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ORIGINAL ARTICLE

Dutch Dataset Vocational Rehabilitation for Chronic Musculoskeletal Pain: Baseline Patients' Characteristics and Program Eligibility

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Abstract

Purpose Vocational rehabilitation (VR) is an intervention to improve return to work for patients with chronic musculoskeletal pain (CMP). However, a systematic overview of characteristics of referred patients or eligible for VR is lacking, which hinders comparability across studies. Objectives were (1) to describe characteristics of patients with CMP referred to and eligible for VR and (2) to identify factors that contribute to VR eligibility.

Methods This study used a multicenter, cross-sectional design. Data of self-reported questionnaires were obtained between 2013 and 2019 from care as usual of eight Dutch VR centers. Descriptive statistics were performed to describe sociodemographic, pain-related, and work-related characteristics. Logistic regression analysis was used to identify factors contributing to VR eligibility.

Results Data sets of $n = 2970$ referred patients were included. The mean age was 46 years and 60% were female. Low back (43%), neck (37%), and shoulder pain (34%) were most reported. 82% Worked in paid employment. The absenteeism rate was 85%, and 44% was partially absent. After multidisciplinary screening, 62.2% were eligible for VR. Persons most likely to be eligible for VR (OR < 1.20) were those having back or neck pain, whereas least eligible (OR < 0.80) were persons having pain in hand/fingers or pain in other regions, unemployed workers, and those referred by a 'other' medical specialists. All other factors contributed little or none to the model.

Conclusions An extensive description of sociodemographic, pain-related, and work-related characteristics is presented for patients eligible for VR. Especially having back/neck pain and being an employee were associated with higher chance of eligibility for VR.

Keywords Return to work · Chronic low back pain · Referring process · Sick leave

Introduction

Chronic musculoskeletal pain (CMP) is common among working adults, of which back and neck are the most prevalent regions (40%) [1]. CMP is associated with a high use of healthcare services, lower work participation, loss in work productivity, and sick leave, all contributing to high socioeconomic costs burden [2–5]. Vocational rehabilitation (VR) is an intervention for improving return to work (RTW) and other work-related outcomes for patients with CMP with delayed recovery [6–8]. In the Netherlands, eight rehabilitation centers, geographically spread across the Netherlands, are providing VR for patients with CMP. The content of this 15-week interdisciplinary, group-based, outpatient, twice a week, VR consists of three main components: biopsychosocial healthcare, work-modifications, and work participation coordination. The biopsychosocial healthcare consists of a

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set of modules, such as graded activity, cognitive behavioral therapy, group education, and relaxation. It is tailored to the patient's specific needs by an interdisciplinary VR team [9]. Although VR has demonstrated efficacy at group level, mean effect sizes are moderate, results of individual patients vary and are largely unpredictable at baseline [10].

The Dutch Dataset Vocational Rehabilitation (DDVR) was developed to measure patients' characteristics and outcome measures of VR treatment in the Netherlands [11]. The DDVR contains diagnostic and evaluative measures for patients with CMP. It was developed based on the International Classification of Functioning, Disability and Health (ICF) [12] and recommendations regarding core set domains and measurement procedures of the mission of the Initiative on Methods, Measurement, and Pain Assessment in Clinical Trials (IMMPACT) [11]. In a Dutch dataset of persons with CMP, biopsychosocial patients' characteristics and the content of data sets of CMP are reported [13], but little detailed measures are used to describe work-related parameters. Presenting VR baseline characteristics of patients with CMP could offer more possibilities for future research regarding generalizability and the comparison between patients' characteristics (inter)nationally.

Until now, studies assessing the effectiveness of (vocational) chronic pain rehabilitation used patients entering trials who have been selected from a larger group that were referred. Additionally, in care as usual, patients may also be referred for multidisciplinary diagnostics only, without intentions to proceed to VR. Patients' characteristics and presently unknown factors might be relevant in professionals' clinical reasoning and selection decisions. Several factors such as gender or pain severity are known for pain rehabilitation in general [14, 15], but are unknown for VR specifically. If characteristics are known of patients who are eligible for VR, and those who are not, three main strategies could enhance mean effect sizes: improvement of selection, better program match with patients' needs, and enhancement of VR content and dosage.

The objectives of this study were (1) to present baseline demographic, clinical, and work-related characteristics of patients referred to VR, and (2) to identify factors contributing to eligibility of the VR program.

Methods

Study Design

A multicenter, cross-sectional design within VR care as usual. The STROBE reporting guideline for cross-sectional studies was used. Because the data for this study were derived from care as usual and handled pseudonymously, approval from an ethical committee was not needed.

Study Sample

The study sample was received from eight VR centers in the Netherlands, that are part of a nationwide network. The selection process, the outline, and content of VR were similar for each center [9]. All patients referred to VR were included in data collection between January 2013 and December 2019. Patients were going through two steps of the VR selection process:

1) Patients were referred to VR by their occupational physician, general practitioner or rehabilitation physician, or other referrers, e.g., medical specialists. Based on referral information, patients were screened at first by a rehabilitation physician. The inclusion criteria were (1) (non)specific musculoskeletal pain/complaints, whether or not combined with psychosocial problems, (2) complaints have been known for a long time and/or are under treatment and have a continuous or progressive course (3) regular primary health showed insufficient results, (4) adverse prognosis without a multidisciplinary, biopsychosocial rehabilitation approach, (5) patients' willingness to sign a treatment agreement, (6) patients' requests are linked to RTW (and involving the employer). To be included in data collection of the DDVR, patients should be able to understand the Dutch language and to complete questionnaires in Dutch. The exclusion criteria were ongoing conflicts at work, having comorbidities that are the primary reason for sick leave not primarily related to CMP, good prognosis of natural recovery within primary care, and insufficient motivation. After consultation, the rehabilitation physician decides which patients are potentially eligible for a multidisciplinary VR-screening. This decision is based on referral information, medical history, biopsychosocial screening, physical examination, a high RTW expectation, and patient motivation. Contraindications, such as comorbidity, when CMP is not multifactorial (indication for primary care at first), not being physically capable to take part in the VR, psychiatric symptoms or language- or communication problems, were taken into account; and
2) A multidisciplinary VR-screening performed by a psychologist, a physical therapist, and an occupational specialist follows to select patients eligible to enter the VR program or recommend another mono- or multidisciplinary intervention when appropriate. The team aims to identify factors that hinder RTW and are potential modifiable with VR. Additionally, the team screens for trainability and motivation for behavior change.

Data Collection

Self-reported data from patients included for the multidisciplinary screening were collected as care as usual by using secured web-based questionnaires after having granted informed consent. Data were collected at baseline (i.e., before and during the multidisciplinary screening) and were processed anonymously for research aims.

Variables

A detailed description of the DDVR and the process of the measurements used in this study and information about their validity and reliability is described elsewhere [11].

Sociodemographic Characteristics

To describe the patient population, the following sociodemographic and lifestyle characteristics were collected: age, gender, level of education, marital status, having children, country of birth and body-mass-index (BMI), drinking alcohol, and smoking. Age was dichotomized based on the median. Level of education was divided into three categories: "low" (including primary school, lower vocational education, and lower secondary school), "medium" (including intermediate vocational education and upper secondary school), and "high" (including upper vocational education or university). BMI was calculated by weight and length and was divided into four categories: underweight (≤ 18.5), normal weight (< 18.5 and < 25), overweight (≥ 25 and < 30), and obese (≥ 30) [16]. To identify the marital status of participants, several options were provided: single, married/living together, long-distance relationship, living with parents, or other. Participants could also provide information on whether they had children or not and in case of having children, how many. Country of birth was divided into The Netherlands and other countries. Lifestyle variables as drinking alcohol (units per week) and smoking (yes or no) were also assessed.

Pain-Related and Medical Characteristics

The following disorder-related characteristics were used: complains/region of pain [17, 18], pain onset, duration of complaints [19], pain intensity [20], level of disability [21], referring physician, physical functioning [22, 23], and quality of life [13]. Complains/region of pain was assessed by giving participants the opportunity to choose between several regions: low back, high back, shoulders, neck, head, arms, hand/fingers, hips, legs/knees, ankles/foot, or other. In addition, participants were asked how many pain locations they can identify (1, 2–5 or > 5). Pain onset was divided into three categories: "suddenly without a cause," "suddenly after trauma, surgery, after giving birth," or "gradual." Duration of complaints was dichotomized into "subacute" (duration of complaints 3 to 6 months) and "chronic" (more than six months) complaints. Pain intensity was assessed on a 11-point Likert scale, as the mean pain score in the preceding week, where 0 denoted no pain and 10 denoted worst possible pain. Pain intensity was dichotomized into "high pain score" (score of ≥ 7) versus "medium/low pain score" (score of ≤ 6) [13, 24]. Level of disability was measured with the Dutch version of the Pain Disability Index (PDI) [25, 26]. The PDI measures seven dimensions: family/home responsibilities, recreation, social activity, occupation, sexual behavior, self-care, and life support activity on a 0–10 scale (0 denotes "no disability" and 10 denotes "maximum disability"). Total scores range from 0 to 70, with higher scores reflecting higher level of disability. The level of disability score was dichotomized based on the median. The RAND-36 scale physical functioning [22, 23] was used to measure self-reported physical functioning independent of (pain) diagnosis [11]. The physical functioning scale consists of 10 questions with three possible answers on a Likert scale: "yes, strongly limited," "yes, a bit limited," and "no, not limited." The total score can range from 0 to 100, with higher scores indicating better physical functioning. Quality of life was measured with the EuroQol-5D (EQ-5D), a 6-item questionnaire to investigate quality of life. The EQ-5D categories measure 5 dimensions: mobility, self-care, activities of daily life, pain, and anxiety/depression. Five questions are categorical (1–3 scale). A total score of the 5 questions is measured and varies between 0 and 1, where 1 reflects perfect health [27, 28].

Work-Related Characteristics

The following work-related characteristics were collected: working/sick leave status [21, 29], work ability [30], RTW expectation [20, 31–36], sick leave duration [17, 37, 38], and psychosocial factors in the delay of recovery and work resumption [39, 40]. Working status was assessed by asking participants whether they are having paid work or not and by asking what they are doing in their daily living (e.g., employee, self-employed entrepreneur, etc.). Contract hours, working days, and work sector were also assessed. Sick leave status and connected items (e.g., presenteeism) were measured with the working status item of the iPCQ-VR [41]. This item was divided into four categories, "100% working," "Partially working," "Full sick leave," and "Sick leave (> 6 weeks)." Sick leave duration was assessed with the sick leave long item of the iPCQ-VR questionnaire [41]. This item was dichotomized into long-term sick leave or not ("yes" = absenteeism for six weeks or more; "no" = absenteeism for less than six weeks). Based on Dutch social security legislation, a period of six week's sick leave was

considered [42]. Work ability was measured using a single item of the Work Ability Index (WAI) [30]. RTW expectation was assessed on a 0–10 scale, with patients rating the certainty that they will be working in six months, where 0 represents "Not at all certain" to 10 "Extremely certain." This item was dichotomized into negative RTW expectancy (score 0–5) and positive RTW expectancy (score 6–10). The most important psychosocial factors in the delay of recovery and work resumption were assessed with The *Work Reintegration Questionnaire* (WRQ). The questionnaire consists of 78 items distributed among 8 scales: 'Distress,' 'Illness behavior,' 'Job strain,' 'Job dissatisfaction,' 'Control,' 'Avoidance,' 'Perfectionism,' and 'Stressful home situation' [39, 40]. The questionnaire was developed in Dutch (VAR: Vragenlijst Arbeidsre-integratie). The subscales consist of multiple statements which are answered on a 4-point Likert scale [39].

Data-analysis

Data were analyzed using SPSS (IBM version 25.0.0.1 64 bit, IBM SPSS Statistics, Armonk, NY). First, the dataset was analyzed for missing data. When age and gender were not reported, most of the other variables were missing as well, so these 1649 patients were excluded. In total, $n=2970$ patients were included in analyses. Impossible outliers (e.g., in length, weight, working days, etc.) were adapted if possible and otherwise treated as missing value.

To describe the sample, descriptive statistics were calculated and presented as means and standard deviations for continuous variables (m and SD) or counts and percentages for categorical variables (n and %). Giving an overview of all variables for both groups, eligible or not eligible for VR, split file was performed. Variables with > 10% missing values were flagged.

Factors contributing to VR eligibility were identified using a binomial logistic regression analysis with the dependent variable being eligible for VR (yes or no). Because of the large number of possible predicting variables, in the first step, univariate logistic regression was used to determine which variables should be included into the multivariate analysis. All assumptions of the logistic regression analysis were checked. Variables that were univariately associated with the eligibility for VR with $p<0.20$ were selected for the second step of the analyses. Subsequently, the multivariate logistic regression analysis was performed using manual stepwise backward selection. In each step, the variable with the lowest predictive value was removed from the analysis, until exclusion of the variable resulted in a significantly decrement of the fit of the model according to the likelihood ratio test ($p<0.05$). Results were presented as odds ratios (OR) with 95% confidence interval (95% CI), and p values. Results were considered significant at $p<0.05$.

Results

The sociodemographic characteristics of the study population are presented in Table 1. Data sets of $n=2970$ referred patients were included. Missing values differed but were never > 10%. The mean age was 46 years (17–67) and 60% were female. After multidisciplinary screening, 62.2% ($n=1704$) of the participants were eligible for VR (8% missing values in this variable). Lower aged participants were more eligible for VR than older aged participants ($p<0.01$).

The pain-related and medical characteristics of the study population are presented in Table 2. The mean fatigue intensity was higher than the mean pain intensity. The majority of the study population had a pain duration of ˃6 months. Low back (43%), neck (37%), and shoulder pain (34%) were most reported.

The work-related characteristics of the study population are presented in Table 3. There was a wide range in work sector, 82% worked in paid employment. The absenteeism rate was 85%, of which 44% was partially absent.

Factors Contributing to Eligibility of VR

In Table 4, the factors, contributing to eligibility of VR, according to the multivariate logistic regression analysis, are presented (Hosmer Lemeshow goodness of fit $p=0.07$). Significant variables with an OR < 0.8 or ˃1.2 were having low back pain, neck pain, pain in hands/fingers, pain in another region, referring physician, and work status. For example, persons having back (OR 1.38, 95% CI 1.12–1.69) or neck pain (OR 1.41, 95% CI 1.15–1.73) were significantly more likely to be eligible for VR; persons referred by a physician other than an occupational physician, general practitioner or rehabilitation physician, were less likely to be eligible for VR (OR 0.68, 95% CI 0.49–0.94). All other factors contributed little or none to the model.

Differences between baseline variables sex, age, BMI, education, work status of patients with and without missing data were evenly distributed between those with and without VR eligibility.

Discussion

A detailed description of sociodemographic, pain- and work-related baseline characteristics of patients with CMP referred to and admitted to VR within a Dutch care as usual context was provided. After multidisciplinary screening, 62% were eligible for VR. Factors positively influencing the VR program eligibility were having back or neck pain, as well as being employed. Sociodemographic baseline

Table 1 Sociodemographic characteristics of the study population (n = 2970) in % (n)

	Referred to VR % (n) or mean (SD) ($n = 2970$)	Eligible for VR % (n) or mean (SD) ($n = 1704$)	Not eligible for VR % (n) or mean (SD) ($n = 1034$)	p
Gender (% female)	59.7 (1773)	61.2 (1043)	57.4 (593)	0.46
Age in years (mean (SD))	46.6 (11.0)	45.8 (11.0)	48.1 (11.0)	< 0.01
16–20 years	0.3 (8)	0.2 (4)	0.3 (3)	
21–30 years	9.4 (280)	10.3 (176)	7.7 (80)	
31–40 years	18.4 (546)	20.2 (345)	15.0 (155)	
41–50 years	27.4 (815)	28.6 (487)	26.0 (269)	
51–60 years	34.2 (1016)	31.8 (542)	39.0 (403)	
61–70 years	10.3 (305)	8.8 (150)	12.0 (124)	
BMI* ($n = 2376$) (mean (SD))	26.8 (5.1)	26.8 (5.2)	27.0 (5.0)	0.40
Underweight (< 18.5)	1.3 (32)	1.2 (17)	1.7 (14)	
Normal weight (18.5–24.9)	38.6 (918)	39.6 (540)	36.2 (300)	
Overweight (25.0–29.9)	37.9 (900)	26,4 (496)	40.1 (332)	
Obese (> 30.0)	22.1 (526)	22.7 (310)	22.0 (182)	
Education				0.01
Low	24.3 (716)	22.8 (386)	27.8 (285)	
Medium	43.6 (1285)	44.0 (745)	42.4 (434)	
High	27.9 (823)	28.9 (490)	25.5 (261)	
Other	4.2 (123)	4.3 (72)	4.3 (44)	
Marital status				0.20
Single	16.2 (478)	15.2 (258)	17.1 (175)	
Married/cohabitation	74.4 (2194)	75.0 (1269)	74.1 (759)	
Long distance relationship	4.4 (131)	4.6 (77)	4.5 (46)	
Living with parent(s)	2.2 (65)	2.5 (43)	1.7 (17)	
Other	2.6 (78)	2.7 (45)	2.6 (27)	
Children* (% yes) ($n = 2002$)	75.2 (2216)	74.8 (1266)	77.1 (788)	0.18
1 Child	21.6 (432)	22.5 (260)	19.7 (139)	
2 Children	53.2 (1065)	53.0 (612)	54.2 (383)	
3 Children	18.9 (378)	18.8 (217)	19.4 (137)	
≥ 4 Children	6.1 (122)	5.5 (64)	6.4 (45)	
Country of birth				0.14
The Netherlands	91.9 (2708)	92.6 (1567)	91.2 (935)	
Other countries	8.1 (240)	7,4 (126)	8.8 (90)	
Drinking alcohol				0.06
No	44.0 (1298)	42.2 (714)	47.9 (491)	
1–3 units/week	32.8 (967)	34.1 (577)	29.1 (298)	
4–7 units/week	15.2 (449)	15.7 (265)	14.9 (153)	
8–14 units/week	6.0 (178)	6.3 (107)	6.1 (63)	
15–20 units/week	1.5 (43)	1.4 (23)	1.7 (17)	
≥ 21 units/week	0.4 (12)	0.4 (7)	0.3 (3)	
Smoking (% yes)	24.6 (724)	24.5 (415)	25.5 (261)	0.60

VR vocational rehabilitation; *BMI* body-mass-index

* > 10% deviance from $n = 2970$

characteristics such as gender, age, and level of education are mostly in line with other comparable pain and vocational rehabilitation datasets within the Dutch and European context [13, 43–45]. Although percentages vary, the majority of participants are female with a mean age of about 45 years. Most pain-related and medical characteristics of the present study population were similar to a Dutch pain rehabilitation study [13], where pain, pain disability, and fatigue were only slightly higher and participants on average had more regions affected. Pain disability was similar to a pain rehabilitation

Table 2 Pain-related and medical characteristics of the study population (n = 2970)

	Referred to VR % (n) or mean (SD)	Eligible % (n) or mean (SD) (*n* = 1704)	Not eligible % (n) or mean (SD) (n = 1034)	*p*
Pain intensity (NRS 0–10)	5.4 (2.4)	5.5 (2.2)	5.4 (2.7)	0.17
Fatigue intensity (NRS 0–10)	6.3 (2.1)	6.2 (2.0)	6.4 (2.2)	0.09
Region of pain				
Low back	43.3 (1286)	46.3 (789)	39.0 (403)	< 0.01
Upper back	19.9 (591)	21.2 (361)	18.3 (189)	0.07
Shoulders	33.7 (1000)	35.3 (601)	31.7 (328)	0.06
Neck	37.0 (1100)	39.7 (676)	33.4 (345)	< 0.01
Face	5.0 (149)	4.9 (84)	5.4 (56)	0.58
Head	24.8 (737)	26.4 (450)	23.3 (241)	0.07
Arms	23.6 (700)	22.8 (388)	25.2 (261)	0.14
Hand/fingers	20.2 (600)	18.7 (319)	22.7 (235)	0.01
Hips	17.9 (532)	17.4 (296)	18.6 (192)	0.43
Legs/knees	23.8 (707)	22.6 (385)	25.3 (262)	0.10
Ankles/foots	16.6 (492)	15.3 (261)	18.9 (195)	0.02
Other	36.6 (1084)	33.8 (576)	40.7 (421)	< 0.01
Local/multisite pain				0.22
1 Pain location	31.8 (944)	30.5 (520)	34.0 (352)	
2–5 Pain locations	49.6 (1472)	50.8 (866)	47.0 (486)	
> 5 Pain locations	18.6 (551)	18.5 (316)	18.9 (195)	
Pain onset				0.01
Suddenly without a known cause	12.6 (373)	12.5 (213)	13.0 (134)	
Suddenly after trauma, surgery, or giving birth	25.2 (749)	27.5 (467)	22.6 (233)	
Gradual	47.0 (1394)	47.1 (802)	46.5 (481)	
Other	15.2 (450)	12.9 (219)	17.9 (185)	
Pain duration (in months)				< 0.01
< 6 (subacute)	19.5 (580)	21.3 (362)	17.7 (182)	
> 6 (chronic)	80.5 (2385)	78.7 (1340)	82.3 (850)	
Referring physician				0.01
Occupational physician	65.8 (1951)	67.6 (1151)	62.9 (649)	
General practitioner	11.0 (326)	10.9 (186)	10.6 (109)	
Rehabilitation physician	13.3 (393)	14.0 (238)	12.5 (129)	
Other	9,9 (296)	7,5 (127)	14.1 (145)	
PDI total score (0–70)	34.8 (13.2)	35.1 (12.4)	34.6 (14.5)	0.34
Family and home responsibilities (0–10)	5.4 (2.3)	5.5 (2.1)	5.4 (2.4)	0.37
Recreation (0–10)	6.1 (2.2)	6.2 (2.2)	6.0 (2.5)	0.05
Social activity (0–10)	5.6 (2.6)	5.6 (2.5)	5.5 (2.7)	0.19
Occupation (0–10)	6.9 (2.4)	6.9 (2.2)	7.0 (2.6)	0.78
Sexual behavior (0–10)	4.5 (3.1)	4.6 (3.0)	4.5 (3.2)	0.27
Self-care (0–10)	3.0 (2.7)	3.0 (2.6)	3.0 (2.8)	0.50
Life-support activity (0–10)	3.3 (2.7)	3.4 (2.7)	3.3 (3.0)	0.57
Physical functioning (Rand 36; 0–100)	57.2 (21.7)	58.3 (20.1)	55.0 (22.6)	< 0.001
Quality of life (EQ-5D total score: 0–1)	0.6 (0.3)	0.6 (0.3)	0.6 (0.3)	< 0.001

VR vocational rehabilitation; *PDI* Pain Disability Index

setting in Denmark [44] and to another VR setting in the Netherlands [45]. The WRQ values were also similar to another Dutch VR setting for CMP [45].

When interpreting the results of the second research question, this study shows how self-reported data can contribute to the screening process of VR. Patients with back or neck

Table 3 Work-related characteristics of the study population ($N = 2970$*)

	Referred to VR % (n) or mean (SD) ($n = 2970$)	Eligible for VR % (n) or mean (SD) ($n = 1704$)	Not eligible for VR % (n) or mean (SD) ($n = 1034$)	*p*
Paid work	93.2 (2735)	95.3 (1624)	88.5 (896)	< 0.001
Current work status				< 0.001
Employee	82.3 (2426)	86.9 (1472)	74.9 (767)	
Self-employed	2.1 (62)	1.7 (29)	2.3 (24)	
Other	15.5 (459)	11.4 (192)	22.7 (233)	
Work sector				0.87
Industry	13.3 (363)	13.4 (217)	13.2 (118)	
Construction	4.9 (135)	4.4 (71)	6.3 (56)	
Health and wellbeing	31.6 (865)	31.8 (516)	32.6 (292)	
Public (e.g., police, municipality)	11.2 (307)	11.7 (190)	8.8 (79)	
Education	8.9 (244)	9.6 (156)	8.0 (72)	
Commercial service	11.3 (310)	11.8 (191)	10.7 (96)	
Other	18.7 (511)	17.4 (283)	20.4 (183)	
Contract (hours/week)	31.5 (8.9)	31.8 (8.6)	31.2 (9.5)	0.16
Working days/week	4.2 (0.9)	4.3 (0.9)	4.3 (0.9)	0.38
Sick leave status				0.75
100% Working (no sick leave)	14.4 (351)	13.3 (198)	15.7(120)	
Partially working	44.3 (1080)	46.1 (686)	40.3 (307)	
Full sick leave	41.4 (1009)	40.6 (603)	44.0 (335)	
Duration sick leave (> 6 weeks)	53.8 (1096)	52.9 (669)	54.4 (335)	0.51
RTW expectation (0–10)	5.9 (3.0)	6.3 (2.7)	5.2 (3.3)	< 0.001
Presenteeism (%)	89.0 (1272)	89.0 (787)	88.3 (377)	0.78
Presenteeism days (last 4 weeks)	11.3 (6.4)	11.3 (6.4)	11.7 (6.4)	0.29
Presenteeism score (0–10)	5.5 (2.2)	5.5 (2.2)	5.6 (2.2)	0.42
WAS (0–10)	3.7 (2.5)	3.8 (2.4)	3.5 (2.6)	< 0.001
WRQ-distress (13–52)	29.7 (8.0)	29.5 (7.6)	30.1 (8.6)	0.07
WRQ-illness behavior (10–40)	31.5 (6.6)	31.1 (6.4)	32.3 (7.0)	< 0.001
WRQ-job strain (7–28)	14.9 (5.3)	14.8 (5.1)	15.3 (5.5)	0.01
WRQ-job dissatisfaction (12–48)	24.3 (8.3)	23.9 (8.0)	24.9 (8.8)	< 0.001
WRQ-control (6–24)	16.4 (4.9)	16.4 94.8)	16.6 (5.1)	0.30
WRQ-avoidance (11–44)	22.0 (6.5)	22.1 (6.4)	21.8 (6.9)	0.35
WRQ-perfectionism (12–48)	35.1 (6.4)	35.2 (6.4)	34.8 (6.4)	0.08
WRQ-stressful home situation (7–28)	13.0 (4.9)	12.9 (4.8)	13.3 (5.2)	0.04

VR vocational rehabilitation; *RTW* return to work; *WAS* Work Ability Score; *WRQ* Work Reintegration Questionnaire

pain seem to had a higher chance of a positive VR eligibility than other pain regions. On the other hand, patients with pain on hand /fingers, or pain in other regions, had had a lower chance of a positive VR eligibility. When comparing to other research, as shown above, patients with back pain are in the majority within (vocational) rehabilitation programs for people with CMP [8, 13]. Work status (being an employee) was associated with positive VR eligibility. This is not surprising, because of the aim and content of VR, consisting a work-modifications module, paid by the employer. Self-employed workers and workers with disability pensions were less likely to be eligible, possibly because the costs of the work module were not covered, or there was no employment to return to, making VR aimed at a return to a worker's own work less suitable. Patients of referrers with a more general look on health such as occupational physicians, general practitioners, or rehabilitation physicians were more likely for VR eligibility, compared to patients of referring medical specialists. This is not surprising, because of the use of the biopsychosocial screening during the VR selection process. On the other hand, these patients of other referrers reflect only 10% of the study population. We think that with good information of our VR and selection process, more and better referring from "others" can be reached.

Table 4 Factors contributing to eligibility of the VR program

Factors	OR	95% CI		P
Demographic				
Age	0.98	0.97	0.99	0.01
Children	1.13	0.90	1.42	0.28
Clinical				
Low back pain	1.38	1.12	1.69	< 0.01
Neck pain	1.41	1.15	1.73	< 0.01
Pain in hand/fingers	0.75	0.59	0.95	0.02
Other region*	0.78	0.64	0.96	0.02
Referring physician**				0.11
General practitioner	1.06	0.78	1.45	0.71
Rehabilitation physician	1.05	0.78	1.39	0.76
Other	0.68	0.49	0.94	0.02
RAND-36 physical functioning	1.00	1.00	1.01	0.09
Work				
Work status	0.57	0.42	0.78	< 0.01
Contract (hours)	1.01	1.00	1.02	0.29
RTW expectations	1.06	1.03	1.10	< 0.01
WAS	0.98	0.94	1.03	0.39
WRQ—illness behavior	0.99	0.97	1.01	0.49
WRQ—job strain	0.98	0.96	1.00	0.02
WRQ—perfectionism	1.02	1.00	1.04	0.01
WRQ—stressful home situation	1.00	0.98	1.02	0.99

VR vocational rehabilitation; *RTW* return to work; *WAS* Work Ability Score; *WRQ* Work Reintegration Questionnaire

Nagelkerke r^2: 0.08

*Other pain region than low back, high back, shoulders, neck, face, head, arms, hand/fingers, hips, legs/knees, ankles/foots

**Reference category: occupational physician

Strengths and Limitations of this Study

The first strength of the study is the large dataset of baseline data originating from a nationwide network of VR centers. In the light of a lack of comparable data, this study adds data that is representative for the Dutch context. Another main strength is the large amount of measurements, which were used in several studies [9, 46–48]. In earlier studies of the outcome of the multicenter Dutch VR program, 70% improved at or above the smallest detectable change individual and 42% improved at or above the minimal important change of the Pain disability Index [46]. In another earlier study of this multicenter Dutch VR program, work participation increased 32% in standard VR and 38% in VR + work module, from baseline to 6-months follow-up [47]. Additionally, the data are collected within a real-life setting and care as usual context. Moreover, we have presented also data of non-eligible persons. We are not aware of other studies with this distinction.

A limitation of the study is the missing data (maximum 10%). Missing data analyses indicated that this appeared to be at random, thus not introducing systemic bias. Additionally, the external validity of this study should be considered consciously. While sociodemographic and clinical variables appear similar to other pain rehabilitation or VR settings, health and social systems, content and dosage of VR differ between settings and countries, which may impact VR eligibility and success. Another limitation of the study is the cross-sectional design, that limits conclusions on causality and the direction of associations.

Implications for Practice and Research

The main implications for clinical practice are twofold. First, the VR selection process can be improved by better informing referrers about the (biopsychosocial) nature of the program. In this study, patients such as those with complaints of hand and fingers, and those referred by a medical specialist were more likely for VR non-eligibility, and other specialized care may be better suitable. Second, the VR selection process showed that a considerable amount of referred patients was judged as non-eligible. It implicates that critical assessment is necessary before patients enter a VR program, in order to control unnecessary use of limited rehabilitation resources. Otherwise, the multidisciplinary VR-screening team gave a well-argued advice for non-eligible persons. We extensively presented baseline demographic, clinical, and work-related characteristics of patients referred to VR. This will enable comparison with other VR studies in different countries and jurisdictions. This is relevant, because VR program composition, dose, and results depend in part on (differences between) jurisdictions. Better understanding of these differences will help generalizability of VR research. We encourage other researchers not only to show the effects of an intervention, but also to show the results of their selection process.

Conclusion

The present study provides an extensive description of sociodemographic, pain-related, and work-related characteristics referred to a VR program in The Netherlands. It serves clinical as well as research-related aims, which both can contribute to more tailored treatment for patients with CMP. Moreover, the eligibility for VR was assessed: after multidisciplinary screening, 62% were eligible for VR, whereas especially back/neck pain and being employed were associated with higher chance of eligibility for VR.

Author Contribution MR and ME contributed to the study conception and design. Data collection was performed by ME. Analysis was performed by VK, JN, and MR. The first draft of the manuscript

was written by FdL and VK and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

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Data Availability The datasets are available upon reasonable request.

Declarations

Competing Interests Fred A. de Laat, Vera Killen, Michel J.A. Edelaar, Janneke Nachtegaal, and Michiel F. Reneman declares that they have no competing interests.

Ethical Approval Because the data for this study were derived from care as usual and handled pseudonymously, formal approval from an ethical committee was not needed.

Informed Consent Written informed consent was obtained from all participants.

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