

# Predictors for return to work after multimodal rehabilitation in persons with persistent musculoskeletal pain

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## ABSTRACT

**Aims:** To identify factors explaining return to work (RTW) 12 months after a multimodal rehabilitation (MMR) intervention in the REHSAM II project. **Methods:** The present study is a secondary assessment of the data from the randomized controlled trial REHSAM II. A total of 97 participants with persistent musculoskeletal pain were randomly allocated to MMR + web-based education or only MMR. The subjects were followed from baseline to 12 months. The baseline variables from the outcome measures were used to identify predictors. The associations between the dependent variable (i.e., RTW) and independent variables (i.e., baseline variables) were analyzed with univariate and multiple logistic regression models. **Results:** The univariate regression analyses showed that pain and disability level, the capacity to perform a task in relation to pain, hospital and psychiatric care, medication for insomnia, catastrophizing, self-assessed work ability compared with lifetime

best, satisfaction with life, ability for coping and controlling work situation, ability for coping with life outside work, and sense of responsibility for managing health condition were significantly associated with RTW. In the final multiple regression model, RTW was predicted by the Örebro Musculoskeletal Pain Screening Questionnaire (ÖMPSQ score) ( $p=0.003$ ,  $OR=0.961$ ) and EuroQol (EQ-5D index) ( $p=0.017$ ,  $OR=7.283$ ). **Conclusion:** Psychosocially related pain and health-related quality of life predicted RTW in the final model. The results confirm that RTW is a multidimensional problem involving a complex interaction of many factors.

**Keywords:** Musculoskeletal pain, Multimodal rehabilitation, Predictors, Return to work

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## INTRODUCTION

Persistent musculoskeletal pain is common worldwide, often implying a reduced activity level, quality of life, and productivity in society due to reduced and/or lost work ability and periods of absence from work [1–4]. An extended period of absence from work is related to

a lower probability of return to work [5] and may lead to social stigmatization and economic and organizational problems on the individual, workplace, and societal levels [6]. There is a growing interest to study return to work in Sweden after the reform of the national sickness insurance system in 2008 [7]. This reform promoted a new return to work policy by focusing on early assessments of work ability, regular screening of the capacity to return to work, entitlement to benefits, and the use of evidence-based methods to return to work. The reform included also larger restrictions for receiving sickness benefits, time limits for the review of eligibility and maximum length of sick leave within the rehabilitation chain, sick leave guidelines, and a new sickness certification. The aim of these changes was to return to work within 90 days, thus reducing the number of people on sick leave [7]. The evidence that early interventions are effective for return to work is growing [8].

Return to work is an outcome measure and a goal in rehabilitation, as identifying predictors for successful return to work has a positive impact both economically and socially for individuals and society [9]. It is vital for health care specialists in their planning and optimization of effective return to work strategies [10]. The concept of RTW is often measured as employment status (i.e., as a decreased work ability, work disability, workability recovery) [11] or a return to the workplace [9]. Part-time RTW can be a pathway to full-time work [12]. To return to at least part-time work and regain one's work ability has positive consequences for the patients and is a successful RTW strategy [11].

There are different approaches when studying RTW, including identifying both risk factors for developing musculoskeletal disorders [13, 14] and predictors for RTW for persons who are suffering from musculoskeletal disorders [10, 15]. Many factors have been described in the literature as potential RTW predictors. These factors can be related to the person, the environment, and/or the workplace [10]. It has been reported that gender, age [16], a period of certified sick leave, motivation, subjective perception of pain [17], patient beliefs [18], catastrophizing [19], fear avoidance [20], and positive or negative approach to work [15] may be considered as predictors for RTW on an individual level. Workplace structure and climate, social support, development opportunities, work tasks, and relationships at work are environmental or work-related predictors [21]. Lydell et al. [8] found that the number of sick-listed days before rehabilitation, age, self-rated pain, life events, gender, physical capacity, self-rated functional capacity, educational level, and light physical labor were predictors for RTW. Positive expectations for RTW and lower disability levels have also been associated with successful RTW [1].

Few studies have analyzed success factors, i.e., factors predicting an increased return to work, after multimodal pain rehabilitation (MMR) in persons with persistent

musculoskeletal disorders. There is a need to identify predictors for successful RTW in this group, as a basis for the development of effective interventions [22].

## REHSAM II project

The REHSAM II project is a randomized controlled trial with the primary aim to evaluate whether MMR in combination with a web Behavior Change Program for Activity (web-BCPA) could increase work ability among persons with persistent musculoskeletal pain from the back, neck, and shoulders in primary health care as compared to MMR only. The MMR contained treatments based on a biopsychosocial perspective of pain, with the patient in focus, and included treatments from at least three health care professionals of different occupations. The multimodal rehabilitation focused on patient-centered synchronized treatments, and a cognitive behavioral approach for behavior change toward activity and participatory goals was used by the healthcare specialists. The treatment period and content were adjusted to the participants' needs and progress [23]. The intervention group also received the web-BCPA, a self-management web program to complement and improve the MMR rehabilitation. It aimed to deepen the participants' knowledge and awareness of how their pain interacted with numerous factors in their life situation in order to learn how to cope with these factors in daily life to increase activity. The web-BCPA consisted of eight modules and contained information, assignments, and exercises, assimilated via educational texts, films, and writing tasks. The participants had access to the program 24 hours a day, 7 days a week for 16 weeks.

A wide variety of outcome measures were used in the project, such as pain intensity, self-efficacy to control pain and other symptoms, self-rated health, general self-efficacy, coping, catastrophizing, among others. Web-BCPA adherence and feasibility, as well as treatment satisfaction, were also investigated. The subjects were followed from baseline to 4 months and 12 months [23, 24].

There is a lack of knowledge about predictors for successful RTW after multimodal rehabilitation for persons with musculoskeletal disorders. Therefore, the aim of this study is to identify factors explaining RTW 12 months after baseline in the REHSAM II project.

## MATERIALS AND METHODS

The present study is a secondary assessment of the data from a recently published randomized controlled study [24]. The baseline variables from the outcome measures included in the REHSAM II project were used to identify predictors for RTW. Data were analyzed with univariate and multiple logistic regression models. Ethical approval for the REHSAM II project was received

from The Regional Ethical Board in Umeå, Sweden (Dnr 2011-383-31M).

## Participants

Participants were recruited by 17 health care centers in Norrbotten, Sweden, certified for MMR. The inclusion criteria for participants were: 1) age between 18 and 63 years; 2) persistent musculoskeletal pain with a duration of at least 3 months in back, neck, shoulder, and/or generalized pain; 3) an estimated risk for long-lasting pain conditions and future disability (score  $\geq 90$  on the Örebro Musculoskeletal Pain Screening Questionnaire (ÖMPSQ)); 4) work ability of at least 25%; 5) familiarity with written and spoken Swedish; and 6) access to a computer and the Internet. Exclusion criteria were reduced cognitive ability (dementia, brain injury), current abuse of alcohol or drugs, in need of other health care (e.g., advanced medical investigation, cancer treatment, terminal care), and/or pregnancy. Participants were randomly allocated to the MMR+web group or the MMR group with opaque, numbered envelopes. The allocation sequences, separate for each health care center, were provided by an independent statistician and stratified for sex and age. The subjects were followed from baseline to 12 months.

## Outcome measures

*Outcome variable:* In this study, RTW status was assessed as an outcome measure. In Sweden, people can work part time, depending on the assessment of the degree of work ability. Sickness benefit can be paid at 25%, 50%, 75%, or 100% [25]. Here, we define successful RTW as maintaining same work ability level at baseline level as well as RTW to at least 25% at the 12-month follow-up compared to baseline [11, 26, 27].

*Predictive variables:* As there is a lack of knowledge about predictors for successful RTW after multimodal rehabilitation, we decided to include all baseline variables in the REHSAM II project in the analysis:

### Background variables

- The background variables were sex, age, smoking, alcohol use, marital status, numbers of children, level of education, medication.
- Variables such as need of hospital and psychiatric care, duration of sick leave and symptoms, physical activity, work training.
- Treatment group (MMR or MMR+web).

Validated questionnaires measuring the following variables:

- Self-reported work ability – The Work Ability Index (WAI) [28].
- Return to work self-efficacy (RTWSE) [29].
- Average pain intensity during the last seven days scored on a Visual Analogue Scale (VAS) 0-100 [30].

- Disability – The Pain Disability Index (PDI) [31].
- Health-related quality of life – EuroQol (EQ-5D) [32].
- Self-efficacy and catastrophizing measures, such as the Arthritis Self-Efficacy Scale (ASES) [33].
- General Self-Efficacy Scale (GES) [34].
- Catastrophizing – Two-item Coping Strategies Questionnaire (Two-Item CSQ) [35].
- Physical and functional level and adjustment to injury and pain – The Örebro Musculoskeletal Pain Screening Questionnaire (ÖMPSQ) [36].

Self-constructed questions about:

- Coping and controlling work situation, as well as life outside work.
- Satisfaction with life and work, and own role in rehabilitation.

## Analyses

The outcome variable, RTW, was analyzed as a dichotomous variable: as either successful or unsuccessful. The associations between the dependent variable (i.e., RTW) and each independent variable (i.e., baseline variables) were evaluated in separate univariate logistic regression models.

After that, multiple regression analyses were used to analyze the relationship between all variables being significant in the univariate logistic regression models and the dependent variable (i.e., RTW) [37].

The independent variables were included from lowest to the highest p-value from univariate analysis, and kept in the model if significant. Odds ratios (OR) were used to reflect the strength of the association. The Cox & Snell R-square (or pseudo r-square statistic) was used to describe the approximate proportion of variation in the values of the dependent variable that could be explained by the variation in the independent variable [38].

A p-value below ( $p \leq 0.05$ ) was considered significant. SPSS version 22.0 was used for the analysis.

## RESULTS

A total of 97 participants were included in the study, 15 men and 82 women, aged between 18 and 63 years, with a mean age 42.7 (10.7) years. Of all the participants, 60 had successfully returned to work and 37 had not returned to work after 12 months, according to our definition. Within the RTW group, 30 participants were able to return to work with 25% or more compared to baseline; 30 participants continued to work at the same level.

The results of the univariate analysis are shown in Table 1. The table shows the independent variables that were significantly related to RTW.

The results of the univariate analysis showed that the EQ-5D health index, ÖMPSQ scale score, and WAI score at baseline were the most relevant variables associated with

RTW after 12 months. A higher EQ-5D index indicating improved health, as well as a lower ÖMPSQ scale score at baseline indicating lower risk for developing long-term problems, were the strongest predictors related to successful RTW after 12 months. Among the other predictors, lower PDI, higher ability for coping with work and controlling work situation, and lower pain intensity last week were associated with successful RTW. Belonging to any of the treatment groups was not significantly associated with RTW outcome after 12 months.

When all factors significantly associated with RTW were entered into the multiple logistic regression, only two predictors remained significant in the final multivariable model: physical and functional level and adjustment to injury and pain, measured by the ÖMPSQ score; and quality of life, measured by the EQ-5D index (Table 2).

## DISCUSSION

This study aimed to identify factors explaining RTW 12 months after baseline in the REHSAM II project.

The results showed that two variables, “Physical and functional level and adjustment to injury and pain” measured by the ÖMPSQ score, and “Self-rated health” measured by the EQ-5D index, were singled out as being associated with RTW. The ÖMPSQ instrument has been designed to predict risk for developing chronic pain associated with psychosocial factors [36, 39].

Earlier studies have shown that the ÖMPSQ has a predictive ability when pain and disability are used as an outcome in patients with low back pain [40]. The present study confirmed that the ÖMPSQ can be used as a predictor for return to work outcome. Westman et al. [41] found similar results three years after MMR for persons with non-acute musculoskeletal pain problems. Participants in their study completed MMR or a standard treatment that included a variety of treatments in primary health care. However, the researchers did not specify the procedures used or the time period for the treatment for each group. Other studies have also shown that ÖMPSQ has a predictive ability for future sick leave: the higher the score, the higher the risk for long-term sick leave [36, 39]. Based on the present results and previous studies,

Table 1: Independent variables with significant associations with return to work in univariate logistic regression.

Variable	P	Cox & Snell R-Square	Odds Ratio (OR)
ÖMPSQ score	0.000	0.188	0.952
EQ-5D index	0.000	0.15	16.822
WAI Score	0.000	0.145	1.332
PDI summary mean	0.002	0.117	0.632
Satisfied with life	0.002	0.112	1.954
ASES Self-efficacy symptoms summary mean	0.004	0.094	1.039
Coping with work situation	0.007	0.082	1.601
CSQ Catastrophizing “It is terrible and I feel it is never going to be better”	0.008	0.081	0.626
Controlling work situation	0.012	0.072	1.523
Psychiatric care	0.020	0.096	0.075
Coping with life outside work	0.021	0.06	1.78
ASES Self-efficacy pain summary mean	0.024	0.055	1.025
Pain intensity minimum 0-100 last week	0.025	0.054	0.98
Responsible for managing my health condition 0-100	0.028	0.054	1.026
Hospital care	0.031	0.05	0.312
CSQ Catastrophizing “I feel I can’t stand it anymore”	0.033	0.049	0.741
Medication for insomnia last month	0.043	0.042	0.7

ÖMPSQ-The Örebro Musculoskeletal Pain Screening Questionnaire, EQ-5D- EuroQol, WAI-Work Ability Index, PDI-The Pain Disability Index, ASES - Arthritis Self-Efficacy Scale (ASES), CSQ- Coping Strategies Questionnaire

Table 2: Independent variables with significant associations with return to work.

Variable	P	Cox & Snell R Square	Odds Ratio (OR)
Physical and functional level and adjustment to injury and pain (ÖMPSQ score)	0.003	0.240	0.961
Self-rated health (EQ-5D index)	0.017		7.283

ÖMPSQ-The Örebro Musculoskeletal Pain Screening Questionnaire, EQ-5D- EuroQol

we assume that the ÖMPSQ is a promising scale for predicting RTW in rehabilitation contexts. In addition, we consider it very important to identify psychosocial risk factors for developing chronic pain as early as possible to promote early RTW. A recently developed psychosocial questionnaire, the “Blue flags questionnaire,” has validated focusing on work-related psychosocial risk factors and the need for contacts and/or actions at the workplace [42].

Another predictor that was significantly associated with RTW outcome in the multiple regression analyses was self-rated health, measured by the EQ-5D instrument. Self-rated health is an often-used generic health indicator that has been examined as a predictor of subsequent disability retirement and working conditions [43].

The univariate logistic regression analysis was used to explore the association between potential predictors and RTW outcome. The results of the univariate analysis are consistent with previous studies and confirm that variables such as pain and disability level, satisfaction with life, abilities to cope with and control work situation, catastrophizing, and other psychosocial variables related to the workplace as well as outside work are related to RTW outcome [1, 14, 16, 44]. Interestingly, medication for insomnia at baseline was significantly associated with RTW in our study. To the best of our knowledge, none of the earlier studies have investigated this predictor.

A surprising finding in this study was that none of the demographic parameters, such as sex, age, or level of education, were associated with RTW. Previous studies that investigated predictors for RTW have shown that male gender [10, 16], young age [45], and higher educational status [45, 46] were found to be significant predictors for successful RTW after multimodal rehabilitation. A possible explanation can be difference in sample size as well as sample proportion of males and females in our study compared to other studies.

Duration of sick leave, physical activity, as well as satisfaction with present work had no association with RTW after 12 months. Number of sick-listed days before rehabilitation and physical activity have been considered as important predictors for RTW after multimodal rehabilitation in earlier studies [10, 16, 47]. Work dissatisfaction predicted non-RTW and disability in the study by Fayad et al. [48]. Return to work self-efficacy was not associated with RTW in our study, but has been mentioned in previous studies as a predictor of RTW [10]. A possible explanation may be that the multimodal rehabilitation in most of these studies focused on different work interventions to facilitate RTW in addition to MMR. In our study, no work interventions were included.

Treatment group was not associated with RTW after 12 months in our study. This means that the participants' belonging to one of the treatment groups (MMR or MMR+web) did not affect the RTW outcome. The mean use of the web-BCPA was low and may indicate that

participants were not motivated by Internet therapy. Moreover, the participants in our study represented a group with severe and complex disorders. As they have experienced high pain intensity for a long time, it can be assumed that the relatively brief intervention conducted in our study could not affect RTW.

## Methodological considerations

Our findings need to be discussed in light of the study limitations. First, this study was a secondary assessment of a randomized controlled trial, which is not an optimal design for investigating predictors. However, this design can be used to generate possible predictive variables for further prospective studies. Another weakness was that the large majority of participants were women, which makes it difficult to generalize the results of this study to men.

There is also an inherent risk of false positive results in the univariate regression models due to the repeated analyses, which could have affected the number of predictive models. In the final regression model, only two variables showed significant association with the outcome variable, which clearly meets the criteria for a minimum case-to-variable ratio to achieve valid results [49]. The final multiple regression model explained 24% of the variance, which indicates relatively low values of model clarification between the predictors and outcome, in comparison to Lydell et al. [10] with 25-35% of explained variance at the 5-year follow-up and 18-25% at the 10-year follow-up. Advantages of this study are that we studied a large number of different predictor variables and that almost all instruments have been widely used and have good validity and reliability.

## Implications and future research

To identify predictors for successful RTW is important. It improves early identification of patients at risk for long-term sick leave and deepens the understanding of factors influencing RTW. Furthermore, it can facilitate modifiable predictors to be targeted with specific interventions and treatments and improve the planning and optimization of RTW assessment strategies, which must be considered early in the RTW process. Our study shows that the ÖMPSQ and EQ-5D instruments can be useful to identify patients with risk for long-term sick leave. However, before firm conclusions are made, prospective studies validating our findings should be performed using the ÖMPSQ and EQ-5D in a larger and heterogeneous sample.

## CONCLUSION

In conclusion, psychosocially related pain and self-rated health showed an association with RTW. In

addition, pain, disability, hospital and psychiatric care, medication, capacities, psychosocial factors, and work ability were related to RTW. The results confirm the fact that RTW is a multidimensional problem involving a complex interaction of many factors.

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**Author Contributions**

Olga Sviridova – Substantial contributions to conception and design, Drafting the article, Final approval of the version to be published  
 Gunvor Gard – Substantial contributions to conception and design, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published  
 Peter Michaelson – Substantial contributions to conception and design, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

**Guarantor of Submission**

The corresponding author is the guarantor of submission.

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None

**Consent Statement**

Written informed consent was obtained from the patient for publication of this study.

**Conflict of Interest**

Authors declare no conflict of interest.

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