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Work participation after vocational rehabilitation in Finland: a matched study by entry pathway and rehabilitation type

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Abstract

Purpose

To examine post-rehabilitation employment among participants in vocational rehabilitation within the Finnish earnings-related pension system compared with matched controls. We distinguished between self-applicants and individuals granted rehabilitation entitlement in connection with a disability pension decision and assessed variation by rehabilitation type and diagnostic group.

Methods

Using nationwide register data, we identified all individuals whose earnings-related vocational rehabilitation ended in 2023 (N = 5243). A combination of exact and propensity score matching was used to select controls with similar background characteristics and pre-rehabilitation labour market histories from the general population. Employment during twelve months following the end of rehabilitation was examined as the outcome.

Results

When all rehabilitation types were combined, employment during the first post-rehabilitation year was 16.8 percentage points higher among self-applicants than among matched controls. Among individuals granted rehabilitation entitlement in connection with a disability pension decision, the corresponding difference was 28.1 percentage points. Differences between rehabilitation participants and controls were clearly larger for workplace-based rehabilitation than for vocational training. Higher employment among participants was observed across all diagnostic groups.

Conclusions

The findings are consistent with vocational rehabilitation supporting continued labour market participation, including among individuals who had already reached a later stage of the work disability process. However, some residual selection may remain, as rehabilitation participants may differ from non-participants in ways that are not fully captured by register data. Differences between rehabilitation types should be interpreted keeping in mind that workplace rehabilitation may be more feasible option for individuals with less severe work disability risks.

Introduction

Maintaining work participation among individuals with health limitations is increasingly important in ageing societies, where early exit from the labour market poses challenges for individuals, employers, and social security systems [1]. Chronic health problems may reduce work ability and increase the risk of

disability retirement, making interventions that support continued employment an important policy concern. Vocational rehabilitation is a commonly used policy measure aimed at supporting return to work, continued employment, and transitions to more suitable work among individuals with health-related work limitations [2, 3].

However, despite its policy relevance, evidence on the labour market effects of vocational rehabilitation is still relatively limited. This is partly because participation in rehabilitation is highly selective and rehabilitation measures differ considerably across populations, settings, and institutional contexts. Several studies have used register-based data to compare participants with non-participants or with individuals who did not complete the rehabilitation programme. Positive employment-related effects have been reported, for example, for vocational retraining among persons with disabilities in Germany [4], vocational rehabilitation services in Canada [5], graded return-to-work after rehabilitation in Germany [6], and placement coaching among disability insurance recipients in Switzerland [7].

Evidence from other register-based and programme evaluation studies similarly points to improvements in employment participation or reduced benefit receipt following vocational rehabilitation, although findings vary across populations and programme types [8, 9]. Other studies, however, have reported more uncertain or heterogeneous effects. In particular, some studies suggest that rehabilitees may remain in a weaker labour market position than comparison groups even after matching, reflecting differences in underlying health status and labour market disadvantage [10]. In addition, the estimated effects may depend on population composition, follow-up length, and how selection into programmes is addressed, with some studies finding limited or no impact once these factors are taken into account [11].

A central methodological challenge in this literature is that individuals who participate in vocational rehabilitation are likely to differ from non-participants in ways that may also affect their subsequent employment outcomes. To address this issue, many recent studies have used propensity score matching or related weighting methods to construct appropriate comparison groups for the rehabilitees [5, 6, 8, 9, 12]. While these methods have the advantage of allowing a large number of observed characteristics to be controlled for, they cannot eliminate all concerns about unobserved confounding. Nevertheless, when randomized study designs are not feasible and comprehensive register data are available, they provide a transparent and empirically grounded approach for balancing observed characteristics between rehabilitation participants and the comparison group.

The present study is conducted in Finland, where vocational rehabilitation is primarily organized within the statutory earnings-related pension system for individuals with an established attachment to working life. Individuals may enter vocational rehabilitation through two different pathways: they may apply for rehabilitation on their own initiative, or they may receive a rehabilitation entitlement in connection with a disability pension decision.

Together, these pathways cover different stages of the work disability process. Self-application typically occurs at an earlier stage, when an individual has faced work-ability problems and seeks support to

continue working, whereas rehabilitation entitlement through a disability pension decision often reflects a more advanced stage of work disability. A previous study analysed self-applicants using propensity score matched controls and found modest improvements in work participation, with differences depending on rehabilitation length and timing [12]. For individuals entering rehabilitation through a disability pension decision, two studies have applied a regression discontinuity design [13, 14]. These studies exploited an earnings threshold determining access to rehabilitation and generally reported effects in the expected direction under a quasi-experimental framework, but the estimates were statistically imprecise and limited to a very narrow population.

The present study examines post-rehabilitation employment among participants in vocational rehabilitation within the Finnish earnings-related pension system compared with matched controls using nationwide register data and matching-based design. We distinguish between individuals who applied for rehabilitation themselves and those who received a rehabilitation entitlement in connection with a disability pension decision. In addition, we examine differences across rehabilitation types and assess heterogeneity in outcomes across major diagnostic groups, including musculoskeletal diseases, other somatic illnesses, and mental disorders.

Methods

Institutional setting

For people with an established attachment to working life, vocational rehabilitation in Finland is primarily provided within the earnings-related pension system. The Social Insurance Institution of Finland (Kela) provides vocational rehabilitation for individuals who have been outside working life for a prolonged period or who have not yet entered the labour market. In specific cases, such as work-related or traffic injuries, vocational rehabilitation is provided by other institutions.

Eligibility for vocational rehabilitation in the earnings-related pension system requires that the individual has a sufficient prior employment history and that, without rehabilitation, a transition to temporary or permanent disability pension is considered likely in the near future. In addition, rehabilitation is granted only if it is expected to prevent or postpone disability retirement or support return to work. Participants may be currently employed or seeking to return to work after an illness. Vocational rehabilitation is based on an individual rehabilitation plan, specifying the content and objectives of the rehabilitation process.

The usual pathway to vocational rehabilitation is through an application initiated by the individual when a threat to work ability has been identified. If the pension insurer accepts the application, the applicant receives a preliminary decision granting entitlement to vocational rehabilitation, which is valid for 10 months and allows time for the rehabilitation plan to be finalized and implemented. Since 2015, however, individuals whose disability pension application is rejected or who are granted only a relatively short-term temporary pension may receive a corresponding rehabilitation entitlement in connection with the

disability pension decision, provided that the eligibility criteria are met. In 2023, rehabilitation was started by 84 percent of individuals receiving entitlement through their own application, compared with 49 percent of those receiving entitlement in connection with a disability pension decision [15].

Vocational rehabilitation measures include work try-outs, work coaching, vocational training, or, in rare cases, support for self-employment. Work try-outs can be implemented either at the individual's current workplace or with a new employer. If an employment relationship still exists, priority is given to adjustments within the current workplace, where work try-outs may facilitate a return to the individual's previous job or a transition to new job tasks. Working hours are often reduced at the beginning and gradually increased towards normal levels during the work try-out. The duration of the work try-out typically ranges from three to six months. Work coaching provides more extensive support for acquiring new occupational skills through supervised workplace learning and may be complemented by external training if needed. Vocational rehabilitation may also support formal education, ranging from shorter courses and continuing professional education to vocational qualifications and higher vocational degree programmes, which may last up to several years. Rehabilitation is financially supported through benefits paid by pension providers, replacing lost earnings during the rehabilitation period. To encourage participation, the level of rehabilitation benefits is a third higher than the corresponding disability pension.

Study population and data sources

This study was based on nationwide register data of the Finnish Centre for Pensions, complemented by data from The Social Insurance Institution of Finland and Statistics Finland. The different registers were linked together by personal identification numbers common to all registers. Our treated group consisted of all individuals who ended their earnings-related pension rehabilitation in 2023. These individuals were identified from the pension register which captures all periods of vocational rehabilitation for which rehabilitation benefits have been paid, ensuring comprehensive population coverage.

If an individual had several rehabilitation spells ending in 2023, the most recent spell was selected. Spells separated by gaps of at most one month were combined and treated as a single rehabilitation spell. A total of 5374 persons with a rehabilitation spell ending in 2023 were identified.

The pension register does not include information on the type of rehabilitation measure received. To address this limitation, information on rehabilitation types was taken from a separate rehabilitation services register. This register is compiled annually from earnings-related pension providers for statistical purposes and does not record precise timing of the rehabilitation. It is therefore not possible to link individual measures to specific rehabilitation spells. In this study, all rehabilitation measures recorded for individuals in the study population in 2023 were extracted.

Classification of rehabilitation measures

On the basis of the rehabilitation services register, rehabilitation measures were classified into five categories: (i) work try-out in the individual's original job with the same employer, (ii) work try-out in a different task with the same employer, (iii) work try-out with a different employer, (iv) work coaching, and (v) vocational training. If an individual had more than one rehabilitation measure (5.7%), the measure that appeared later in this hierarchy was assigned, reflecting increasing intensity or commitment.

Individuals with no information in the rehabilitation services register (N = 21), with records indicating only a preliminary assessment without details of the actual rehabilitation measure (N = 78), and with unclassifiable work try-out or another rehabilitation measure than listed above (N = 8) were excluded. In addition, individuals whose rehabilitation spell was recorded as having begun before 2017 were excluded as likely register errors or extreme outliers (n = 24). The final analytical sample comprised 5243 rehabilitation participants.

Control group and matching design

For the rehabilitation participants, matched controls with similar observed characteristics and pre-rehabilitation labour market trajectories were searched from a register covering the entire working-age population in Finland. Matching was conducted separately within strata defined by rehabilitation type, pathway into rehabilitation (self-application vs rehabilitation granted in connection with a disability pension decision), and diagnostic group, classified into musculoskeletal diseases, other somatic diseases, and mental disorders. This stratification resulted in 30 distinct matching strata.

The control pool was restricted to those of the same age as rehabilitation participants (20–63 years) and excluded individuals with no recorded earnings-related pension accrual (and thus no eligibility for rehabilitation under the earnings-related pension system). Matching covariates were measured prior to rehabilitation onset. Because control group members had no natural rehabilitation onset date, a pseudo-start date was assigned to each member of the control group, separately within each rehabilitation-type stratum, following the joint distribution of rehabilitation start year and month among participants [16]. This ensured that, on average, baseline characteristics and labour market histories were measured over comparable calendar periods for rehabilitation participants and controls. However, between the matched rehabilitee-control pairs, the start dates could differ. After the assignment of pseudo-start dates, individuals who had received full permanent disability pension or vocational rehabilitation during the 24 months preceding their pseudo-start date, or were not residing in Finland, were further excluded from the control pool. The final control pool consisted of 2.7 million individuals.

Matching variables

Exact matching was imposed on age (in 5-year age groups), sex, and educational attainment to ensure that any differences in post-rehabilitation outcomes are not driven by residual imbalance in these core sociodemographic factors. Furthermore, the diagnostic category of the most recent sickness allowance

spell was exact matched to better control for pre-existing morbidity. Finally, the presence of an active employment contract in the month preceding rehabilitation onset was included as an exact matching variable, as participation in workplace-based rehabilitation in the original job or in a different task with the same employer practically requires an ongoing employment relationship at the start of rehabilitation.

Furthermore, propensity score matching was conducted on industry, socioeconomic status, and degree of urbanization of the municipality of residence. Monthly labour market states were included as 84 binary indicators describing employment, receipt of sickness allowance, full temporary disability pension, partial disability pension, unemployment, and the presence of an active employment contract. These indicators were measured for months 1–12 prior to rehabilitation onset, as well as at 18 and 30 months prior, to capture longer-term labour market dynamics.

Matching was performed using Stata version 18.0 MP, employing the kmatch package [17].

One-to-one nearest-neighbour matching without replacement was applied within each stratum. A suitable matched control was found for all rehabilitation participants, and no treated individuals were excluded because of lack of common support. Post-matching balance diagnostics indicated good covariate balance across all matching strata (Supplementary Tables S1 and S2).

Outcome measures and follow-up

As the outcome, employment during the 12 months following the end of rehabilitation was examined. For controls, follow-up of employment began from the same day as for their matched rehabilitation participant. We first present monthly employment rates during the first year following the end of rehabilitation. Individuals were considered employed in a given month if they had an employment relationship and fewer than 15 social-benefit days during that month. For the main statistical analyses, being employed for most of the follow-up year was examined, defined as having more than 180 employment days omitting overlapping social benefit spells. The outcome of interest was the average treatment effect on the treated (ATT), estimated as the difference in post-rehabilitation employment outcomes between rehabilitation participants and matched controls under the matching assumptions.

Because matching was conducted separately by rehabilitation type, entry pathway, and diagnostic group, some control group members were selected more than once: 147 individuals served as controls twice and five individuals three times. To account for the resulting dependence between observations, standard errors were clustered at the individual level in all outcome analyses.

Results

Table 1 presents the number of rehabilitees by rehabilitation type and the pathway into rehabilitation. Of the 5243 included rehabilitees, 3782 (72%) had applied for rehabilitation themselves, while 1461 (28%) entered rehabilitation after receiving a rehabilitation entitlement in connection with a disability pension decision. Among self-applicants, vocational training was the single most common rehabilitation

measure, although workplace-based rehabilitation measures were more common when considered together. Among those granted rehabilitation with a disability pension decision, work try-out with another employer was the most common measure. Overall, work try-outs in the original job or with another employer were more frequent than those in a different task with the same employer. Work coaching was rarely used.

Table 1
Distribution of rehabilitees ending earnings-related vocational rehabilitation in 2023, by rehabilitation type and pathway into rehabilitation, n (%)

Work try-out in original job	**Self-applicants**	**Rehabilitation granted with disability pension decision**	**All**
	828 (22)	**362 (25)**	**1190 (23)**
Work try-out in different task	420 (11)	176 (12)	596 (11)
Work try-out for another employer	824 (22)	539 (37)	1363 (26)
Work coaching	90 (2)	40 (3)	130 (2)
Vocational training	1620 (43)	344 (24)	1964 (37)
Total	3782 (100)	1461 (100)	5243 (100)

Figure 1 compares labour market states in the treated and control groups during the 24 months preceding rehabilitation by pathway into rehabilitation, with all rehabilitation types combined. The figure indicates very similar pre-rehabilitation labour market histories among the treated and the controls. Additional balance diagnostics are reported in the supplement for other matching variables (Table S1) and separately by rehabilitation type (Table S2). Overall, balance on the matched variables was good.

Examination of pre-rehabilitation labour market histories shows marked differences between the two pathways into rehabilitation (Fig. 1). Among self-applicants, around 70 percent were at work 24 months before rehabilitation, but the proportion decreased to about 20 percent by the start of rehabilitation. At the same time, sickness allowance became more common, and the proportions unemployed and receiving disability pension also increased. Among those granted rehabilitation in connection with a disability pension decision, employment was clearly less common and fell to about 10 percent already one year before rehabilitation. In this group, the share receiving disability pension increased from around 20 percent to 50 percent over the 24 months preceding rehabilitation. Unemployment also increased during the final six months, possibly reflecting an increasing number of individuals reaching the maximum duration of sickness allowance.

Figure 2 shows employment rates in months 1–24 before the start of rehabilitation and months 1–12 after the end of rehabilitation by pathway into rehabilitation, with all rehabilitation types combined. The period spent in rehabilitation, which differed in length across participants, and the corresponding period for matched controls, has been omitted from the figure. Among self-applicants, the monthly post-rehabilitation employment rate in the treated group was about 60 percent throughout the follow-up year, with little change over time. In the control group, monthly employment rate increased from about 40 percent to nearly 50 percent during the same period. Among those granted rehabilitation in connection with a disability pension decision, monthly employment rate in the treated group was about 50 percent during follow-up. In the control group, monthly employment rate increased from about 20 to 26 percent.

In the following analyses, employment is summarized over the full follow-up year and defined as being employed for most of the year (> 180 days). Table 2 presents the proportion employed for most of the follow-up year by pathway into rehabilitation and rehabilitation type. Figures for monthly employment rates by rehabilitation type are presented in the supplement Figure S1. The proportion of employed for most of the year differed clearly across rehabilitation types: employment was highest among those who had a work try-out with their original employer and lowest among those who had a work try-out with another employer. However, these differences partly reflect differences in pre-rehabilitation employment between those assigned to different rehabilitation types.

Turning to post-rehabilitation differences between rehabilitees and matched controls, the employment gap was 16.8 percentage points among self-applicants and 28.1 percentage points among those granted rehabilitation in connection with a disability pension decision when all rehabilitation types were considered together. The largest gap among self-applicants was observed for work try-out in the original job with the same employer, the proportion of employed was 37.7 percentage points higher among rehabilitees than among controls. The corresponding difference was 25.0 percentage points for work try-out in a different task with the same employer and 11.2 percentage points for work try-out with another employer. No statistically significant difference was observed for work coaching. For vocational training, the difference was considerably smaller, 7.6 percentage points.

Among those granted rehabilitation in connection with a disability pension decision, differences in post-rehabilitation employment between rehabilitees and matched controls were generally larger across all rehabilitation measures. For work try-out with the original employer, whether in the same job or a different task, the difference was more than 40 percentage points. Work try-out with another employer showed the smallest difference. For vocational training, the difference between the treated and control groups was clearly larger than among self-applicants.

Table 2
Post-rehabilitation employment in the treated and control groups during the year after rehabilitation (%, 95% CI) and between-group differences (%-points), by pathway into rehabilitation and rehabilitation type

	Pre-rehabilitation employment	**Post-rehabilitation employment (% employed for most of the follow-up year)**			
	Treated group	**Treated group**	**Control group**	**Difference**	**p-value for difference**
Self-application					
Work try-out in original job	20.8	73.7 (70.7–76.7)	36.0 (32.7–39.3)	37.7 (33.2–42.1)	< 0.001
Work try-out in different task	36.9	71.2 (66.9–75.5)	46.2 (41.4–51.0)	25.0 (18.5–31.5)	< 0.001
Work try-out for another employer	14.0	37.5 (34.2–40.8)	26.3 (23.2–29.4)	11.2 (6.7–15.7)	< 0.001
Work coaching	31.8	54.4 (44.1–64.8)	46.1 (35.7–56.5)	8.4 (-6.3-23.0)	0.26
Vocational training	33.5	61.7 (59.3–64.0)	54.1 (51.7–56.5)	7.6 (4.2–11.0)	< 0.001
All	26.8	59.9 (58.4–61.5)	43.2 (41.6–44.8)	16.8 (14.5–19.0)	< 0.001
Rehabilitation granted with disability pension decision					
Work try-out in original job	13.2	69.9 (65.2–74.6)	23.4 (18.9–27.9)	46.5 (40.0–53.0)	< 0.001
Work try-out in different task	23.3	68.8 (61.9–75.6)	26.2 (19.5–33.0)	42.5 (32.9–52.1)	< 0.001
Work try-out for another employer	8.6	30.8 (26.9–34.7)	15.0 (11.9–18.2)	15.8 (10.8–20.8)	< 0.001
Work coaching	16.9	47.5 (31.9–63.1)	13.9 (2.5–25.3)	33.6 (14.3–52.9)	< 0.001

	Pre-rehabilitation employment	Post-rehabilitation employment (% employed for most of the follow-up year)			
	Treated group	Treated group	Control group	Difference	p-value for difference
Vocational training	23.9	51.5 (46.2–56.7)	31.0 (26.0–36.0)	20.5 (13.2–27.7)	< 0.001
All	17.2	50.4 (47.8–52.9)	22.3 (20.1–24.5)	28.1 (24.7–31.5)	< 0.001

Footnote: The pre–rehabilitation employment rate (month −1) is shown in the table for comparison. Only the employment rate for treated group is shown, as the rate for the control group was virtually identical.

Table 3 examines heterogeneity in post-rehabilitation employment differences between rehabilitees and matched controls across diagnostic groups. When all rehabilitation types were considered together, self-applicants with musculoskeletal disorders showed the smallest post-rehabilitation employment difference relative to controls, whereas those with mental disorders showed the largest difference. The same pattern was observed for work try-outs with a new employer. Although differences between diagnostic groups were not statistically significant for the other rehabilitation types, work try-outs in a different task and work coaching showed a similar tendency. Among those entering rehabilitation via a disability pension decision, no differences between diagnostic groups were observed when all rehabilitation types were combined. However, for work try-outs in the original job, the post-rehabilitation employment difference was smaller among individuals with mental disorders than among those with musculoskeletal or other diseases.

Table 3
Difference in post-rehabilitation employment between the treated and control groups during the year after rehabilitation (%-points, 95% CI), by diagnostic group

Self-application	Work try-out in original job	Work try-out in different task	Work try-out for another employer	Work coaching	Vocational training	All
Musculoskeletal diseases	38.9 (30.8–47.0)	17.7 (7.1–28.3)	4.5 (-2.9-11.8)	4.9 (-16.6-26.4)	7.0 (2.5–11.5)	12.0 (8.6–15.3)
Other somatic illnesses	37.8 (30.6–45.0)	20.0 (8.0–32.0)	12.4 (3.2–21.5)	8.2 (-24.0-40.4)	8.0 (1.5–14.5)	18.5 (14.4–22.7)
Mental disorders	36.4 (28.6–44.1)	37.3 (26.5–48.2)	17.9 (10.6–25.1)	13.3 (-11.6-38.3)	8.8 (0.3–17.2)	22.9 (18.7–27.1)
	p = 0.82	p = 0.56	p = 0.03	p = 0.88	p = 0.94	p < 0.001
Rehabilitation granted with disability pension decision						
Musculoskeletal diseases	50.9 (40.3–61.4)	36.6 (20.4–52.9)	11.5 (2.2–20.7)	30.6 (-4.3-65.4)	27.0 (15.4–38.5)	29.5 (23.7–35.3)
Other somatic illnesses	59.3 (48.2–70.4)	42.6 (24.9–60.3)	13.4 (3.7–23.1)	14.3 (-28.3-56.9)	9.0 (-4.1-22.1)	26.8 (20.5–33.1)
Mental disorders	31.8 (20.0-43.6)	49.0 (33.4–64.6)	20.8 (13.3–28.2)	42.1 (15.6–68.6)	24.2 (11.1–37.4)	27.8 (22.3–33.3)
	p = 0.003	p = 0.45	p = 0.13	p = 0.77	p = 0.10	p = 0.81

Sensitivity of the results to unobserved confounding

Robustness of the main results to unobserved confounding was assessed using Rosenbaum bounds [18, 19].The analysis examines how strongly unobserved factors would need to influence rehabilitation participation among otherwise comparable matched individuals in order to render the estimated treatment effects presented in Table 2 statistically non-significant. The analysis does not demonstrate whether such unobserved factors actually exist but only evaluates the robustness of the findings to departures from the assumption of no unmeasured confounding.

Results of the sensitivity analyses is presented in Supplementary Table S3. The findings were generally robust to moderate and even substantial levels of hidden bias. However, the estimated effect of vocational training among self-applicants appeared relatively sensitive to potential unobserved confounding.

Discussion

This study examined post-rehabilitation employment following vocational rehabilitation separating entry pathway and rehabilitation type. We found clear differences between the treated and matched control groups in employment during the 12 months following rehabilitation. The difference was even larger among those granted rehabilitation in connection with a disability pension decision than among self-applicants. However, the differences varied by rehabilitation type: for vocational training the differences between the treated and control groups were fairly modest compared to the larger differences among those with work try-outs, especially when conducted in the rehabilitee's previous workplace. Higher employment among participants was observed across all diagnostic groups, with largest differences among self-applicants with mental disorders.

Evaluation of the findings

After rehabilitation, employment was at a clearly higher level among rehabilitation participants than in the control group. When all rehabilitation types were considered together, the proportion of employed during the first follow-up year after rehabilitation was 16.8 percentage points higher among self-applicants than among their matched controls. Expressed in relative terms, the proportion of employed was 39 percent higher among rehabilitation participants. Among those granted rehabilitation in connection with a disability pension decision, the difference was 28.1 percentage points, with the proportion of employed among rehabilitation participants being more than double that observed among the controls. A key question is how much of these differences is due to the participation in rehabilitation? Although the treated and control groups appear similar in terms of their labour market background and other observed characteristics, they may still differ in factors that were not measured in the study. One possible difference is that rehabilitation participants are more motivated to remain in employment and return to work than non-participants [20, 21]. In addition, differences in health status, prognosis, and other characteristics relevant to future employment may not have been fully captured by the available data.

At first glance, the larger post-rehabilitation employment differences between rehabilitation participants and matched controls among those granted rehabilitation in connection with a disability pension decision may appear surprising. Individuals entering rehabilitation through this pathway are generally further along in the disability process and may more often be oriented towards transitioning out of the workforce, rather than continuing in employment. Half of them had already started receiving a disability pension. However, the results for this group cannot be directly compared with those for self-applicants because the two pathways involve individuals with markedly different profiles. In the analyses,

participants were compared with controls who had similar observed characteristics within each pathway. Thus, those entering rehabilitation through a disability pension decision were compared with similarly high-risk individuals, whereas self-applicants were compared with individuals with a different baseline profile. Furthermore, our study group includes only those who actually started rehabilitation. Thus, even among those granted rehabilitation in connection with a disability pension decision, the participants likely represent the more motivated subset. In contrast, the control group may include individuals who received a preliminary decision but did not participate in rehabilitation.

There were substantial differences in post-rehabilitation employment between rehabilitation types. When the rehabilitation measure was a work try-out with the same employer in the participant's original job, the differences in employment between rehabilitation participants and the control group were very large but when the intervention consisted of vocational training, the differences were smaller. However, selection may again explain the differences between rehabilitation measures. A work try-out in one's previous job with the same employer is typically the first and most straightforward option to be considered. If this is not feasible or proves unsuccessful, other measures are considered. In addition, participants in this type of rehabilitation may benefit from a familiar working environment and employer support that may not be similarly available in other rehabilitation measures. Because individuals who are initially in a more favourable situation may be more likely to receive this type of intervention, strong conclusions about differences between rehabilitation measures should not be drawn.

The small differences observed for vocational training may also relate to the typically long duration of training programmes. As the time spent in rehabilitation (and the corresponding period for the comparison group) was excluded from the analysis, individuals in the comparison group also had a relatively long period during which changes in work ability and labour market attachment could occur before follow-up began.

Comparison to earlier studies

A number of earlier studies have examined the effectiveness of vocational rehabilitation and other measures supporting work participation among workers with disabilities [22–28]. Comparison of the results across these studies is challenging because they differ in terms of target populations, legislative contexts, the content of rehabilitation measures, and methodological approaches. Nevertheless, the post-rehabilitation employment differences observed in the present study appear larger than those typically reported in previous research.

The closest comparison to our study is an earlier Finnish propensity score–matched study focusing on self-applicants [12]. Also compared to that study we observe somewhat larger post-rehabilitation differences in employment between participants and controls. In the earlier study, employment during the first post-rehabilitation year was 11.8 percentage points higher among participants than among controls after adjustment for pre-rehabilitation differences, compared with 16.8 percentage points in the present study.

Several factors may explain this difference. The earlier study examined cohorts entering rehabilitation between 2008 and 2010, whereas the present study covers a considerably later period. During this time, access to vocational rehabilitation has become more selective, as eligibility criteria have been more closely aligned with the legal requirement of a probable risk of work disability [29]. The study populations also differed in several respects. The earlier study was restricted to individuals who had received sickness allowance or disability pension due to musculoskeletal diseases or mental disorders within the previous three years and who were employed at the end of the preceding year, whereas no such restrictions were applied in the present study. Applying similar restrictions to the current data reduced the observed differences somewhat. Finally, the present study measured pre-rehabilitation labour market histories in greater detail. Because employment declines markedly, and at an accelerating rate, during the final year before rehabilitation [30], annual measures of labour market attachment used in the earlier study may not fully capture this decline. Accounting for monthly pre-rehabilitation trajectories likely improved comparability between participants and controls and may partly explain the larger observed differences.

The earlier study did not include direct information on rehabilitation type. However, it used the length of rehabilitation as a proxy to separate workplace rehabilitation (up to 10 months) from vocational training (> 10 months). For longer rehabilitation programmes, the estimated differences are broadly similar to those observed in the present study for vocational training. In contrast, for shorter programmes, the study showed clearly smaller differences than those found in the present study of workplace-based rehabilitation.

Limitations

Participants in earnings-related vocational rehabilitation form a group that is strongly attached to the labour market. However, employment declines markedly before rehabilitation, while sickness allowance receipt increases and unemployment and disability pension receipt become more common. A key challenge in evaluating vocational rehabilitation is identifying a suitable comparison group that helps address selection bias and confounding, which are inherent concerns in observational studies. In the present study, controls were drawn from the general population. Using detailed information on background characteristics and pre-rehabilitation labour market histories, we were able to identify a comparison group that was highly similar to rehabilitation participants with respect to observed characteristics but did not undergo vocational rehabilitation. An alternative approach would be to use an internal comparison group consisting, for example, of individuals who were eligible for rehabilitation but did not participate. Such a group is likely to be more comparable to rehabilitation participants with respect to their underlying risk of work disability before any matching or statistical adjustment is performed. However, similar concerns remain regarding unobserved differences for example in motivation, return-to-work expectations, and confidence in returning to work.

Individuals who had received vocational rehabilitation within two years before their pseudo-start date were excluded from the control pool. However, it was not possible to exclude individuals who entered vocational rehabilitation during the period corresponding to their matched participant's rehabilitation

spell, because the duration of that period was not known until matching had been completed. In total, 233 controls started vocational rehabilitation during this period, including 180 matched to participants in vocational training. This is unsurprising given the relatively long duration of training programmes. Nevertheless, post-matching removal of the affected matched pairs had only a modest impact on the results. Among self-applicants participating in vocational training, the post-rehabilitation employment difference decreased from 7.5 to 6.5 percentage points, whereas changes in the other groups were negligible because only a small number of affected matched pairs were removed. In addition, the data contained no information on other work ability–enhancing measures that may have been undertaken by individuals in the comparison group during the excluded period.

The treated group included all individuals whose rehabilitation ended in 2023. However, in the diagnosis-specific analyses sample sizes remained small. Furthermore, with only one-year follow-up, the longer-term sustainability of employment could not be assessed.

Concluding remarks

In this matching-based study, vocational rehabilitation participants had substantially higher post-rehabilitation employment than matched controls. However, some of this difference may reflect residual selection, as rehabilitation participants may differ from non-participants in ways that could not be observed or measured. However, particularly for workplace rehabilitation, the observed differences between rehabilitation participants and matched controls were large, making it unlikely that they can be explained entirely by selection. The differences between the various rehabilitation measures should also be interpreted with caution. The particularly favourable outcomes observed for workplace rehabilitation with the original employer may reflect the fact that this type of rehabilitation is typically used in less severe or more straightforward cases.

Differences between self-applicants and those granted rehabilitation in connection with a disability pension decision are less affected by this type of selection. However, direct comparison should be avoided because the two pathways involve individuals at different stages of the work disability process. The effectiveness of vocational rehabilitation among individuals granted rehabilitation in connection with a disability pension decision has sometimes been questioned, as rehabilitation is initiated relatively late in the disability process. However, the present findings suggest that vocational rehabilitation is associated with favourable employment outcomes also in this group.

Declarations

Funding

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Competing Interests

The authors declare no competing interests.

Author contributions

All authors contributed to the conception and design of the study. ML and SK prepared the data. ML conducted the analyses and wrote the first draft of the manuscript. All authors critically reviewed and revised the manuscript and read and approved the final version.

Ethical Approval

The Finnish Centre for Pensions has a statutory mandate to conduct research related to the pension system and its development. Under Finnish legislation, ethical approval and written informed consent were not required, as the study was based solely on pseudonymised register data and did not involve contact with participants.

Data Availability

The data analysed in this study are based on the registers of the Finnish Centre for Pensions and supplemented with information from several national registers. Due to legal and confidentiality restrictions, the data cannot be made publicly available. Interested researchers may contact the authors for information on data access. Access to the data is subject to permission from the Finnish Social and Health Data Permit Authority Findata and the relevant register keepers.

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Figures

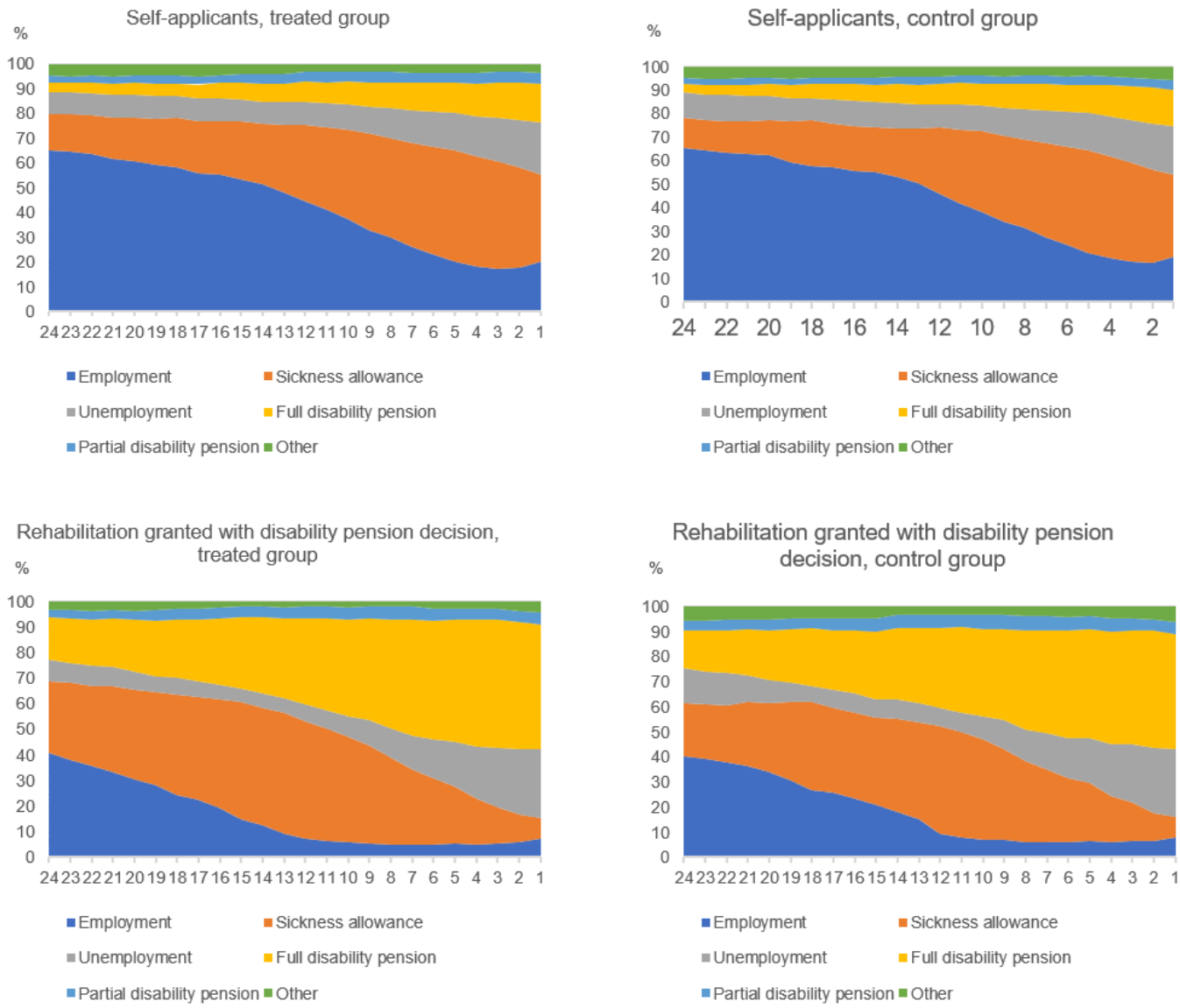


Figure 1

Labour market status in the treated group and the control group 1-24 months before vocational rehabilitation, by pathway into rehabilitation

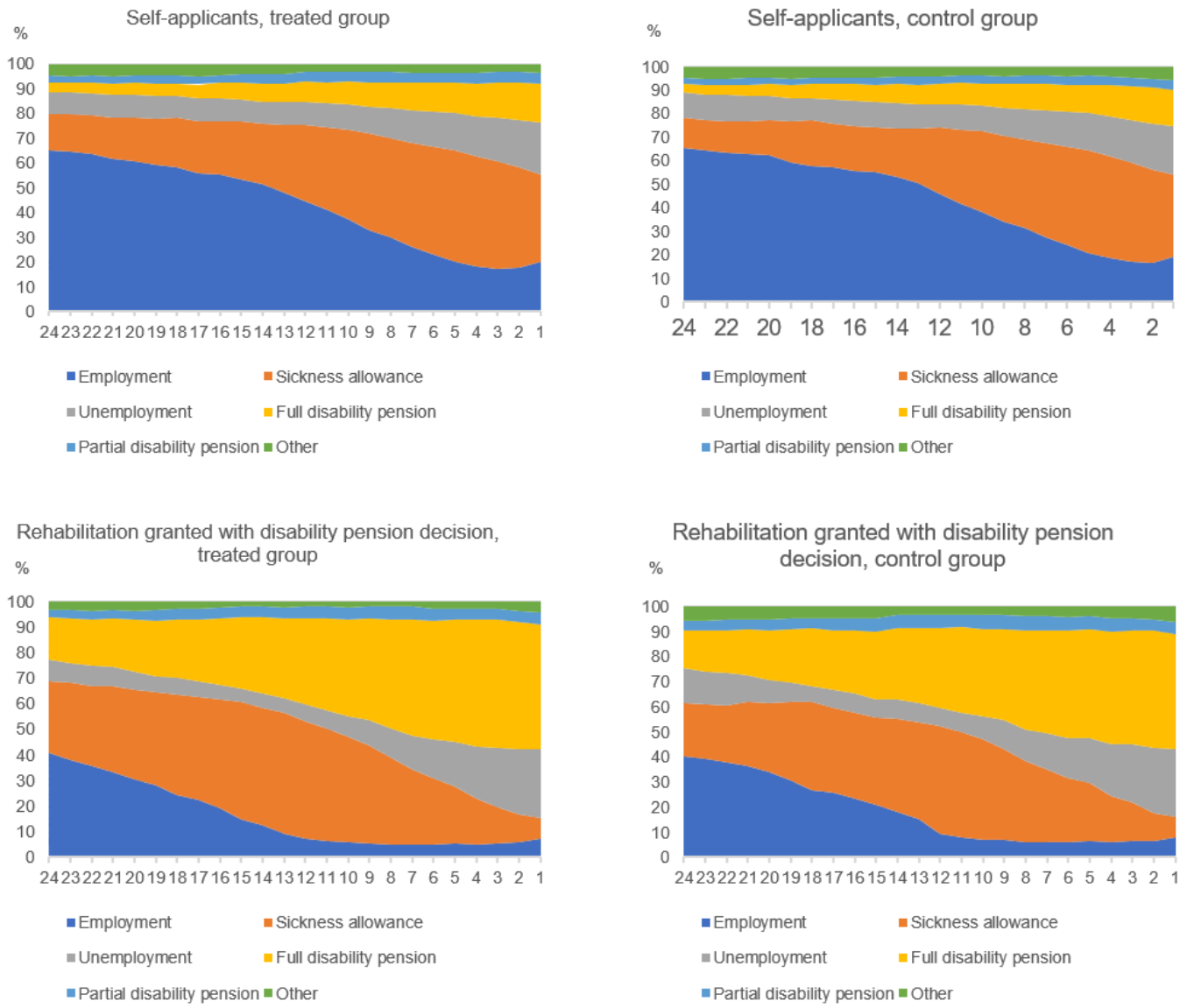


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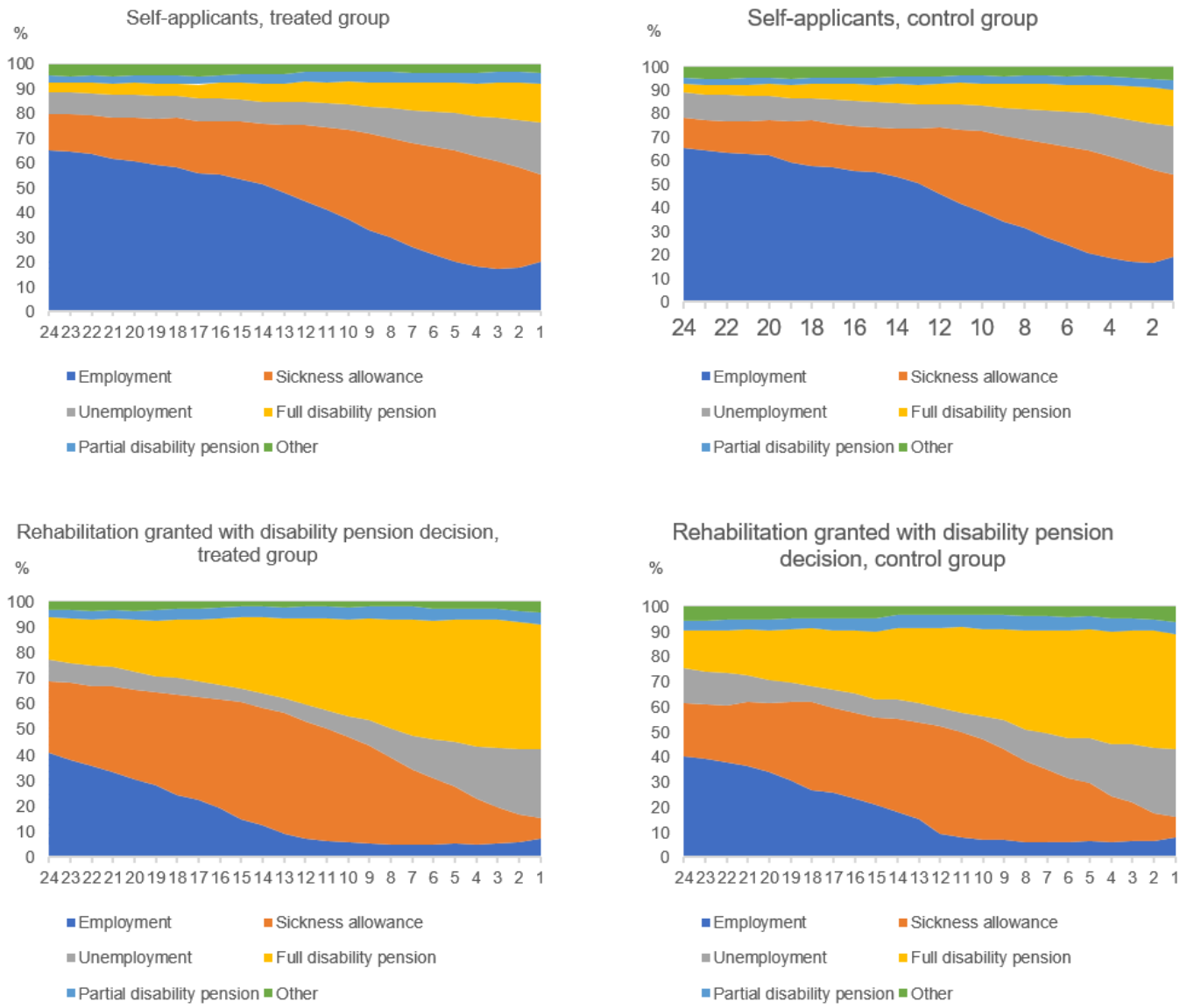


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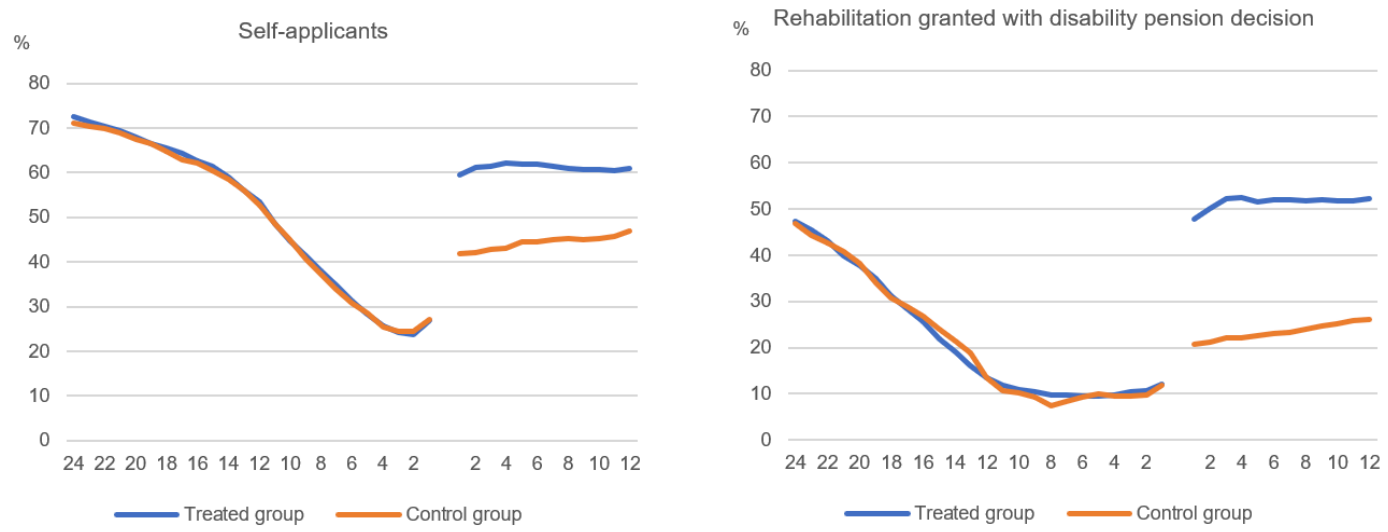


Figure 2

Monthly employment rates 1–24 months before the start of vocational rehabilitation and 1–12 months after the end of vocational rehabilitation in the treated and control groups, by pathway into rehabilitation

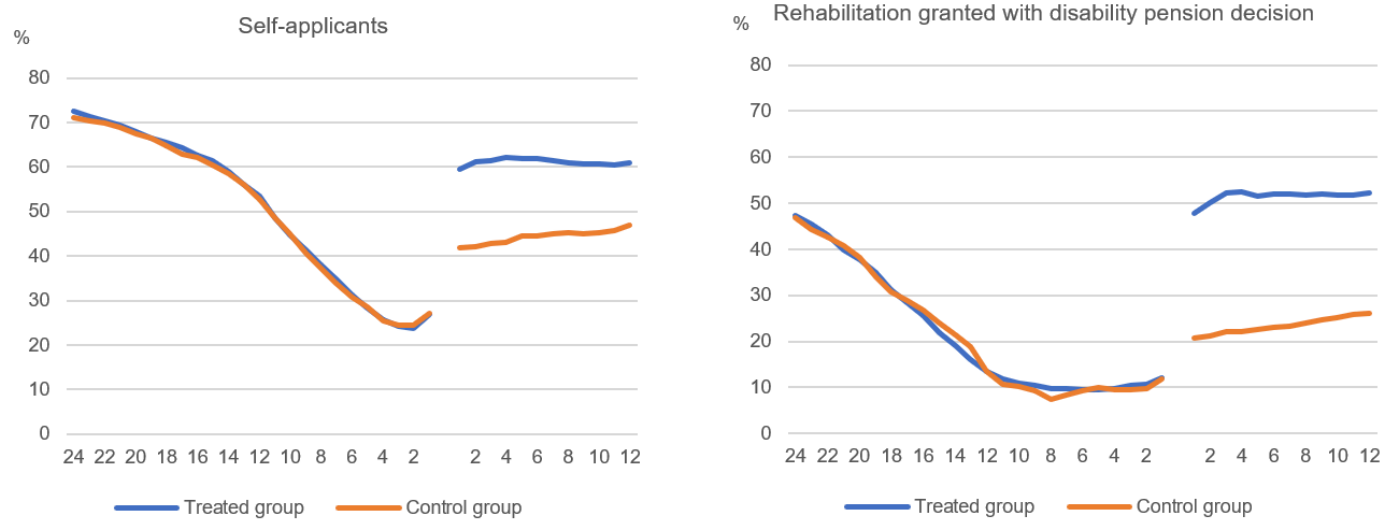


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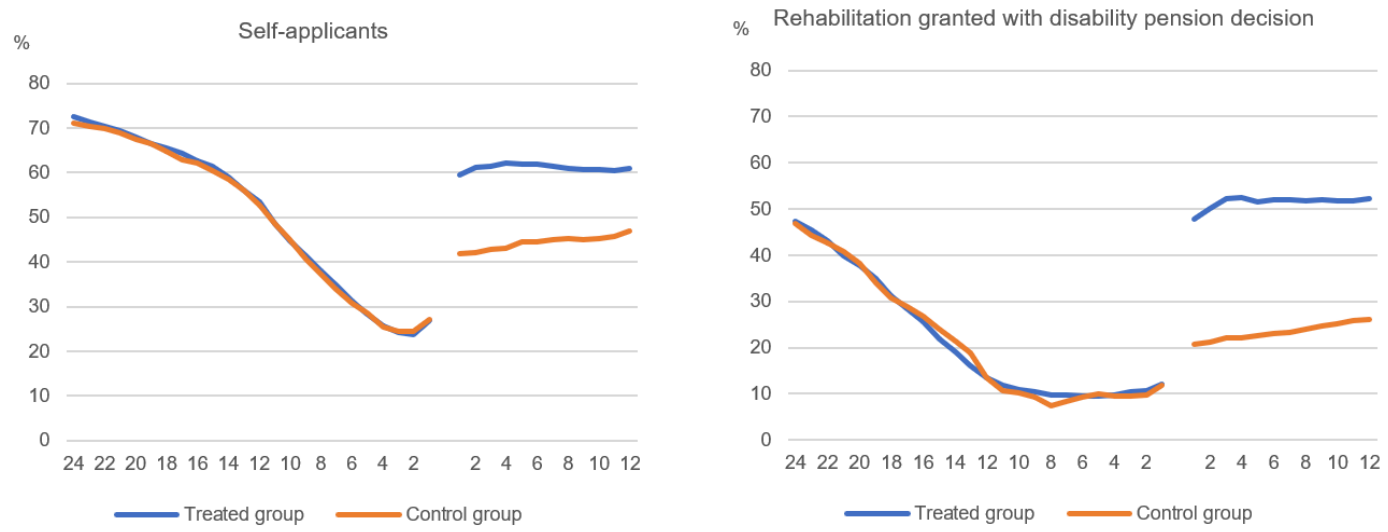


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Monthly employment rates 1–24 months before the start of vocational rehabilitation and 1–12 months after the end of vocational rehabilitation in the treated and control groups, by pathway into rehabilitation

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