmed again. However, inspection of the individual values of gender in the third and fourth block revealed that women still participated less after one year of treatment because of more experienced pain, fatigue and activity limitations. Results of the explained variance of changes in the impairment related variables in the third block showed a signifi-

cant contribution to the prediction of changes in Role-physical by adding 15% to the explanation of the total variance. However, examining the individual β -values revealed that disease activity had no individual predictive power in respect to changes in social participation. Adding the variable of changes in activity limitations increased the explained variance in social participation after one year of treatment by 3%. In this last model, changes in pain and activity limitations as well as changes in fatigue had, in contrast to changes in the disease activity, significant predictive value. Because of the significant contribution of the last two blocks as well as the significant values of the individual variables of changes in fatigue, pain and activity limitations, the first hypothesis was confirmed for the most part.

Table 6

Hierarchical Regression Analysis with Changes After One Year in Role-physical as Dependent Variable

Variable	Model 1		Model 2		Model 3		Model 4	
	<i>B (SE B)</i>	β						
Role-physical at baseline	-.62(.06)	-.56**	-.64(.05)	-.58**	-.49(.05)	-.44**	-.47(.05)	-.42**
Gender			-9.35(3)	-.15**	-5.03(2.71)	-.08	-5.04(2.62)	-.08
Changes in DAS28					-.10(1.09)	-.01	-.29(1.06)	-.01
Changes in Bodily Pain					.35(.07)	.28**	.27(.07)	.22**
Changes in Vitality Scale					.31(.07)	.21**	.24(.07)	.16**
Changes in Physical Functioning							.26(.06)	.21**
ΔR^2		.31**		.02**		.15**		.03**
R^2		.31**		.34**		.49**		.53**

* $p < .05$, ** $p < .01$.

Assessment of the Predictive Value of depressive feelings at baseline on changes in Social Restrictions

This study hypothesized that depressive feelings at baseline hamper the effect of treatment of social participation after one year. To test this assumption, a hierarchical regression analysis was conducted, ascertaining the predictive value of these affective symptoms on the three domains of social participation.

Social Functioning

To control for Social Functioning at baseline, this variable constituted the first block. Regarding results of the multivariate regression analysis presented in Table 7, it was found that 41% of the variance was attributed to scores on the subscale Social Functioning at baseline. However, after the subscale Mental Health at baseline was entered, it did not yield an increase in the variance explained by the model, $\Delta F(1,298) = 3.52, ns$. Other than expected, the examination of the β -coefficient of depressive feelings before the onset of treatment offered information on the non-significance of this variable. Consequentially, the hypothesis that depressive feelings at baseline affected improvements in social functioning after one year of treatment could not be confirmed.

Table 7
Hierarchical Regression Analysis with Changes After One Year in Social Functioning as Dependent Variable

Variable	Model 1		Model 2	
	<i>B (SE B)</i>	β	<i>B (SE B)</i>	β
Social Functioning at baseline	-.64(.05)	.64**	-.70(.05)	-.70**
Mental Health at baseline			.14(.08)	.10
ΔR^2	.41**		.01	
R^2	.41**		.41**	

* $p < .05$, ** $p < .01$.

Role-emotional

Table 8 lists the results of the stepwise multivariate regression analysis, with changes in social participation as the dependent variable, represented by changes in scores on the subscale Role-emotional. To control for Role-emotional at baseline, this variable was entered in block 1 and accounted for 34% of the variance. After the scores on the subscale Mental Health, assessed before treatment started, were added, results indicated that the second model in this analysis contributed to the prediction of changes in social participation by explaining additional 3% of the variance. In contrast to the regression analysis with changes in scores on the subscale Social Functioning as the dependent variable, in this analysis, depressive feelings at baseline were significantly predictive for changes in the Role-emotional subscale. Thus, the findings confirmed the hypothesized impact of depressive feelings at baseline on changes in scores on the subscale Role-emotional.

Table 8
Hierarchical Regression Analysis with Changes After One Year in Role-emotional as Dependent Variable

Variable	Model 1		Model 2	
	<i>B (SE B)</i>	β	<i>B (SE B)</i>	β
Role-emotional at baseline	-.61(.05)	-.58**	-.74(.06)	-.70**
Mental Health at baseline			.34(.10)	.20**
ΔR^2	.34**		.03**	
R^2	.34**		.36**	

* $p < .05$, ** $p < .01$.

Role-physical

Table 9 summarizes results that are reviewed in this section. Here, the variable representing changes in the domain Role-physical was used as the dependent variable. Again, the first model, consisting of baseline scores on the subscale Role-physical to control for it, contributed significantly to the variance by explaining 32% of the change in social participation. In consideration of the second model, to which Mental Health at baseline was added, this model contributed to the explanatory power for changes in the subscale Role-physical. The explained variance increased by 2%. Examination of the β -coefficient of Mental Health at baseline yielded a significant value, which led to the confirmation of the hypothesis

Table 9
Hierarchical Regression Analysis with Changes After One Year in Role-physical as Dependent Variable

Variable	Model 1		Model 2	
	<i>B (SE B)</i>	β	<i>B (SE B)</i>	β
Role-physical at baseline	-.60(.05)	-.56**	-.66(.06)	-.62**
Mental Health at baseline			.23(.08)	.15**
ΔR^2	.32**		.02**	
R^2	.32**		.34**	

* $p < .05$, ** $p < .01$.

Gender differences in social participation before the begin of treatment

To explore whether the women presented in this sample differed from the men in terms of social participation right before treatment, a t-test of independent samples was conducted. Because of the alternative hypothesis which assumes that the mean value is higher in one group (men) than in the other (women), the p-value of a one sided t-test was utilized (Huizingh, 2010).

Table 10
Gender Differences Before the Start of Treatment

Variables	Mean (SD)		T-value	p
	Female	Male		
Social functioning at baseline	68.56 (25.00)	74.27 (23.90)	1.91	.03
Role-emotional at baseline	63.90 (28.30)	72.3 (29.30)	2.41	.01
Role-physical at baseline	40.63 (23.95)	47.99 (31.15)	2.10	.02

Note. p-values indicated with sig.(1-tailed) for an independent sample t-test with the subscales SF, RE, RP at baseline as dependent variables.

The results of the t-test (Table 10) displayed that there was a significant difference in social participation at baseline between men and women in the three domains representing social participation. However, results of the additional ANCOVA denoted that the found differences between men and women in social participation before the start of treatment were not independent of impairments and activity limitations.

The analysis of the possible influences of the disease activity, pain, fatigue and activity limitations at baseline on gender showed that all covariates were responsible for the finding that women scored lower on the subscale Social Functioning before the treatment started (Table 11). Hence, the fact that they participated less than men was related to a higher disease activity, more experienced symptoms of pain and fatigue as well as more perceived activity limitations.

Table 11
Analysis of Covariance with Social Functioning at Baseline as Dependent Variable

Source	Mean (SD)	df	F	Partial Eta Square
<u>Covariates</u>				
Disease activity at baseline		1	4.60**	.02
Pain at baseline		1	40.78**	.12
Fatigue at baseline		1	42.36**	.13
Activity limitations at baseline		1	16.16**	.05
<u>Independent variable</u>				
Gender	70.81 (24.61)	1	.00	.00

* p<.05, ** p<.01.

After conducting an ANCOVA with Role-emotional at baseline as the dependent variable (Table 12), results revealed that there was no independent gender difference in social participation. Rather, the difference was a result of the two impairment related variables pain and fatigue. In other words, women participated less at baseline because of more experienced pain and fatigue.

Table 12

Analysis of Covariance with Role-emotional at Baseline as Dependent Variable

Source	Mean (SD)	df	F	Partial Eta Square
<u>Covariates</u>				
Disease activity at baseline		1	.64	.00
Pain at baseline		1	12.59**	.04
Fatigue at baseline		1	33.20**	.10
Activity limitations at baseline		1	1.54	.01
<u>Independent variable</u>				
Gender	66.58 (28.79)	1	.93	.00

* $p < .05$, ** $p < .01$.

The difference between men and women in the third domain of social participation (Table 13), Role-physical at baseline, was again ascribable to the influences of the impairment related variables pain and fatigue and activity limitations at baseline.

Table 13

Analysis of Covariance with Role-physical at Baseline as Dependent Variable

Source	Mean (SD)	df	F	Partial Eta Square
<u>Covariates</u>				
Disease activity at baseline		1	.47	.00
Pain at baseline		1	50.77**	.15
Fatigue at baseline		1	19.39**	.06
Activity limitations at baseline		1	24.49**	.08
<u>Independent variable</u>				
Gender	43.07 (26.79)	1	.04	.00

* $p < .05$, ** $p < .01$.

More precisely, the results pointed out that women suffered more pain, felt more fatigue and experienced more activity limitations than men before treatment started which led to less physical role functioning.

Discussion

This study aimed at establishing clarity concerning the impact of RA and social participation in respect to treatment. Therefore, it was shown on the one hand that all participants yielded improved scores both on the subscales of the SF36 and the DAS28. On the other hand, the study dealt with the assumptions that an improvement of impairments as well as less experienced limitations in activities would lead to more social participation after one year of treatment. Relying on the ICF model, these aforementioned variables that were assumed to have predictive value are representatives of the component body functions and structures as well as activities. Results showed that, taken as whole, improvements in impairments and activity limitations are related to improvements in social participation. Especially changes in pain and fatigue were found to be constant relational factors. This finding is in line with a previous cross sectional study of Fransen et al. (2002) who found pain to be directly associated with participation restrictions.

Up to the present, it has been investigated that less symptoms of fatigue are associated with a lower disease activity (Weinblatt et al., 2003) but not in how far improvements in fatigue are related to social participation in the context of treatment. This study perceived a relationship between improved symptoms of fatigue and an increase in social participation. This effect can be explained by several factors.

At first, fatigue is a common symptom of RA, which is present in 40-80% of the patients (Rupp, Boshuizen, Jacobi, Dinant, & Bos, 2004). Second, a previous study found out that persistent fatigue is strongly associated with social restrictions (Pollard, Choy, & Scott, 2005). Regarding the findings of this study, it can be concluded that fatigue is not only an influential factor during the disease itself but also in the context of treatment. In accordance with those previous reports and the fact that pain and fatigue themselves are strongly related to one another, it was not remarkably that both are dominant relational factors in this study. However, the remaining component of impairments assessed with the DAS28 delivered no individual predictive contribution to the variance in social participation. The correlations already indicated that scores of the DAS28 were less associated with the three domains of social participation in contrast to fatigue and pain. Fransen et al. (2002) found out that not all components of impairments were linked to participation restriction. An additional confirmation of this finding was reported by Newman (2000) who stressed that contextual factors

were more important than measures of the severity of the disease as well as the disability in addressing the impact of RA. Further research is required to establish this finding.

Changes in activity limitations were generally related to an improved social participation. However, this could not be found in the assessment of its predictive power on the subscale Social functioning, the first subscale that indicated social participation. On the contrary, a cross-sectional study of Fransen et al. (2002) depicted activity limitations to be related to participation restrictions. This finding might be explained by the indicated score at baseline, which was in contrast to the scores on the subscales Role-emotional and Role-physical, relatively high. Therefore, participants in this study already reported fewer restrictions on this subscale before the onset of treatment. One possible reason is that the perceived restrictions are less severe in Social Functioning than in Role-emotional or Role-physical, due to the fact that Social Functioning does not necessarily incorporate physical presence. Chang, Coster, & Helfrich (2013) defined this kind of participation as community participation. According to them, patients with RA can be socially involved without active engagement in social activities because they are able to fulfill their social roles and functions by interacting with friends via phone or internet or working from home, which is still socially satisfactory, thus they do not feel much restriction in this domain of social participation.

The second hypothesis of this study was confirmed for the most part. The results indicated that depressive feelings which were present before the start of the treatment seemed to hamper improvements in social participation despite successful treatment. Although this was not true for the subscale Social Functioning, it held indeed true for the subscales Role-emotional and Role-physical, representing social participation. Regarding the results, one possible explanation can be found in the scores at baseline on these subscales. Here, it was shown that participants already scored higher on the subscale Social Functioning at baseline than on the subscales Role-emotional and Role-physical.

The present findings are in line with the results of a study by Kuhlow et al. (2010) who found the subscale Mental Health of the SF36 to explain a high degree of restrictions in social participation. This finding stresses the complexity of the interrelation between physical and psychological components in RA because affective symptoms not only have a negative impact on the effect of treatment on social participation but it was also found out, for instance, that patients with RA and depressive symptoms scored higher on disability scores than patients without these symptoms (Abdel-Nasser, Abd El-Azim, Taal, El-Badawy, Rasker, & Valkenburg, 1998). In line with this, Soderlin and colleagues (2000) explained depression by the inability to participate in social activities, a finding which underlines the

problem of causality. Although this study cannot shed light on the causal relationship between depression and disease activity, it can be concluded that depressive feelings at baseline had a negative effect on treatment outcomes of social participation. This could be due to the fact that depressive feelings as well as anxiety possibly prevent concerned patients from perceiving positive effects of treatment. In addition these negative affective states may strengthen the patients attention to symptoms that are still present (Nicassio & Irani, 2012). Future research should also address to what extent neuroticism has an impact because of the known fact that neuroticism leads to a high sensibility for negative affect and stressful events (Biebrich & Kuhl, 2002). In consistence with the previous finding, it is known that negative affect worsens states of emotional distress during periods of intense pain (Zautra, Johnson, & Davis, 2005). Therefore the impact of neuroticism and negative affect on social participation should be of interest for following studies. Supporting this possible explanation, Cohen & Rodriguez (1995) indicated that the focus on symptoms remains if the individual has feelings of depression and anxiety. An additional important fact that should be taken into account is the role of expectancies. Expectancies and the patients' beliefs can have an incremental impact on treatment outcomes (Rutherford, Wager, & Roose, 2010). Due to the fact that maladaptive thoughts and beliefs are common during depressive feelings (Boden, John, Goldin, Werner, Heimberg & Gross, 2012), these might also affect improvements in social participation. The perceived functional abilities, as well as disabilities and symptoms can be vulnerable for biases. On top of that, bodily sensations are open for irrational interpretations or catastrophizing due to affective symptoms (Newman, 2000). In line with this, Kojima et al. (2009) found that patients with RA who also showed severe symptoms of depression reported to suffer from severe pain even though their inflammation level was low. In accordance with Kojima and his colleagues, it is also established that people in a more positive mood judge their own health status as better and report less symptoms (Pettit, Kline, Gencoz, Gencoz & Joiner, 2001). It is further to mention that a negative mood of patients at an early stage of treatment has been found to be influential on the final treatment outcome (Koban & Willutzki, 2007). Future studies should also focus their attention on the way patients cope with their disease because studies found out that patients, suffering from osteoarthritis (OA), who perceived their coping strategies as valuable and beneficial reported less depressive feelings (Aldwin & Revenson, 1987, McCrae & Costa Jr., 1986). Another issue that future studies should consider is how social support interacts in the context of treatment especially in relationship with social participation and how it sustains wellbeing. Here, studies already figured out that social support is linked to less report of depressive feelings (Riemsma, Taal,

Wiegman, Rasker, Bruyn, & van Paassen, 2000). It is further to mention that there are possible other confounding variables such as the physical symptoms pain, disease activity or fatigue, whose impact on depression was not addressed in this study. Future studies should account for these possible influences. Regarding all facts, a practical implication is to integrate additional forms of therapy that focus on psychological symptoms, like cognitive behavior therapy which has been proven to be successful especially in treating anxiety (Newman, 2000), in the process of treatment in order to improve treatment success.

The last two hypotheses dealt with the topic of gender differences and focused attention on how they differ in respect to social participation. Despite the examined improvement of disease activity like less pain, fatigue, improved scores on the DAS28 as well as fewer restrictions in participations, results of this study indicated that gender, as a personal factor in the ICF model, appeared to be influential. At first, this study assessed if women participated less in contrast to men right before the start of treatment. In general, this hypothesis was confirmed. However, it was shown that the difference was due to the impact of the impairments as well as the activity limitations experienced at baseline. More precisely, women participated less, in contrast to men, because of more experienced pain, fatigue and activity limitations and because of a higher disease activity. This finding is in line with previous studies who already found out that women with RA reported poorer scores on disease activity measures as well as on scales assessing physical functioning and felt in general more disabled due to the disease than men (Makinen, Hannonen &, Sokka, 2008, Sokka et al., 2009). Moreover, it was already investigated that women are more responsive to pain, in contrast to men, because of a lower threshold for pain and consequentially experienced these symptoms as more severe than men (Vollenhoven, 2009). A study of Thyberg et al. (2009) figured out that women reported slightly more symptoms of fatigue in comparison to men. The examined outcomes can further be ascribed to the process of sex-related socialization. Due to this process, it is acknowledged that women are more sensible for experienced symptoms and more likely to search for medical advice than men (Morrison & Bennett, 2010). Thus, this study made a contribution by broadening the insight in gender differences by figuring out that women score lower than men on subscales assessing social participation because the disease had a greater impact on women than on men.

The last hypothesis of this study assumed to find a gender difference in social participation even after the impact of RA had been ameliorated due to successful treatment. This assumption was also verified by examining that gender as a single factor had an influence on the treatment outcome regarding social participation. An important fact that has to be taken

into account is that there was only a gender difference found in Social Functioning after one year of treatment. Regarding the gender difference on the subscale Role-emotional and Role-physical after one year of treatment, the results showed that women participated less in contrast to men due to more experienced pain, fatigue and activity limitations even after one year of treatment. The outcome can be explained by the previous finding that men are more responsive to medical treatment than women (Forslind, Hafstrom, Ahlem, & Svensson, 2007). In addition, it is a known fact that women are more affected by RA than men. Many researchers blame differences in hormone levels for this variation. Women produce higher levels of hormones such as estrogens or progesterones which are responsible for an overreaction of the immune system to certain stimuli. On the contrary, it was found that men produce significantly lower levels of these hormones (Fairweather, Frisanco-Kiss, & Rose, 2008). Future research is needed to audit if this hormone difference is also responsible for the found difference in social participation. More precisely, future studies should investigate if the finding of the study, that women participated less due to more experienced impairments and activity limitations, can be attributed to differences in hormone levels. A practical implication would be to include hormone therapy in the process of treatment.

It should be found out as well, if men are more likely to believe to be in control of the disease itself and its activity because this belief can have a positive effect (Weinman & Petrie, 1997). On top of that, an own consideration of this study is to advise future research to investigate whether women have another way of coping with depressive feelings, that often accompany patients with RA, than men. If this was found to be true, it would explain the findings that physical symptoms appeared to affect women more resulting in less participation and would be in line with the aforementioned fact that depressive feelings as well as anxiety can aggravate the perception of physical symptoms (Morrison & Bennett, 2010). In general it is acknowledged that depression is more often found in women than in men (Vandereycken, Hoogduin, & Emmelkamp, 2008). In line with this fact, one study, examining influences related to depression in patients with OA, found that the female sex is more associated with a depressed mood (Sale, Gignac, & Hawker, 2008). It was also examined that women reported more negative affect when they were exposed to stressors, in contrast to men, and that women showed more positive affect when confronted with pleasant events (Davis, Okun, Kruszweska, Zautra, & Tennen, 2010).

Implications that can be drawn from results of this study are that therapy should be aligned to the female sex, for instance by providing hormone therapy to control for possible overreactions to physical symptoms or cognitive behavior therapy to regulate possible de-

pressed states. Moreover, according to Ong et al. (2010) interventions should enhance women's attention to positive sources which possibly promotes positive affect.

Advantages and Limitations of the Study

One of the main advantages of this study lies in the longitudinal investigation of this study which allowed for intra-individual comparisons between participants as well as between different impacts of the disease over the course of treatment. A further strength of the study is the representative, consecutive sample of patients with an early disease. The sample size was relatively large and included participants of different ages, educational levels etc. as well as a relative balanced distribution of men and women. Concerning the fact that all participants received the same treatment, this forms another important strength.

However, the study holds some limitations as well. On the one hand, results of the study did not permit inferences in terms of causality because of the design of the study. Because there was no control group included, no judgment about causal relationships could be pronounced. This limitation refers especially to the problem of causality regarding depressive feelings. In the analysis of the influence of depression at baseline on changes in social participation, it was not controlled for possible confounding factors and therefore no causal inferences can be drawn from the results.

On top of that, there are other components of the ICF model, such as contextual factors whose impact remained unexamined. Previous studies found these to be influential, for instance the role of social support, financial situation, education or the attitude of the individual (BAR, 2010; Pollard, Choy, & Scott, 2005). On account of this, it would be valuable if future studies would study the impact of these.

Subject to discussion is also the measuring instrument. This study utilized predominantly the SF36, a more generic measure tool. Because it is a short-form health survey, it is less precise leading to a reduction of statistical power of the hypotheses (Ware & Gandek, 1998). Especially the assessment of participation restrictions in this study is another limitation. Future studies should use more disease-specific measurements in the estimation of social participation because of the more generic assessment of the SF36. Therefore it is also questionable, if this questionnaire is sufficient in the operationalizing of the ICF model.

Conclusion

This study was interested in the impact of Rheumatoid Arthritis on social participation over the course of treatment. Findings supported the assumption that especially improve-

ments in pain and fatigue are related to improvements in social participation. Changes in activity limitations were only associated with improvements in two domains of social participation (Role-emotional and Role-physical) assessed with the SF36. Other than expected, it could not be confirmed that changes in Disease activity contributed to an improvement in social participation. A further inference that can be drawn from the results is that depressive feelings at baseline mainly seemed to hamper treatment effects on social participation after one year of treatment. The study also offered insight into gender differences. Women appeared to be more restricted in social participation both before and after one year of treatment, probably resulting from severe experience of impairments and activity limitations. Given these findings, treatment should be aligned to several factors, such as depressive feelings in patients or gender, in order to account not only for an improvement of functionality.

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Appendix

SF36-questionnaire

SF-36(tm) Health Survey

Instructions for completing the questionnaire: Please answer every question. Some questions may look like others, but each one is different. Please take the time to read and answer each question carefully by filling in the bubble that best represents

your response.

Patient Name: _____

SSN#: _____ Date: _____

Person helping to complete this form: _____

1. In general, would you say your health is:

- Excellent
- Very good
- Good
- Fair
- Poor

2. Compared to one year ago, how would you rate your health in general now?

- Much better now than a year ago
- Somewhat better now than a year ago
- About the same as one year ago
- Somewhat worse now than one year ago
- Much worse now than one year ago

3. The following items are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?

a. Vigorous activities, such as running, lifting heavy objects, participating in strenuous sports.

- Yes, limited a lot.
- Yes, limited a little.
- No, not limited at all.

b. Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf?

- Yes, limited a lot.
- Yes, limited a little.
- No, not limited at all.

c. Lifting or carrying groceries.

- Yes, limited a lot.
- Yes, limited a little.
- No, not limited at all.

d. Climbing several flights of stairs.

- Yes, limited a lot.
- Yes, limited a little.
- No, not limited at all.

e. Climbing one flight of stairs.

- Yes, limited a lot.
- Yes, limited a little.
- No, not limited at all.

f. Bending, kneeling or stooping.

- Yes, limited a lot.
- Yes, limited a little.

No, not limited at all.

g. Walking more than one mile.

- Yes, limited a lot.
- Yes, limited a little.
- No, not limited at all.

h. Walking several blocks.

- Yes, limited a lot.
- Yes, limited a little.
- No, not limited at all.

i. Walking one block.

- Yes, limited a lot.
- Yes, limited a little.
- No, not limited at all.

j. Bathing or dressing yourself.

- Yes, limited a lot.
- Yes, limited a little.
- No, not limited at all.

4. During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health?

a. Cut down the amount of time you spent on work or other activities?

- Yes No

b. Accomplished less than you would like?

- Yes No

c. Were limited in the kind of work or other activities

- Yes No

d. Had difficulty performing the work or other activities (for example, it took extra time)

- Yes No

5. During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?

a. Cut down the amount of time you spent on work or other activities?

- Yes No

b. Accomplished less than you would like

- Yes No

c. Didn't do work or other activities as carefully as usual

- Yes No

6. During the past 4 weeks, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbors, or groups?

- Not at all
- Slightly
- Moderately
- Quite a bit
- Extremely

7. How much bodily pain have you had during the past 4 weeks?

- Not at all
- Slightly
- Moderately
- Quite a bit
- Extremely

8. During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?

- Not at all
- Slightly
- Moderately
- Quite a bit
- Extremely

9. These questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time during the past 4 weeks.

a. did you feel full of pep?

- All of the time
- Most of the time
- A good bit of the time
- Some of the time
- A little of the time
- None of the time

b. have you been a very nervous person?

- All of the time
- Most of the time
- A good bit of the time
- Some of the time
- A little of the time
- None of the time

c. have you felt so down in the dumps nothing could cheer you up?

- All of the time
- Most of the time
- A good bit of the time
- Some of the time
- A little of the time
- None of the time

d. have you felt calm and peaceful?

- All of the time
- Most of the time
- A good bit of the time
- Some of the time
- A little of the time
- None of the time

e. did you have a lot of energy?

- All of the time
- Most of the time
- A good bit of the time
- Some of the time
- A little of the time
- None of the time

f. have you felt downhearted and blue?

- All of the time
- Most of the time
- A good bit of the time
- Some of the time
- A little of the time
- None of the time

g. did you feel worn out?

- All of the time
- Most of the time
- A good bit of the time
- Some of the time
- A little of the time
- None of the time

h. have you been a happy person?

- All of the time
- Most of the time
- A good bit of the time
- Some of the time
- A little of the time
- None of the time

i. did you feel tired?

- All of the time
- Most of the time
- A good bit of the time
- Some of the time
- A little of the time
- None of the time

10. During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting friends, relatives, etc.)?

- All of the time
- Most of the time
- Some of the time
- A little of the time
- None of the time

11. How TRUE or FALSE is each of the following statements for you?

a. I seem to get sick a little easier than other people

- Definitely true
- Mostly true
- Don't know
- Mostly false
- Definitely false

b. I am as healthy as anybody I know

- Definitely true
- Mostly true
- Don't know
- Mostly false
- Definitely false

c. I expect my health to get worse

- Definitely true
- Mostly true
- Don't know
- Mostly false
- Definitely false

d. My health is excellent

- Definitely true
- Mostly true
- Don't know
- Mostly false
- Definitely false