

The value of interdisciplinary treatment for sickness absence in chronic pain: A nationwide register-based cohort study

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Abstract

Background: Interdisciplinary treatment (IDT) is an internationally recommended intervention for chronic pain, despite inconclusive evidence of its effects on sickness absence.

Methods: With data from 25,613 patients in Swedish specialist healthcare, we compared sickness absence, in the form of both sick leave and disability pensions, over a 5-year period between patients either allocated to an IDT programme or to other/no interventions (controls). To obtain population-average estimates, a Markov multistate model with theory-based inverse probability weights was used to compute both the proportion of patients on sickness absence and the total sickness absence duration.

Results: IDT patients were more likely than controls to receive sickness absence benefits at any given time (baseline: 49% vs. 46%; 5-year follow-up: 36% vs. 35%), and thereby also had a higher total duration, with a mean (95% CI) of 67 (87, 48) more days than controls over the 5-year period. Intriguingly, sick leave was higher in IDT patients (563 [552, 573] vs. 478 [466, 490] days), whereas disability pension was higher in controls (152 [144, 160] vs. 169 [161, 178] days).

Conclusion: Although sickness absence decreased over the study period in both IDT patients and controls, we found no support for IDT decreasing sickness absence more than other/no interventions in chronic pain patients.

Significance: In this large study of chronic pain patients in specialist healthcare, sickness absence is compared over a 5-year period between patients in an interdisciplinary treatment programme and other/no interventions. Sickness absence decreased over the study period in both groups; however, there was no support for that it decreased more with interdisciplinary treatment than alternative interventions.

1 | INTRODUCTION

Present in a third of the general population globally, chronic pain beyond 3 months is a leading public health problem (Goldberg & McGee, 2011; Raffaelli & Arnaudo, 2017; Steingrimsdottir et al., 2017; Treede et al., 2019). Spontaneous recovery is poor, and overtime the condition can evolve into a complex clinical presentation that persists for decades (Costa et al., 2012; Itz et al., 2013; Toye et al., 2017). Socioeconomically, chronic pain represents 3%–10% of the annual gross domestic product in western economies (Breivik et al., 2013; Gaskin & Richard, 2012). Sickness absence in the form of sick leave and disability pensions is consistently identified as a main contributor, with chronic pain-associated diagnoses constituting some of the most common causes of prolonged sickness absence in the general population (Alexanderson & Norlund, 2004; Breivik et al., 2013; Ferrie et al., 2009; Gaskin & Richard, 2012; Gustavsson et al., 2012; Head et al., 2008; Lidwall, 2015; Phillips, 2009). In Sweden, sickness absence reduction is a public health priority, and a government policy was implemented in 2009 to facilitate access to evidence-based interventions for chronic pain-associated musculoskeletal and mental disorders (Bramberg et al., 2015).

Interdisciplinary treatment (IDT) is an internationally recognized chronic pain core intervention (Gatchel et al., 2014; International Association for the Study of Pain, 2017). Based on the biopsychosocial approach, a multiprofessional team concurrently delivers physical, psychological and social measures that, both independently and in conjunction with each other, target the different facets of the chronic pain condition (Gatchel et al., 2014; International Association for the Study of Pain, 2017). Evidence generally supports that IDT is superior to less comprehensive interventions for outcomes associated with the chronic pain experience; however, it remains inconsistent where IDT's effects on sickness absence are concerned (Dragioti et al., 2018; Kamper et al., 2015; Norlund et al., 2009; Salathe et al., 2018; Scascighini et al., 2008; van Middelkoop et al., 2011). This inconsistency can partially be attributed to the heterogeneity of chronic pain conditions combined with unstandardized IDT programmes, both identified as major impediments to high-quality research (Kaiser et al., 2017). High data volumes can compensate for the variability of these sources by adding sufficient power to identify positive effects. Given that absenteeism is a core outcome in clinical trials of IDT, we, therefore, compared the IDT effects on sickness absence to other/no interventions over five years in a large Swedish national register dataset (Kaiser et al., 2018).

2 | METHODS

2.1 | Design and participants

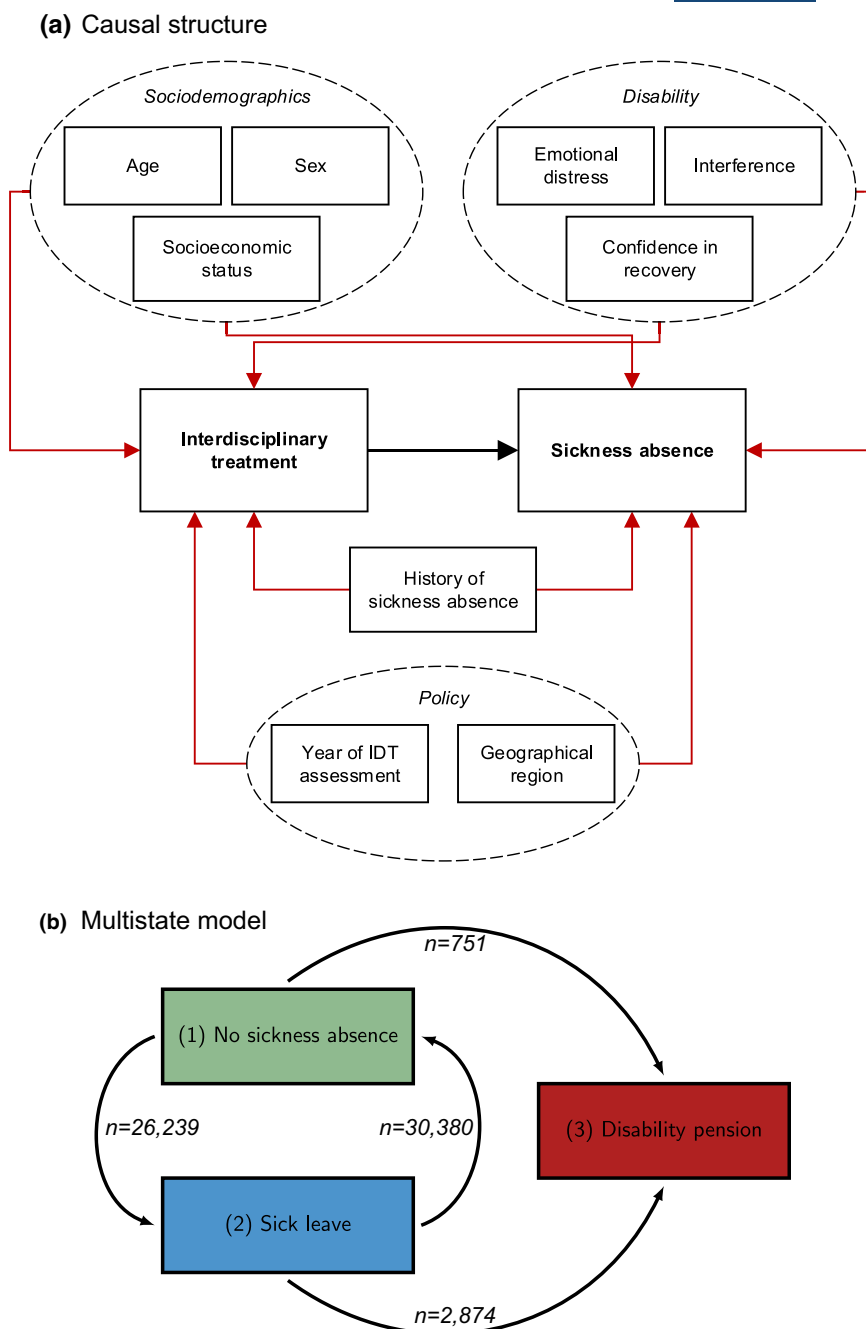
To estimate the population-average intention-to-treat effect of IDT on sickness absence, this register-based observational cohort study emulated a target nonblinded randomized controlled trial (see Hernan & Robins, 2016 for procedural details) from a stipulated causal structure (Figure 1a; Hernan & Robins, 2016, 2020). The proportion of patients on sickness absence and the total sickness absence duration over a 5-year period was compared between patients either allocated to an IDT programme or to other/no interventions. The observation period was from the IDT assessment (t_0) to the first occurring of the following: the end of follow-up after 5 years, age 61 or the end of the data record in November 2018. The study population was defined through the Swedish Quality Registry for Pain Rehabilitation (SQRP), which includes patients with complex chronic pain conditions, referred mainly from the primary care, who are eligible for IDT at any 1 of the up to 38 specialist pain management clinics in Sweden (Nyberg et al., 2011). Patients with chronic pain ≥ 90 days and aged 18–60 years at t_0 who were eligible for IDT during the period 2009–2016 were included, while those with a registered ICD-10 neoplasm diagnosis (C00–D49) in the 5 years prior to t_0 , an IDT assessment in the 2 years prior to t_0 or any permanent disability pension in the year prior to t_0 were excluded.

Information on sickness absence stored in the Micro Data for Analysis of the Social Insurance (MiDAS) register was obtained from the Swedish Social Insurance Agency (Österlund, 2011). In addition, sociodemographic information from the Longitudinal Integration Database for Health Insurance and Labour Market Studies (LISA) was acquired from Statistics Sweden, while data on ICD-10 neoplasm diagnoses stored in the National Patient Register, and dispensed prescription pharmaceuticals stored in the Prescribed Drug Register were procured from the National Board of Health and Welfare (Ludvigsson et al., 2011, 2019; Wettermark et al., 2007). Registers were linked using the unique personal identification numbers held by all Swedish residents (Ludvigsson et al., 2009). This study was approved by Uppsala's Medical Research Ethics Committee (DNR 2018/036) and is registered at ClinicalTrials.gov (id: NCT04598373).

2.2 | IDT and controls

Interdisciplinary treatment at SQRP-affiliated specialist clinics comply with Swedish national guidelines, which imply a

FIGURE 1 Analysis design. (a) Directed acyclic graph of the stipulated causal structure. The black arrow represents the effect of interest, while the red arrows denote noncausal pathways due to the clinical decision process. IDT, interdisciplinary treatment. (b) Multistate model of sickness absence with the possible transitions denoted by arrows and the observed number of transitions denoted by n



cohesive programme of concurrently admitted interventions that are coordinated by an experienced multiprofessional team (Gerdle et al., 2011). The team generally includes physicians specialized in rehabilitation medicine, psychologists, physiotherapists, occupational therapists and social workers, who, using a biopsychosocial approach, collaborate in the assessment and treatment of the patients to provide personalized care (Gerdle et al., 2011; Rivano-Fischer et al., 2020; Söderlund et al., 2012). Details of the exact IDT components are not registered in SQR; however, the programmes primarily include group-based activities such as cognitive behavioural therapy, physical exercise and occupational training, combined with patient education and other individual

activities (Rivano-Fischer et al., 2020). Examples of measures directed at mitigating sickness absence are identification of return-to-work impediments, activity training in simulated work environments, vocational skill guidance and workplace assessment or intervention; specific work-related goals vary and are formulated with the patient (Gerdle et al., 2011; Rivano-Fischer et al., 2020). Typically, IDT programmes are delivered 2–5 days per week over a 4- to 12-week period and amount to from 30 to over 100 hr of treatment in total (Rivano-Fischer et al., 2020; Tseli et al., 2020). In practice, patients who visit a specialist clinic are initially assessed by the team. They complete questionnaires on their chronic pain experience, receive information about SQR and sign a

written-informed consent form. Depending on the outcome of the assessment, the clinic's resources, the practical possibility for the patient to participate in an intervention and other unspecified factors, patients are subsequently either allocated to an IDT programme or to other/no interventions (controls). The procedure for the control group differs between clinics and can include monodisciplinary treatment (e.g. physiotherapy, pharmacological treatment, psychological treatment), self-management recommendations, referral back to the primary healthcare or no intervention.

2.3 | Sickness absence

In Sweden, the typical working age is 18–67 years with retirement becoming possible from the age of 61. Swedish residents are eligible for sick leave benefits from age 16, and are granted for either full time (100%) or part time (25%, 50% or 75%) of ordinary work hours (Österlund, 2011). Sick leave benefits are typically limited to 364 days per 450-day period, but can be extended for serious illness or if a person's work ability is reduced due to an occupational injury (Socialförsäkringsbalk, SFS 2010:100). Benefits are reimbursed by the Swedish Social Insurance Agency once they exceed a qualifying period of 14 days for employees, between 3 and 93 days for self-employed workers and as little as 1 day for the unemployed and students (Österlund, 2011). Individuals aged 30–64 can also be granted a full or partial permanent disability pension if their working capacity is considered to be permanently impaired. In this study, sickness absence included disability pensions and sick leave spells exceeding 14 days.

2.4 | Causal structure

For a fair comparison between IDT patients and the controls, the bias introduced by the IDT selection procedure must be considered in the analyses (Hernan & Robins, 2020). Figure 1a illustrates our stipulated causal structure, which includes confounding due to past sickness absence, sociodemographics, disability and policy. In what follows, we describe the support for the relationship of the confounders to the intervention and the outcome. History of sickness absence is both an indicator of IDT and a strong predictor of future sickness absence, while policy differences result in geographical and temporal variations of the two (Bramberg et al., 2015; Dorner et al., 2015; LoMartire et al., 2021; Ropponen et al., 2020; Wallman et al., 2009). With respect to sociodemographics, both healthcare consumption and sickness absence reportedly increase with age and female sex, while socioeconomic status is inversely associated with both the likelihood to receive adequate healthcare and sickness

absence (Adler & Newman, 2002; Cylus et al., 2011; Dorner et al., 2015; Lager et al., 2019; LoMartire et al., 2021; Mastekaasa & Melsom, 2014; Moscelli et al., 2018; Patton & Johns, 2007; Ropponen et al., 2020; Wallman et al., 2009; Wang et al., 2013). As emphasized in ICD-11, emotional distress and pain interference in everyday activities are critical dimensions of chronic pain, and both of these are positively associated with both IDT and sickness absence (Gerdle et al., 2011; Hallman et al., 2019; Svebak & Halvari, 2018; Treede et al., 2019). Finally, confidence in recovery is an indicator of IDT that reportedly also influences sickness absence (Gerdle et al., 2011; Kuijer et al., 2006; LoMartire et al., 2021; Main et al., 2010; Rotger & Rosholm, 2020).

2.5 | Statistical analysis

To account for recurrent and competing events, the standard survival approach was generalized to a reversible Markov multi-state model (Crowther & Lambert, 2017; Gran et al., 2015; Willekens, 2014). In such models, the states, the possible transitions and the functional models used to compute the state transition probabilities are decided a priori (Willekens, 2014). Our model contained two transient states of no sickness absence and sick leave, and one absorbent state of permanent disability pension (Figure 1b). States were based on gross sickness absence (i.e. both partial and full absence days were counted as full days of absence) and concurrent states were prioritized in the following order: disability pension, sick leave and no sickness absence. From the state transition probabilities, we computed the state occupation probabilities over time and the mean state duration for the 5-year period, with 95% confidence intervals obtained through empirical bootstrap with 10,000 replicates. With data stratified by intervention group, unadjusted estimates were initially obtained using the nonparametric Aalen-Johansen estimator (R package: *mstate* v0.2.12; de Wreede et al., 2011; R Core Team, 2020). Population-average estimates were subsequently computed via transition-specific flexible parametric models with restricted cubic splines on the log-cumulative hazard scale (R package: *stpm2* v1.5.1; Crowther & Lambert, 2017; R Core Team, 2020). The Bayesian information criterion guided the calibration of the splines, with up to five degrees of freedom each for the main effects and the intervention's interaction with time. To account for our stipulated causal structure (Figure 1a), the parametric models were estimated with inverse probability weights (R package: *ipw* v1.0-11; Gran et al., 2015; Hernan & Robins, 2020; R Core Team, 2020; van der Wal & Geskus, 2011). The weights were derived from a logistic regression exposure model, which included main effects for the covariates: gross sick leave in the year prior to t_0 (0, 1–180, 181–365 days), t_0 year (2009–2011, 2012–2014, 2015–2016), the clinics' healthcare region (Stockholm/Gotland, southern Sweden, south-eastern Sweden, western Sweden, central Sweden, northern Sweden),

emotional distress measured with the Hospital Anxiety and Depression Scale (0–39, 40–60, 61–100 score), interference measured with the Multidimensional Pain Inventory (0–4, 5–6 score), confidence in recovery (high, moderate, low), age (18–30, 31–45, 46–60 years), sex (male, female) and socioeconomic status represented by the patient's family's past 5-year mean disposable income divided into sample tertiles (0–33, 34–66, 67%–100%; Kerns et al., 1985; LoMartire et al., 2020). Finally, the results' robustness was examined through three sensitivity analyses: majority-based states redefined according to the dominating state per day; an alternative causal structure that also considered country of birth, education level, pain intensity, pain duration and fibromyalgia diagnosis (ICD-10: M79.7) and the initial 90 days excluded from the analysis.

3 | RESULTS

3.1 | Sample characteristics

Of the 54,338 patients considered for an IDT programme at a Swedish pain specialist clinic during the period 2009–2016, 25,613 (47.1%) met the eligibility criteria (Figure 2). The patients included in this study consisted of approximately equal parts of

IDT patients (53.2%) and controls (46.8%), corresponding to 57,936 and 50,287 person-years each. Most baseline characteristics showed negligible differences between IDT patients and controls, apart from IDT patients having more gross past-year sick leave, more frequently being in the Stockholm region, having a higher proportion of females and being more confident in recovery (Table 1). In total, 12.0% (IDT: 9.8%; control: 14.5%) of patients have some covariate missingness and were, therefore, included in the unadjusted analysis only. Excluded patients have somewhat lower sickness absence than the rest of the sample; however, relative trends in sickness absence between intervention groups remained similar (Supplementary materials).

3.2 | Sickness absence

Interdisciplinary treatment patients consistently had a higher probability than controls of receiving sickness absence benefits, with the largest differences observed in the first year (Figure 3). According to the unadjusted estimates, 51.3% of the IDT patients started on sickness absence compared to 40.9% of the controls. This then decreased to 42.6% versus 35.9%, 35.4% versus 33.2% and 33.7% versus 32.4% by the end of the first, second and fifth year respectively. Sick leave initially dominated

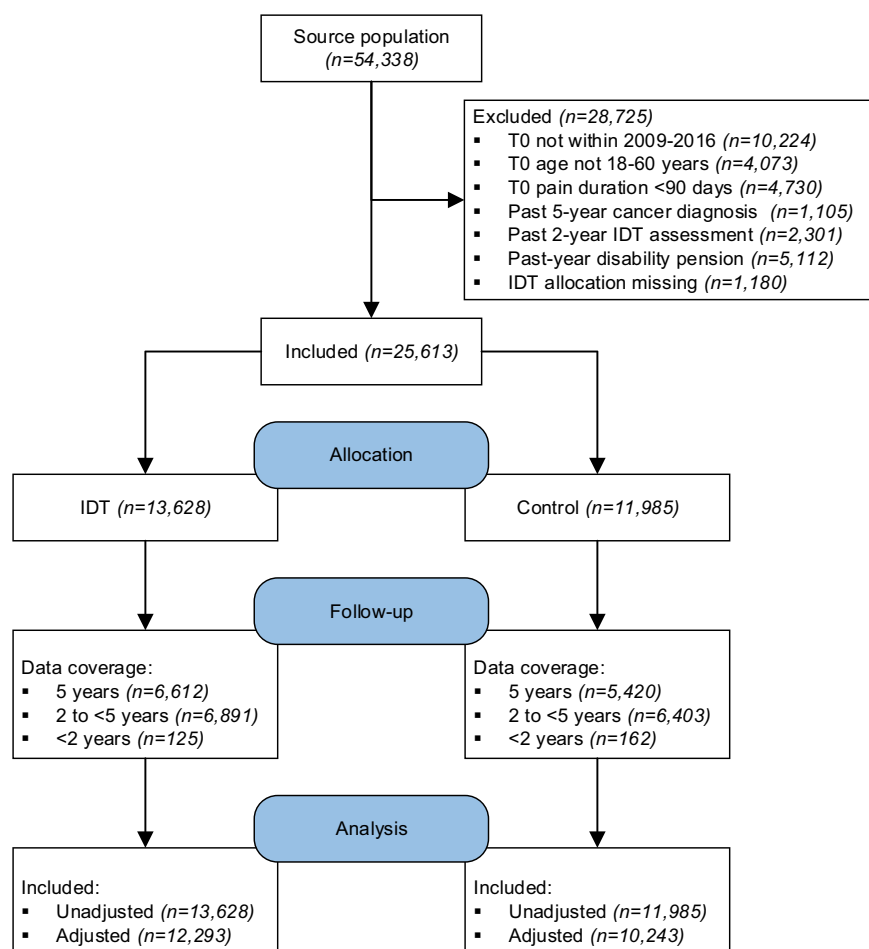


FIGURE 2 Sample flow diagram. IDT, interdisciplinary treatment. T0, time of IDT assessment. Control denotes other/no interventions

TABLE 1 Sample baseline characteristics

| | Interdisciplinary treatment | Control ^g |
|---|-----------------------------|----------------------|
| Patients ^a | 13,628 (100.0) | 11,985 (100.0) |
| Person years ^b | 2.4 (0.8, 3.9) | 2.7 (1.3, 4.2) |
| Age (years) ^b | 42.4 (34.4, 49.3) | 42.2 (32.9, 50.0) |
| Female ^a | 10,247 (75.2) | 8,018 (66.9) |
| Healthcare region ^a | | |
| Stockholm/Gotland | 5,234 (38.4) | 2,103 (17.5) |
| Southern Sweden | 2,780 (20.4) | 2,969 (24.8) |
| South-eastern Sweden | 1,023 (7.5) | 1,878 (15.7) |
| Western Sweden | 1,204 (8.8) | 546 (4.6) |
| Central Sweden | 2,479 (18.2) | 3,215 (26.8) |
| Northern Sweden | 908 (6.7) | 1,274 (10.6) |
| Country of birth ^a | | |
| Sweden | 10,861 (79.7) | 8,981 (74.9) |
| Other European country | 1,321 (9.7) | 1,454 (12.1) |
| Non-European country | 1,446 (10.6) | 1,550 (12.9) |
| Education (years) ^a | | |
| Elementary (<10) | 1,689 (12.4) | 2,195 (18.3) |
| High school (10–12) | 7,641 (56.1) | 6,502 (54.3) |
| University/college (>12) | 4,274 (31.4) | 3,249 (27.1) |
| Employment status ^a | | |
| Employed | 10,237 (75.1) | 7,529 (62.8) |
| Unemployed | 2,592 (19.0) | 3,218 (26.9) |
| Student | 366 (2.7) | 660 (5.5) |
| Family composition ^a | | |
| Partner with children | 3,840 (28.2) | 3,701 (30.9) |
| Partner without children | 2,112 (15.5) | 1,968 (16.4) |
| Single with children | 1,350 (9.9) | 1,190 (9.9) |
| Single without children | 6,323 (46.4) | 5,123 (42.7) |
| Family's past 5-year mean annual disposable income (1,000 SEK) ^b | 1,939 (1,484, 2,497) | 1,793 (1,311, 2,351) |
| Pain characteristics | | |
| Duration (years) ^b | 4.6 (1.7, 11.2) | 4.8 (1.9, 11.0) |
| NRS-10 past-week pain intensity ^b | 7 (6, 8) | 7 (6, 8) |
| Number of pain locations (0–36) ^b | 13 (7, 20) | 12 (7, 20) |

(Continues)

TABLE 1 (Continued)

| | Interdisciplinary treatment | Control ^g |
|---|-----------------------------|----------------------|
| Primary pain location ^a | | |
| Head | 662 (4.9) | 670 (5.6) |
| Neck, shoulders and upper extremities | 3,121 (22.9) | 2,609 (21.8) |
| Upper back and chest | 652 (4.8) | 569 (4.7) |
| Lower back | 2,928 (21.5) | 2,034 (17.0) |
| Abdomen | 152 (1.1) | 212 (1.8) |
| Hips and lower extremities | 1,124 (8.2) | 1,206 (10.1) |
| Widespread or varying pain | 4,489 (32.9) | 4,030 (33.6) |
| Top 5 primary ICD-10 diagnoses ^a | | |
| Fibromyalgia (M79.7) | 2,320 (17.0) | 1,668 (13.9) |
| Low-back pain (M54.5) | 1,249 (9.2) | 880 (7.3) |
| Unspecified pain (R52.9) | 1,121 (8.2) | 1,353 (11.3) |
| Myalgia (M79.1) | 1,067 (7.8) | 1,101 (9.2) |
| Cervicobrachial syndrome (M53.1) | 861 (6.3) | 630 (5.3) |
| HADS emotional distress ^{b, c} | 48 (35, 60) | 47 (33, 61) |
| MPI interference ^b | 4 (4, 5) | 5 (4, 5) |
| EQ-5D index ^{b, d} | 0.2 (0.0, 0.6) | 0.2 (0.0, 0.6) |
| Confidence in recovery ^a | | |
| High | 3,209 (23.5) | 2,063 (17.2) |
| Moderate | 3,359 (24.6) | 2,458 (20.5) |
| Low | 6,017 (44.2) | 6,113 (51.0) |
| Schizophrenia or bipolar disorder ^{a, e} | 336 (2.5) | 429 (3.6) |
| Gross sick leave days the previous year ^b | 89 (0, 260) | 39 (0, 258) |
| Past-year dispensed prescription medication classes ^{b, f} | 2 (1, 3) | 2 (1, 3) |

^aFrequency (percent).^bMedian (25th and 75th percentile).^cBased on LoMartire et al. (2020), scaled as percentiles.^dBased on UK time trade-off.^eICD-10: F20-25 or F28-31.^fClasses include non-opioid pain medications, opioids, antidepressants, benzodiazepines, hypnotics, mood stabilizers, antipsychotics and attention-deficit/hyperactivity disorder medications.^gControl denotes other/no interventions.

the sickness absence (t0: 51.3% vs. 40.9%; first year: 40.7% vs. 31.5%; second year: 29.5% vs. 24.3%; fifth year: 18.1% vs. 15.3%), but overtime there was a steadily increasing proportion of patients on disability pension (first year: 1.9% vs. 4.4%; second year: 5.9% vs. 8.9%; fifth year: 15.6% vs. 17.1%), until they contributed equally at the end of the fifth year. The adjusted population-average estimates displayed similar patterns, albeit with mitigated differences in both sick leave (t0: 49.2% vs. 46.0%; first year: 41.6% vs. 32.9%; second year: 30.2% vs. 25.1%; fifth year: 19.6% vs. 18.7%) and disability pension (first year: 2.3% vs. 4.0%; second year: 6.5% vs. 8.3%; fifth year: 16.8% vs. 16.2%).

Interdisciplinary treatment patients also have a higher total duration of sickness absence compared to controls, with an unadjusted mean (95% CI) difference of 75 (58, 92)

days over the 5-year observation period (Table 2). Driven by sick leave, the first year accounted for the largest difference at 44.7% of the total discrepancy, after which intervention group differences became less pronounced. Sick leave and disability pension displayed opposite patterns, with IDT patients having 116 (102, 130) more days of sick leave and 41 (31, 51) days less of disability pension. The same patterns were observed in the adjusted model, but with slightly smaller differences than in the unadjusted model. The population-average estimate was 67 (48, 87) additional days of total sickness absence for IDT patients, resulting from 85 (68, 100) more days of sick leave and 17 (6, 29) fewer days of disability pension. Finally, the sensitivity analyses supported that the results were robust with 43, 67 and 61 additional sickness absence days for the majority-based states,

FIGURE 3 Sample sickness absence.

Unadjusted and population-average state occupation probabilities (main plots) and state transition probabilities per starting state (inset plots: I and II showing patient who started with no sickness absence and on sick leave respectively). The dotted vertical lines mark the end of the most IDT programmes at 90 days. IDT, interdisciplinary treatment. Control denotes other/no interventions

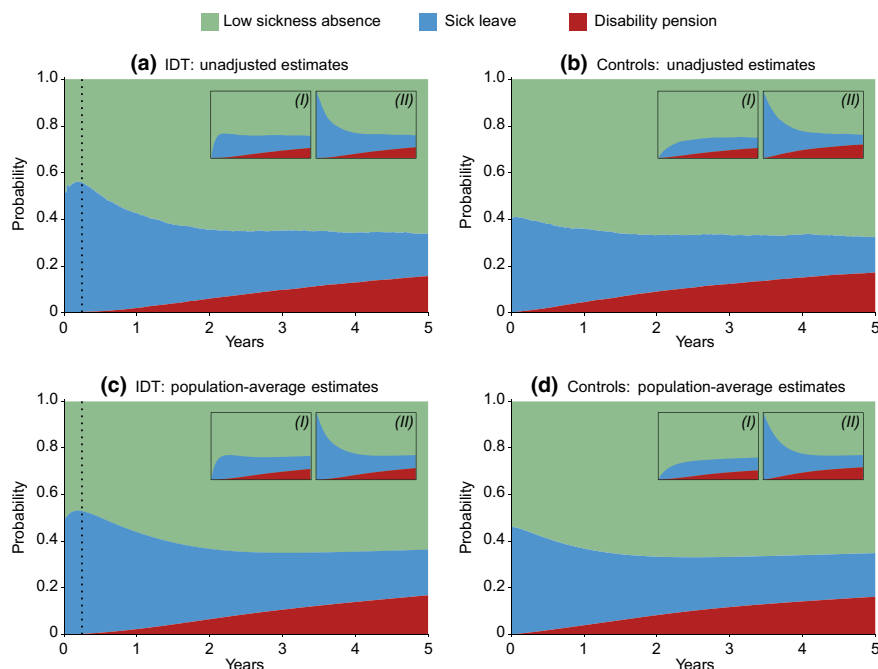


TABLE 2 Mean (95% CI) state duration in days over the 5-year observation period

| | Interdisciplinary treatment | Control ^b | Difference ^a | Ratio ^a |
|-----------------------------|-----------------------------|----------------------|-------------------------|--------------------|
| Crude estimate | | | | |
| No sickness absence | 1,124 (1,112, 1,135) | 1,199 (1,186, 1,212) | −75 (−92, −58) | 0.94 (0.92, 0.95) |
| Sick leave | 563 (553, 572) | 447 (436, 457) | 116 (102, 130) | 1.26 (1.22, 1.30) |
| Disability pension | 139 (132, 145) | 180 (171, 188) | −41 (−51, −31) | 0.77 (0.72, 0.82) |
| Population-average estimate | | | | |
| No sickness absence | 1,110 (1,097, 1,123) | 1,178 (1,163, 1,192) | −67 (−87, −48) | 0.94 (0.93, 0.96) |
| Sick leave | 563 (552, 573) | 478 (466, 490) | 85 (68, 100) | 1.18 (1.14, 1.21) |
| Disability pension | 152 (144, 160) | 169 (161, 178) | −17 (−29, −6) | 0.90 (0.84, 0.96) |

95% CI based on 10,000 bootstrap replicates.

^aControls are reference.

^bControl denotes other/no interventions.

alternative causal structure and initial 90 days excluded respectively (Supplementary materials).

4 | DISCUSSION

In this large-sample study of chronic pain patients in Swedish specialist healthcare, we examined IDT as a strategy for mitigating sickness absence. The proportion of patients on sickness absence and the total sickness absence duration over a 5-year period was compared between patients either allocated to an IDT programme or to other/no interventions (controls). Our results showed that patients on sickness absence decreased over the study period in both groups. IDT patients were more likely than the controls to receive sickness absence benefits at any given time, amounting to 67 additional sickness absence days over the 5-year period; the difference could, in part, be attributed to the intervention itself.

Consistent with our findings, previous studies generally report that chronic pain patients included in an IDT program decrease their sickness absence over time (Berglund et al., 2018; Busch et al., 2011; Henchoz et al., 2010; Moll et al., 2018; Pedersen et al., 2018; Rivano Fischer et al., 2019; Roche-Leboucher et al., 2011). However, results are mixed when comparing effects of IDT to a control intervention, with some support both for and against IDT as a sickness absence mitigator. Over the past decade, four randomized controlled trials including patients with subacute to chronic pain provided evidence for IDT (Berglund et al., 2018; Busch et al., 2011; Henchoz et al., 2010; Roche-Leboucher et al., 2011). Moderate-to-large effects in favour of IDT were reported in two studies that compared IDT to treatment as usual for either 10-year sickness absence (mean [95% CI] difference: 436 [1, 870] days) or 1-year return to work (odds ratio [95% CI]: 3.3 [1.3, 7.9]) in the Swedish healthcare system (Berglund et al., 2018; Busch et al., 2011). Meanwhile, small effects were observed in the other two studies when comparing IDT to physiotherapy for 1-year return to work (IDT vs. control: 15% vs. 44% part-time work, 63% vs. 33% full-time work; $p = 0.012$) and sick leave (mean sick leave difference: 37 days; $p = 0.042$) in the Swiss and French healthcare systems (Henchoz et al., 2010; Roche-Leboucher et al., 2011). Conversely, and consistent with our results, three studies investigating subacute to chronic pain patients found no evidence supporting IDT over the past decade (Busch et al., 2018; Moll et al., 2018; Pedersen et al., 2018). Two were randomized controlled trials in the Danish healthcare system that compared IDT to a brief intervention in either 5-year sickness absence or 1-year return to work and reported no intervention differences (mean [95% CI] difference: 10.8 [−6.7, 28.4] weeks; hazard ratio [95% CI]: 0.94 [0.63, 1.41] respectively; Moll et al., 2018; Pedersen et al., 2018). The third was a matched-cohort study in the Swedish primary and

specialist healthcare that compared IDT to treatment as usual over a 1-year period and reported slightly more sickness absence for IDT (mean difference [95% CI]: 15 [12, 18] days; Busch et al., 2018). Similarly to us, they both observed the largest sick leave difference in the first 3 months post evaluation and found a higher likelihood of disability pension for controls (Busch et al., 2018). A fourth cohort study of patients with subacute to chronic pain in the Swedish primary healthcare also reported higher sickness absence in IDT patients compared to a reference group, but attributed the effect to the clinical decision process itself (Sennehed et al., 2020). Earlier studies display similar tendencies with inconsistent results of none-to-moderate effects based on mostly low-quality designs (Kamper et al., 2015; Norlund et al., 2009; Scascighini et al., 2008; van Middelkoop et al., 2011). Hence, although numerous studies of IDT effects on socioeconomic outcomes have been conducted over the past decades, their combined evidence remains inconclusive (Dragioti et al., 2018; Kamper et al., 2015; Norlund et al., 2009; Salathe et al., 2018; Scascighini et al., 2008; van Middelkoop et al., 2011).

Our results were derived from a large population-representative sample of chronic pain patients in a specialist treatment setting and could be generalized to similar patients and social insurance systems. Strong assumptions are nonetheless necessary when interpreting observational data causally, with the principal threat being noncomparable intervention groups due to insufficiently managed confounding. In practice, confounder adjustment requires a balance between theory and feasibility, and while we adjusted for strong confounders identified in the literature, it is likely that some bias remained. Employment status was the most important confounder that was not partialled out due to the low data quality. Note worthy is also that tacit knowledge from clinical experience in the pre-intervention assessment procedure likely influenced the intervention allocation and thereby contributed to group differences. Hence, the possibility that our results are the consequence of noncomparable intervention groups cannot be excluded. The second-most important limitation was the absence of information on the intervention characteristics. The Swedish national guidelines provide a loose framework for IDT programmes, but their practical implementation is neither recorded in SQR nor consistent across clinics, and the extent to which labour market re-entry measures are incorporated is unspecified. An incongruity in intervention goals has also been discussed: whereas policymakers fund the intervention to reduce sickness absence, care providers tend to focus on health optimization, which may delay return to work (Hellman et al., 2015). Our results could, therefore, be the consequence of intervention similarities combined with insufficient labour market re-entry measures. Less-severe limitations included: (a) nonregistered sick leave during the qualifying period; (b) absence of microdata on migration, death and retirement; (c) pooling of full and partial sickness

absence due to poor resolution; and (d) 12% missingness in the population-average analysis. The former two resulted in a slightly underreported sickness absence and possibly some bias if the factors differed across intervention groups, while the latter two are unlikely to generate any meaningful bias, as sensitivity analyses revealed that state distributions were similar across intervention groups and that excluded patients displayed similar sickness absence patterns respectively.

Despite an ever-increasing body of research, support for IDT as a sickness absence mitigator remains limited, which can be attributed to two methodological shortcomings (Dragioti et al., 2018; Enright & Goucke, 2016; Kamper et al., 2015; Norlund et al., 2009; O'Keeffe & O'Sullivan, 2017; Salathe et al., 2018). On the one hand, the randomized controlled trials often have insufficient power and follow-up time, and on the other, the high-powered register studies often have inadequate information on IDT programmes and the control group (Busch et al., 2018; Dragioti et al., 2018; Sennehed et al., 2020). This calls for better designed studies, especially when considering the high resource burden that IDT represents to the healthcare system. High-powered randomized controlled trials are needed to provide clear evidence of causal effects, while pragmatic register-based trials remain important to ascertain generalizability to real-world practice (Craig et al., 2008). The Nordic Registers constitute a suitable framework for pragmatic trials if detailed information on IDT programmes, patient selection criteria and follow-up on the control group is incorporated in the future (Maret-Ouda et al., 2017). Such improvements are important as it is both ethically and practically problematic to identify valid control groups in the clinical setting.

5 | CONCLUSIONS

We compared sickness absence in chronic pain patients allocated to either IDT in the Swedish specialist healthcare or to other/no interventions. Sickness absence decreased over the study period in both IDT patients and controls; however, we found no support for IDT decreasing it more than other/no interventions. The observational design prohibits definite conclusions from our results, as they could be the consequence of insufficiently managed confounding. Nonetheless, as IDT is an internationally recommended intervention that represents a considerable resource burden on the healthcare system, despite inconclusive evidence for its effects, this calls for more adequately powered randomized controlled trials and better-designed epidemiological studies.

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AUTHOR CONTRIBUTIONS

RLM designed the study, processed and analysed the data, and drafted the manuscript under the supervision of BOÅ, LV and BG. BOA, MB, LV and BG contributed with conceptual field knowledge. LC aided in the results interpretation and the manuscript's logical development. PF and ÖD provided statistical advice. All authors discussed the results, commented on the manuscript and approved the final version.

CONFLICT OF INTEREST

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

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