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ABSTRACT

Objectives The objective of the study was to examine outpatient healthcare use before and during a long-term sickness absence (LTSA), and to compare the development of healthcare use between groups defined through LTSA lengths and disability pension (DP) transition.

Design Register-based longitudinal study with five 6-month periods before and after the start of the LTSA spell in early 2016.

LTSA groups 1 (N=210) and 2 (N=187) went on to reach the statutory maximum LTSA length, with group 1 transitioning to DP. Group 3 (N=3082) had a shorter LTSA spell. Control group 4 (N=92 921) had no LTSA.

Setting and participants Non-retired individuals aged 20–59, with no LTSA during 2015 (N=96 400) were included from the total population of the city of Oulu, Finland. Register data were linked on LTSA spells and outpatient healthcare use 2013–2018, DP status in 2018, and various covariates.

Main outcome measures Negative binomial regression models were used to examine the covariate-adjusted number of healthcare visits, and to examine the association of the LTSA groups with healthcare use before and after the start of LTSA (incidence rate ratios and predicted means).

Results Individuals eventually reaching the maximum LTSA length (groups 1 and 2) had a higher level of healthcare use before the LTSA and especially after the start of LTSA than others. Individuals transferring to DP after the maximum LTSA (group 1) used healthcare the most after the start of LTSA.

Conclusions The risk for at least 1 year's disability may be identified by frequent outpatient healthcare use years before LTSA. However, future disability retirees could not be identified through their pre-LTSA healthcare use. Instead, their high use of healthcare after the start of the LTSA was consistent with their increasing health problems leading to retirement.

INTRODUCTION

Both disability benefit spells and publicly reimbursed healthcare use cause enormous public expenses.^{1 2} As markers of ill health

Strengths and limitations of this study

- The data on outpatient healthcare use are based on comprehensive registers covering all schemes relevant to the Finnish working-age population and a 5-year follow-up setting.
- The use of register data to define the number of visits, and on long-term sickness absence (LTSA) spells, disability pensioning, and covariates removes inaccuracy related to self-reporting.
- The study relies on total working-age population of the fifth largest city of Finland, Oulu.
- The study population is restricted to individuals with no LTSA in 2015, warranting caution in generalising the results to the whole working-age population.
- The study lacks better information on health status, work environment of employed persons, and diagnosis behind the LTSA, all known to associate with healthcare use.

and occupational disability, they both have mainly been treated in research literature as risk outcomes^{3–12} or as predictors of disability pensioning (DP).^{13–16} The association between long-term sickness absence (LTSA) and healthcare use is also evident. More frequent healthcare use is associated with more frequent and longer sickness absence spells later on.^{7 17–19} Vice versa, time spent on sick leave or DP associates with a higher frequency of healthcare use.^{9 12 20 21}

However, more information is needed about the temporal association between LTSA and healthcare use. We do not yet understand how healthcare use develops before and during a LTSA spell. Nor do we understand how the level of use varies according to the length and outcome of the LTSA spell. Following the level of healthcare



use before occupational disability can reveal different profiles for groups with differing lengths and outcomes of sickness absence. This kind of knowledge may help identify groups in risk of long or permanent disability. On the other hand, understanding how healthcare use is related to different lengths of sickness absence or a transition to DP may help evaluate the functioning of the disability benefit or healthcare systems. If treatment and other supportive measures during LTSA are successful in shortening the disability spell or preventing DP, do shorter LTSA spells mean decreased healthcare use later as well? Correspondingly, do those who end up on DP have a distinctive healthcare use trajectory?

Only a few previous studies have focused on changes in healthcare use in relation to disability benefits. The level of healthcare use has been followed using register or survey data through the DP transition. The use of healthcare has been shown to decrease but remain high after the transition.^{22–24} In some studies, the level of healthcare use has also been followed before and after interventions as a measure of health and regained work ability, with sickness absence duration as a covariate.^{25–27} However, register-based follow-up studies on how the use of health services develops during sickness absence are still lacking.

In addition, when examining how the level of healthcare use develops before and during LTSA, it is necessary to account not only for the duration of the LTSA spells and a possible post-LTSA DP, but also for the effects of demographic, socioeconomic and disease-related covariates.^{3–11} The aim of this study was to examine whether the use of healthcare differed between different LTSA groups: individuals transferring to disability retirement after a maximum-length LTSA, individuals not transferring to disability retirement after a maximum-length LTSA, individuals with shorter LTSA spells, and individuals with no incident LTSA during the same time period.

METHODS

Study population

Register-based data for the years 2013–2018 were collected from several registers for the total population of the city of Oulu, situated in Northern Finland.²⁸ Oulu is the fifth largest city of Finland, with a population of 207 327 inhabitants in 2020. On various demographic, socioeconomic or healthcare-related indicators, Oulu does not differ in any systematic way from Finland as a whole.²⁸ Individuals who were residents of Oulu, 20–59 years old, and not retired at the end of year 2015, and had no LTSAs during 2015, were included in this study (N=96 400). Those receiving a pension at baseline were excluded, as pensioners are not entitled to sickness allowance. The lower and upper age limits were set so that the subjects would be of adult age and would not reach the lowest limit of old-age pension in Finland (63 years) during the follow-up years.

Grouping based on LTSA and DP

The study population was divided into groups according to having or not having incident LTSA spells during the first half of 2016, also using information on the length of sickness absence and whether or not they ended up on DP after the LTSA. LTSA was measured as the amount of compensated sickness allowance days. The Social Insurance Institution of Finland (Kela) can pay sickness allowance to non-retired persons aged 16–67 as compensation for loss of income due to inability to work because of sickness or impairment. The allowance can be paid when the sickness absence exceeds 10 working days, which are covered by the employer. Thus, sickness allowance captures only rather long sickness spells. A physician's sickness certificate is a prerequisite for the allowance. Based on a certain diagnosis, the allowance can generally be granted for 1 year at most during 2 years' time. After this statutory maximum period, a DP may be considered.

Register data on sickness allowance spells were derived from Kela, including the start dates of the illness and the end dates of compensated LTSA spells. Information on DP status at the end of 2018 was derived from the registers of Kela and the Finnish Center for Pensions.

The number of compensated LTSA days for the years 2016, 2017 and 2018 and data on DP from the end of 2018 were used to categorise subjects into four groups: *Group 1* (N=210) went on to reach the maximum length of compensated LTSA starting in the first half of 2016 (1 January–30 June), and transitioned to DP by the end of 2018. *Group 2* (N=187) eventually reached the maximum length of compensated LTSA starting in the first half of 2016, but did not transition to DP. *Group 3* (N=3082) started a LTSA in the first half of 2016, but did not reach the maximum length of the LTSA period. Finally, a *control group 4* (N=92 921) had no LTSA spells in the first half of 2016. As this group did not have start dates for illness or LTSA spell, the start date of the follow-up was fixed to 1 April, the midpoint of the first half of 2016.

Data on outpatient healthcare and the follow-up setting

Data on the use of outpatient healthcare were collected for the years 2013–2018 covering all schemes (public, occupational, private) of the Finnish service system. Data on public healthcare use were obtained from the municipality of Oulu and from the Care Register for Health Care.²⁹ Visits to municipal health centres and outpatient visits to hospital-based specialised care were equally included in public care. Data on occupational health service (OHS) attendance were gathered from the four largest OHS providers in Oulu (Terveystalo, Mehiläinen, Attendo and Työterveys Virta), estimated to cover around 92% of employees entitled to OHS.³⁰ Data on the use of private outpatient care were retrieved from the reimbursement registers of Kela.

Public outpatient primary healthcare services, provided by municipal health centres, offer universal coverage for all residents. OHSs are the main provider of primary care services for the working population. All employees

are entitled to at least employer-provided preventive care in OHS, but employers frequently also provide primary care through OHS.³¹ The use of private healthcare is state supported via partial reimbursement. The reimbursement varies by service, but it was 14% of the fee for a general practitioner visit in 2020.³² Because of strong and affordable public and OHS schemes, role of the private scheme is still rather small in Finland. Outpatient specialised care is offered both by the public and private schemes, and to a small extent also by OHS.

Active visits to healthcare professionals, either face-to-face contacts, phone calls or virtual contacts, were included. Dental healthcare, public student healthcare and laboratory visits were excluded to harmonise the data between the schemes. As separate visits during the same day were inconsistently recorded in the registers of different register holders, the number of visits was approximated by separate attendance days with each healthcare provider. Finally, the total number of visits for each follow-up period (see below) was calculated for each subject.

The average number of outpatient healthcare visits was followed in five 6-month periods before and five 6-month periods after the start of the first sickness absence spell. The visit to obtain a sickness certificate from a physician (first day of illness), needed for the sickness allowance, was included in the first follow-up period.

Covariates

Since demographic and socioeconomic factors, along with morbidity, are associated with both the frequency and length of sickness absence^{3–5} and the level of healthcare use,^{7,9–12,21} they need to be adjusted for when examining the association between LTSA and healthcare use.

Sex, age, marital status, socioeconomic status and entitlement to reimbursements for medicine expenses at the end of 2015 were retrieved from registers of Kela. Unemployment benefit and employment spells were retrieved from registers of Kela and Finnish Centre for pensions.

The sample was classified into four age groups in 10-year age bands (see [table 1](#)). Marital status was classified as married, unmarried, and divorced, separated or widowed. Socioeconomic status was measured in terms of occupational class and educational level. Occupational class followed the classification used by Statistics Finland³³ and distinguished between upper and lower non-manual employees, manual workers, entrepreneurs and others. The group of 'others' included the long-term unemployed and other persons outside employment. Educational level was categorised into upper tertiary, lower tertiary, secondary and basic level education. Labour market status at the start of the LTSA was defined as either employed, unemployed or other. Entitlement to reimbursements for medicine expenses was used as a proxy measure for chronic disease.³⁴ These entitlements are part of the National Health Insurance system and guarantee the recipients' access to medicines needed for the treatment of certain long-term diseases at a lower

cost. A person can have one or multiple reimbursement entitlements. Here, a division between no diseases (no entitlements), one disease, and multiple chronic diseases was used.

Statistical methods

The average, unadjusted number of outpatient healthcare visits for the five 6-month periods before and the five 6-month periods after the start of the sickness absence spell were first calculated. Covariate-adjusted estimates for the number of outpatient healthcare visits for each period were then calculated using negative binomial regression models. This method is suitable for count data with a right-skewed distribution.³⁵ Finally, the association of LTSA groups and covariates with the average number of healthcare visits before and after the start of the LTSA spell were analysed separately with two negative binomial regression models. For these two models, incidence rate ratios (IRRs) and predicted means for outpatient healthcare visits with their 95% CIs are presented. The analyses were conducted using Stata statistical software package V.14.1.

Patient and public involvement

No patient involved.

RESULTS

[Table 1](#) shows the distributions of the covariates by LTSA group. The four groups were very different in size, as only a few of those on LTSA reached the maximum length of the allowance, and most individuals in the study population did not have any LTSA in the first half of 2016.

There were significant differences between the four groups. Compared with others, persons in group one were on average older, had more often only attained a basic level education, were more often outside employment (occupational class of others), and had more chronic diseases. Persons in group two had a similar socioeconomic profile as group one but were younger, had fewer chronic diseases and were more often unmarried. Persons in groups 1 and 2 were more often unemployed at the onset of disability than others. Group three had a relatively similar age and chronic disease profile as group 2, but included a clearly larger-than-average share of women and non-manual employees. Group three was also most often employed at the onset of disability. Group 4, that is, those with no LTSA, comprised the majority of the study population. This group was younger and had fewer chronic diseases than other groups.

[Figure 1](#) presents unadjusted averages for outpatient healthcare visits in each 6-month period before and after the start of sickness absence. Thirty to 7 months before the LTSA spell, the level of healthcare use was stable in each group, with groups 1 and 2 having more visits than others. One year before the first LTSA spell, healthcare use began to increase for all those who would later start

**Table 1** The covariates in the study population and by long-term sickness absence (LTSA) group

	All	Group 1: maximum LTSA spell, transferred to DP	Group 2: maximum LTSA spell, no DP	Group 3: less than maximum LTSA	Group 4: no LTSA
	N=96 400	N=210	N=187	N=3 082	N=92 921
	%	%	%	%	%
Sex					
Male	52.4	49.5	49.7	38.8	52.8
Female	47.6	50.5	50.3	61.2	47.2
Age group					
20–29	32.1	16.2	23.0	20.3	32.6
30–39	26.9	14.3	24.1	24.4	27.0
40–49	21.1	19.5	23.5	24.1	21.0
50–59	19.9	50.0	29.4	31.2	19.5
Marital status					
Married	41.3	45.7	36.4	45.6	41.2
Unmarried	49.0	33.8	46.0	38.9	49.4
Divorced/separated /widowed	9.7	20.5	17.7	15.6	9.4
Educational level					
Upper tertiary	17.0	10.0	5.9	14.6	17.1
Lower tertiary	25.4	22.4	12.8	28.1	25.4
Secondary	47.2	51.4	65.2	48.2	47.2
Basic	10.4	16.2	16.0	9.1	10.4
Occupational class					
Upper non-manual employee	21.2	8.6	9.1	18.6	21.3
Lower non-manual employee	25.9	17.1	17.1	39.5	25.5
Manual worker	17.0	18.1	19.8	21.0	16.8
Entrepreneur	5.3	5.2	7.5	4.4	5.3
Other	30.7	51.0	46.5	16.5	31.1
Labour market status at the start of LTSA					
Employed	68.2	46.2	46.0	84.7	67.7
Unemployed	16.4	39.5	33.7	8.9	16.5
Other	15.5	14.3	20.3	6.4	15.8
Chronic diseases					
No	85.0	58.1	74.3	76.4	85.4
One disease	12.2	28.6	21.9	18.3	12.0
Multiple diseases	2.8	13.3	3.7	5.3	2.6
All	100.0	100.0	100.0	100.0	100.0

an LTSA spell (groups 1, 2 and 3). Six months before the spell, the increase steepened.

During the first 6 months of LTSA, healthcare use peaked for all three groups. After that, the use decreased in groups 2 and 3. However, for group 1, use of healthcare increased until months 7 to 12 of the LTSA, before starting to gradually decrease. The group differences were mostly statistically significant for all ten 6 months periods

(see confidence intervals). However, the differences between groups 1 and 2 were only statistically significant for months 13 to 30. For group 4, the level of healthcare use remained stable and lower for the whole follow-up.

Adjusting for covariates narrowed the differences between the levels of healthcare use between groups 1 and 2 marginally (predicted means in figure 2). Most notably, the visually detectable but very slight difference

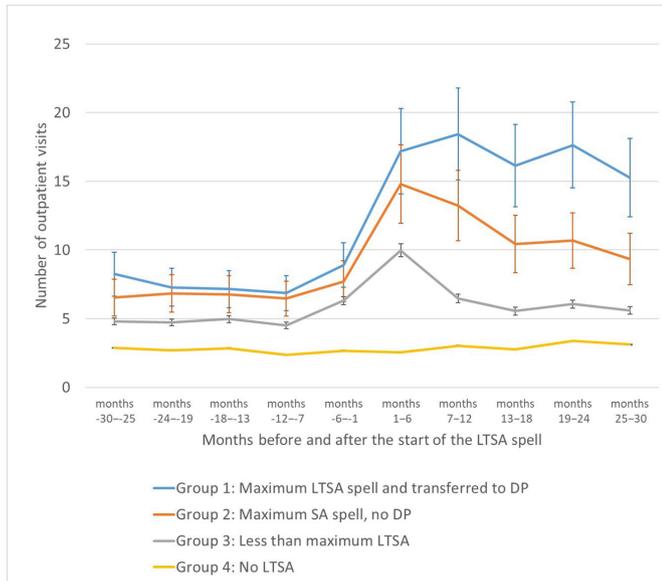


Figure 1 Outpatient healthcare use in the four LTSA groups.

in average use before the start of the LTSA between groups 1 and 2 disappeared. Instead, adjusting for covariates marginally increased how group three differed from groups 1 and 2 in its average healthcare use 6 to 1 months before the start of the LTSA.

Finally, the association of LTSA groups and covariates with the average outpatient healthcare visits were examined before and after the start of the LTSA spell. The results of the negative binomial regression models are presented in table 2. The LTSA group variable and covariates were entered into the models simultaneously. Group one served as the reference group in the analyses.

The first four columns present results for the time *before the LTSA spell*. As was seen in figure 2, the level of healthcare use was highest in groups 1 (predicted mean 5.63) and 2 (predicted mean 5.66), lower in group 3 (IRR

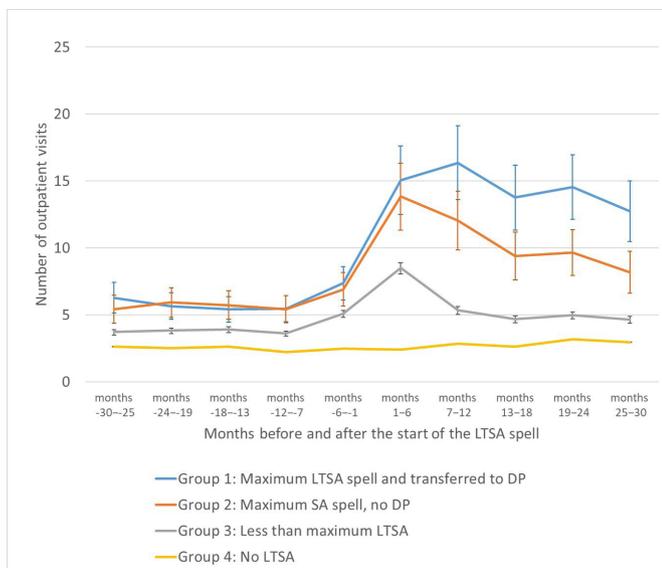


Figure 2 Covariate-adjusted outpatient healthcare use in the four LTSA groups (predicted means for visits).

0.71 compared with group 1, predicted mean 3.97), and lowest in group 4 (IRR 0.44, predicted mean 2.47), when adjusted for covariates. The level of healthcare use did not differ between groups 1 and 2.

The last four columns in table 2 present results for the time *after the start of the LTSA spell*, respectively. Adjusting for covariates, the level of healthcare use was highest in group 1 (13.92), second highest in group 2 (IRR 0.76 compared with group 1, predicted mean 10.53), second lowest in group 3 (IRR 0.40, predicted mean 5.54), and lowest in group 4 (IRR 0.20, predicted mean 2.78). The differences between LTSA groups after the start of the LTSA spell were larger than before LTSA.

The associations between covariates and outpatient healthcare use were largely similar before and after the start of LTSA. Females used outpatient healthcare more than males, persons between 50 and 59 years more than younger age groups, and 20–29 year olds less than other age groups. Those divorced, separated or widowed used healthcare more than other groups. Those with only basic education or with secondary education had more visits than those with tertiary education. Also, lower non-manual employees and manual workers had more visits than other occupational classes. Entrepreneurs used outpatient healthcare less than other occupational class groups. Those unemployed at the start of LTSA had slightly more visits than others before the LTSA spell. Finally, an increasing number of chronic diseases was strongly associated with increased level of healthcare use.

DISCUSSION

There is insufficient information about the temporal association between sickness absence and healthcare use. Understanding this association better can help identify groups in risk of long or permanent disability, and also help evaluate how well the interplay of disability benefit and healthcare systems works. Our study shows that the development of outpatient healthcare use before and during an incident LTSA varies according to the length and outcome of the LTSA spell. The trajectories of healthcare use were compared between four groups: those who eventually transferred to DP after reaching the maximum length of compensated LTSA (group 1), those who did not transfer to DP after reaching the maximum LTSA spell (group 2), those who had a LTSA spell shorter than the maximum length (group 3), and those with no LTSA (control group 4).

Outpatient healthcare use before LTSA

Individuals who went on to reach the maximum length of compensated LTSA (groups 1 and 2) used healthcare more than others in the study population before the LTSA, controlling for demographic and socioeconomic covariates and chronic diseases. Notably, their level of use was significantly and steadily higher already years before their sickness absence started, compared with those who had a shorter (less than the maximum length) LTSA

**Table 2** The long-term sickness absence (LTSA) groups and covariates associated with the average level of outpatient healthcare use (a) before LTSA, and (b) after LTSA in a negative binomial regression analysis model

	Before LTSA				After the start of LTSA			
	IRR	95% CI	Predicted means	95% CI	IRR	95% CI	Predicted means	95% CI
LTSA group								
Group 1: Maximum LTSA spell and transferred to DP	1.00		5.63	4.99 to 6.27	1.00		13.92	12.37 to 15.46
Group 2: Maximum LTSA spell, no DP	1.00	0.85 to 1.19	5.66	4.97 to 6.34	0.76	0.64 to 0.89	10.53	9.27 to 11.79
Group 3: Less than maximum LTSA	0.71	0.63 to 0.79	3.97	3.85 to 4.09	0.40	0.35 to 0.45	5.54	5.37 to 5.71
Group 4: no LTSA	0.44	0.39 to 0.49	2.47	2.45 to 2.49	0.20	0.18 to 0.22	2.78	2.77 to 2.80
Sex								
Male	1.00		1.98	1.96 to 2.00	1.00		2.31	2.29 to 2.33
Female	1.66	1.64 to 1.68	3.29	3.26 to 3.31	1.57	1.55 to 1.59	3.63	3.59 to 3.66
Age group 2015								
20–29	1.00		2.18	2.15 to 2.20	1.00		2.58	2.55 to 2.61
30–39	1.23	1.21 to 1.26	2.68	2.65 to 2.72	1.13	1.11 to 1.15	2.92	2.89 to 2.96
40–49	1.22	1.19 to 1.24	2.65	2.62 to 2.69	1.15	1.12 to 1.17	2.96	2.91 to 3.00
50–59	1.27	1.25 to 1.30	2.77	2.73 to 2.81	1.23	1.21 to 1.26	3.19	3.14 to 3.23
Marital status								
Married	1.00		2.54	2.52 to 2.57	1.00		2.85	2.83 to 2.88
Unmarried	0.96	0.94 to 0.97	2.43	2.41 to 2.46	0.98	0.97 to 1.00	2.80	2.77 to 2.83
Divorced/separated/ widowed	1.13	1.11 to 1.15	2.87	2.82 to 2.93	1.13	1.11 to 1.16	3.23	3.17 to 3.30
Educational level								
Upper tertiary	1.00		2.42	2.37 to 2.46	1.00		2.76	2.71 to 2.81
Lower tertiary	0.99	0.97 to 1.01	2.40	2.36 to 2.43	1.01	0.99 to 1.03	2.79	2.75 to 2.82
Secondary	1.05	1.03 to 1.08	2.54	2.52 to 2.57	1.04	1.01 to 1.06	2.86	2.84 to 2.89
Basic	1.21	1.17 to 1.24	2.92	2.86 to 2.97	1.17	1.14 to 1.20	3.23	3.17 to 3.29
Occupational class								
Upper non-manual employee	1.00		2.47	2.43 to 2.51	1.00		2.69	2.64 to 2.74
Lower non-manual employee	1.11	1.09 to 1.13	2.74	2.70 to 2.78	1.16	1.13 to 1.18	3.12	3.08 to 3.16
Manual worker	1.06	1.04 to 1.09	2.63	2.58 to 2.67	1.09	1.06 to 1.11	2.93	2.88 to 2.98
Entrepreneur	0.69	0.67 to 0.71	1.71	1.66 to 1.76	0.70	0.68 to 0.72	1.89	1.83 to 1.94
Other	1.01	0.98 to 1.03	2.49	2.45 to 2.52	1.09	1.07 to 1.12	2.95	2.90 to 2.99
Labour market status at the start of LTSA								
Employed	1.00		2.55	2.53 to 2.58	1.00		2.96	2.93 to 2.98
Unemployed	1.07	1.05 to 1.10	2.75	2.70 to 2.80	1.02	1.00 to 1.05	3.02	2.97 to 3.08
Other	0.84	0.82 to 0.86	2.16	2.12 to 2.20	0.80	0.78 to 0.82	2.35	2.31 to 2.40
Chronic diseases								
No	1.00		2.28	2.27 to 2.29	1.00		2.64	2.62 to 2.66
One disease	1.85	1.82 to 1.88	4.21	4.14 to 4.28	1.63	1.60 to 1.65	4.29	4.22 to 4.36
Multiple diseases	2.61	2.52 to 2.69	5.93	5.74 to 6.12	2.16	2.08 to 2.23	5.70	5.51 to 5.89

All predictors adjusted simultaneously in the models (all-adjusted models).

spell (group 3). Thus, frequent outpatient healthcare use seems to anticipate very long occupational disability already years before the disability actualises. Possibly, the

condition causing eventual disability can be chronic long before the LTSA spell, accounting for the early frequent healthcare use. Multimorbidity may also explain the high

early level of healthcare use in groups 1 and 2, as having multiple health-related conditions predicts long LTSA spells, DP and more frequent healthcare use.^{36–41} In our analysis, a proxy measure for chronic diseases reflecting multiple diseases was controlled for among other covariates, and this changed the differences between LTSA groups very little. It is noteworthy that the level of healthcare use years before LTSA spell did not distinguish between groups 1 and 2, that is, those who would eventually transfer to DP and those who would not. In other words, although based on previous literature frequent outpatient healthcare use is a risk factor for DP over the following years,^{7 16 42} our results suggest that the risk of DP cannot be distinguished from the more general risk of long-term sickness associated with early outpatient healthcare use.

Individuals who had a LTSA spell of less than 1 year (group 3) also had consistently more outpatient healthcare visits from 2.5 years before the LTSA spell to the start of the spell compared with individuals with no LTSA. While there is no uniform distinction between a short-term and LTSA, this consistent and early difference shows that individuals with at least some long-term compensated sickness absence often have more severe or chronic health conditions even before the LTSA spell, compared with individuals that either do not have a need for sickness absence or their sickness absence is of a short duration (self-certified or employer covered). LTSA is most often caused by mental disorders or musculoskeletal diseases,^{43–45} while short absences are usually caused by transient medical conditions. In addition, group 3 included more employed individuals than other LTSA groups. Many employed individuals with a LTSA have physically or mentally demanding working conditions,^{46 47} causing OHS healthcare visits already before the disability period. Lastly, as there were relatively more persons outside employment in group 4 than 3, and they may hesitate to use healthcare for financial reasons,^{48 49} this may add to the very low level of healthcare use in this group. While occupational class and labour market status at the start of LTSA were controlled for, the effects of working conditions and underuse of healthcare may still explain some amount of the group differences in healthcare use.

Outpatient healthcare use after the start of LTSA

In terms of outpatient healthcare use, the LTSA groups differed from each other more *after the start of the LTSA* spell than before it. Those who eventually transferred to DP (group 1) had the highest level of healthcare use after the start of the LTSA. The level was also higher among group 1 than among non-retiring individuals who reached the maximum length of compensated LTSA (group 2), although the difference was statistically significant only 1, 5 years after the start of LTSA. If outpatient healthcare use is used as a measure of ill health, our results may indicate that healthcare and pension systems successfully identify those with disabling health problems. Earlier studies

on health symptom trajectories⁵⁰ and psychotropic drug consumption^{51 52} have shown somewhat similar results—a steep rise in the disability indicators before the pension grant, and a steady long decline after the pension grant. In this study, the decrease in use for group 1 started after the first follow-up year. This is the earliest possible time point for reaching the maximum LTSA length and transferring to a DP. Perhoniemi *et al*⁵¹ also found a higher psychotropic drug consumption level after the pension decision for DP retirees compared with the rejected DP applicants. On the other hand, a higher level of healthcare use in group 1 may reflect a better standard of care. It is possible that those transferring to DP benefited from a more rigorous initial attempt to improve their functional capacity. More healthcare visits may also mean more accurate documentation of occupational disability, increasing their chances to qualify for a pension. As these interpretations are not mutually exclusive, they can all play a role.

All individuals that eventually would reach the maximum length of compensated LTSA experienced a steep rise in healthcare use starting 6 months before the start of the LTSA spell, a peak in the first LTSA year, and a gradual, long decrease after that peak. The early peak is partly a consequence of the mandatory physician visits to receive sickness allowance. Usually, multiple visits and certificates are needed early on as the physician monitors the development of the health condition if it continues to cause occupational disability. For some of the disability retirees, possibly retiring already before the end of 2018, the gradually decreasing healthcare use can reflect a decreasing incentive to improve functional capacity once they have qualified for a pension. For those not transferring to a pension, the decrease may be explained by two processes: For those returning to work, the decrease after a high level of care use may reflect successful restoration of work ability by means of treatment or rehabilitation. In contrast, for those who after prior employment faced unemployment instead of DP or return to work, the decreasing level may in fact reflect lesser chances for care after losing their access to OHS. For group 2, we ran additional analyses on their labour market status in the end of the follow-up, and on their rejected DP applications. Circa half (51%) of group 2 faced unemployment and one-third (35%) were employed during the last 6-month period of the follow-up. In the total study population, the corresponding proportions were 20% and 86% respectively. 60% of group 2 also had a rejected DP application after the start of LTSA. These figures reflect a high risk of marginalisation among those in group 2 if DP is not granted but work ability is not regained either.⁵³

In spite of the gradual decrease, groups 1 and 2 showed relatively frequent healthcare use up until the end of the maximum LTSA. In addition to the original medical causes responsible for the sickness absence and healthcare visits, the negative consequences of sickness absence per se also may contribute to healthcare visits during the LTSA. Long sickness absence has been associated with risks for inactivity, social isolation, sleep disturbance,

lower self-rated health and decreased psychological well-being.^{54–56}

For those who had a LTSA spell of less than a year (group 3), the attendance trajectory was very unsurprising, showing a mild peak around the start of LTSA, and a steep decline thereafter. Most often (64%) even the LTSA spells are not more than 30 days long,⁵⁷ thus not requiring several healthcare visits afterwards.

Methodological considerations

Our study population was defined using register data on the total working-age population of the city of Oulu, Finland, linked to register data on healthcare use, LTSA spells, DP and covariates. Unlike in many other studies, data on healthcare use were based on comprehensive registers covering all schemes relevant to the Finnish working-age population. Registers are deemed to be highly reliable and objective, with very little missing information, no self-report bias and no loss to follow-up. Furthermore, both the number of outpatient healthcare visits, approximated with attendance days, and the precise length of the sickness absence spells could be calculated reliably.

However, a limitation is the restriction of our study population to individuals with no LTSA or pensions in the previous year. This of course warrants caution in generalising the results to the whole working-age population in Finland. Furthermore, our data were drawn from one Finnish city. While the general social security and healthcare systems are similar all over the country, the results may not be generalisable to other social security systems. Our proxy measure for chronic disease, entitlements to reimbursements for medicine expenses, was not ideal. These reimbursements are most often used for diseases of the circulatory system, diabetes or asthma, whereas in disability benefits the emphasis is strongly on mental disorders and musculoskeletal diseases.⁵⁸ Furthermore, we lacked more complete information on health status or the physical and psychosocial work environment that could explain some of the differences between the healthcare use trajectories in the four LTSA groups. Future studies should also control or stratify between different diagnostic groups, whether from healthcare use or sickness absence data. Our healthcare data did not include information on diagnosis, which can affect both the level of healthcare use^{8 21 59 60} and the length and consequence of sickness absence.^{43–45 61–63} Further, group 2 was heterogeneous in their paths after the maximum LTSA period, shown by our additional analysis on labour market status and rejected DP applications. However, due to data size limitation, we could not treat those subjects as different subgroups in our analyses. Future studies with larger data sets could also provide more detailed analyses on healthcare use of rejected DP applicants.

CONCLUSIONS

Our results show that individuals who go on to reach the maximum 1 year's length of compensated LTSA use

outpatient healthcare more than others not only after the start of their sickness absence spell, but also years before the spell started. Thus, individuals with a risk for very long disability may be identified based on frequent outpatient healthcare use years before the first sickness absence spell. However, our results imply that those who end up transferring to DP cannot be identified from others who reach the maximum LTSA spell on the basis of early healthcare use. Nevertheless, those who eventually end up on disability retirement have the highest level of healthcare use after the start of the LTSA, indicating that healthcare and pension systems successfully identify disabling health problems. It is crucial to understand the ways both disability benefits and use of healthcare cause public expenses, and to find a balance between efficient, equal care and lower costs.

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Contributors Both authors contributed to the planning and conducting the study. RP wrote first and successive drafts of the manuscripts, and conducted the statistical analyses. JB contributed in writing and revising the manuscript, and advised on statistical modelling. Both authors interpreted the results and approved the final version/revision of the manuscript. RP: guarantor.

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Ethics approval The study used secondary data from registers. Following the guidelines of the Finnish National Board on Research Integrity, an ethical review statement is not required for studies based solely on administrative register data. Good scientific practice and data protection procedures and regulations were followed. City of Oulu, Kela, Statistics Finland and Finnish Institute of Health and Welfare provided permissions for the use of the register data.

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