


# BMJ Open Parallel use of primary and secondary healthcare by frequent attenders in occupational health and their work disability: a longitudinal study in Finland

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## ABSTRACT

**Objectives** To investigate occupational health frequent attenders' (FAs) use of other healthcare sector services and whether parallel use affects their likelihood to receive a disability pension.

**Design** Longitudinal study combining routine medical record data with register data.

**Setting** Primary care in Finland is provided through three parallel healthcare sectors, all available to the working population. Additionally, patients can be referred to secondary care. This study combines medical record data from a nationwide occupational healthcare provider, with healthcare attendance data from private care and from public primary and secondary care attendance, sociodemographic data and disability pension decisions.

**Participants** Patients between 18 and 68 years of age who used occupational health primary care at least once during the study years 2014–2016 were included. The total study population was 59 650 patients. They were divided into three groups (occasional and persistent FAs and non-FAs) for analysis.

**Primary and secondary outcome measures** The primary outcome was FAs parallel use of private care and public primary and secondary care. The secondary outcome was work disability pension granted to FAs who used several healthcare sectors.

**Results** Both FA groups were more likely to use other healthcare service sectors more than non-FAs did. Persistent FAs were likely to use public secondary care services in particular (OR 4.31 95% CI 3.46 to 5.36). FAs using all healthcare sectors were also more likely to receive a disability pension than those FAs using only occupational health services (OR 4.53 (95% CI 1.54 to 13.34)). This association was strengthened by attendance in public secondary care.

**Conclusions** FAs using several healthcare sectors in parallel have an increased likelihood to receive a disability pension. There is need for care coordination to ensure adequate measures for work ability support.

## BACKGROUND

Frequent attenders (FAs) are a group of patients that use healthcare services

## Strengths and limitations of this study

- This study combines real-world routine medical record data with multiple registers providing a unique opportunity to study parallel service use in primary and secondary care in Finland.
- Access to information about granted disability pensions enables reliable estimation of disability pensions as an outcome measure associated with multiple healthcare sector use instead of self-reported work disability.
- Comprehensive data linkage allowed adjusting for sociodemographic confounding factors.
- Limitations are that register data do not allow examining patients' views and reasons for choosing different healthcare sectors.
- Also, lost to follow-up is greater in occupational health services than in public healthcare as access to occupational health services is linked to employment status.

extensively. The phenomenon is often associated with ill-health and chronic illnesses,<sup>1</sup> coexisting morbidity,<sup>2</sup> sickness absences<sup>3</sup> and work disability.<sup>4</sup> FAs also have more medically unexplained symptoms<sup>5</sup> than other clients. While FAs may have unmet needs, they may also have unrecognised illnesses.<sup>6</sup> All healthcare sectors, public, private and occupational health (OH), seem to have FAs but the morbidity and sociodemographic characteristics vary depending on the setting. For example, mental and musculoskeletal illnesses are linked to frequent visits among the working population,<sup>7–9</sup> and they also cause a substantial proportion of long-term work disability.<sup>10</sup>

FA has been divided into occasional—when service use diminishes on its own—and persistent—when high use continues for

several years. Persistent FA (pFA) appears to be linked to for example long-term illnesses, medically unexplained symptoms and social problems,<sup>11</sup> and also illness behaviour.<sup>12</sup> In the working population, both occasional and pFA has been linked to increased likelihood of sickness absences and disability pensions (DPs).<sup>4 13</sup> Both FA groups appear to have similar work ability risks but for unknown reasons, the visits of occasional FAs decrease in number over the study period, part of this may be associated with transitions between workplaces or benefits. Since there is little previous information on the risks associated with either occasional or pFA, it is necessary to study these groups also separately.

Primary healthcare may be organised in several different ways, but FA creates a marked and roughly same kind of demand—the top 10% constitutes 30%–40% of visits in primary care, although there is evidence that FAs create a greater demand in the public sector.<sup>1 11 14</sup> Primary care in Finland is provided through several healthcare sectors (public, private and OH), which may allow for parallel service use across for example public and OH primary care.<sup>15 16</sup> However, there are few studies examining this phenomenon. Survey studies have suggested that OH services (OHS) primary care may be used often as the sole primary care provider, if these primary care services are available to a patient.<sup>15 16</sup>

Whether FAs differ from other patients in their use of parallel services remains unclear. Also, whether occasional and pFAs differ in their use of other healthcare sectors, is unknown. The FA phenomenon itself is challenging to study in a system where several healthcare sectors provide primary care services. Studying parallel use requires combining information from all service sectors, from systems that are not designed to fit together.

Another unanswered question is OHS FAs' use of secondary healthcare, specialist care that is available after a referral from primary care services. Patients who suffer from severe illnesses or are at risk of work disability are likely to consult secondary care. Research indicates that secondary care costs are increased with FAs<sup>17</sup> and that FA is associated with specialist consultation within OHS.<sup>18</sup> Whether this extends to FAs use of public secondary care, is yet unknown. As FAs in OHS primary care are more likely to receive a disability grant than other users,<sup>4</sup> it can be presumed that their illnesses are more severe and that they need secondary care consultations. Additionally, sociodemographic factors such as occupational class and education are also known to be linked to work disability and service use.<sup>14 19–22</sup> Social determinants of health that include gender, education and employment act as background variables impacting on the occurrence and severity of disability<sup>23</sup> and thus should be taken into consideration when studying factors related to work disability.

Using several healthcare sectors is likely to scatter care creating a need for care coordination. In addition, work disability rates may increase when the condition is not identified sufficiently early and timely information

on prognosis, treatment options and possibilities to modify work might not be shared and instituted. Healthcare sectors that are not linked to the return to work programme of a workplace or who may not know of rehabilitative possibilities may suggest DP too early. OHS has the best expertise in the rehabilitative measures available to support work ability and the possibility to discuss work modifications with the workplace,<sup>24</sup> and thus, it should be part of patient consultations. However, patients might choose to use other service providers for different reasons. In order to understand patients' use of healthcare sectors, and understand how care coordination can be improved, we first need to understand if patients are using other healthcare sectors while they are clients of OHS.

This study aims to examine how FAs, both occasional and persistent, in OHS primary care use parallel healthcare services (primary and public secondary). We also examine whether use of several service sectors is associated with the likelihood of receiving a disability grant even when adjusted for confounding sociodemographic factors.

## METHODS

### Study setting and design

The Finnish OHS have two simultaneous roles: mandatory preventive functions and voluntary primary care (curative) functions, both arranged by the same service provider. OHS primary care is a parallel service to public and private care and employed patients can use all sectors.<sup>25</sup> The public primary and secondary care are available to all citizens with a copayment, while most costs are subsidised by taxes. OHS is funded by employers and is available free of charge to all employed patients at the time of the visit. The costs paid by the employers are partly subsidised through funding collected from employers and employees through an insurance plan, and approximately 75% is paid by the employers. Private care is paid by the client and only a minor compensation is available through Social Insurance Institution of Finland (KELA).

Patients might use just one or all of the available primary care sectors—OHS, private and public. In addition, they may use public secondary care services which are available after a referral from the primary care level, and which have a copayment fee. Public secondary care is specialist care including both inpatient and outpatient episodes.

This is a longitudinal study combining register data from several data owners. The study population was formed based on real world medical record data from Pihlajalinn, a large private OHS provider, which at the time of the study included 40 OHS units across Finland. The clientele of Pihlajalinn represents the working population of Finland fairly well including workplaces from a wide range of industries and rural as well as urban areas. The medical record data from Pihlajalinn were combined with service use data from private care

and public primary and secondary care. Data on other primary and public secondary care visits were received from the Finnish Institute for Health and Welfare (THL) and KELA. THL keeps the Care Register for Healthcare and the Register of Primary Health Care visits. KELA has the data on private care visits based on reimbursement applications. The data were further complemented with sociodemographic data from Statistics Finland and data on DP from the Finnish Centre for Pensions (FCP).

In Finland, DP may be granted for individuals whose work ability has been reduced due to an illness for at least a period of 1 year. Partial or full fixed-term DP may be granted when rehabilitation is expected and for the duration of rehabilitation. For a full DP (fixed-term or permanent) work ability must be reduced by at least 3/5 and for partial DP (fixed-term or permanent) by 2/5 based on a physician's assessment in both healthcare and insurance sector. Full DP leads to withdrawal from the labour force. DPs are funded through a mandatory insurance paid by all employees and employers.

### Data collection and study population

OH primary care data contained visits to different OHS professionals during 2014–2016. These data were used to determine FA status in OHS primary care. The data were sent by Pihlajalinnä to Statistics Finland, which pseudonymised the data and combined them with sociodemographic data from their FOLK-database.<sup>26</sup> The use of public primary care services and public secondary care services are available from THL's Care Register for Healthcare, and they were combined with the data by Statistics Finland. We included only outpatient visits in public secondary care. The visits to private care were gathered from KELA and further added to the data by Statistics Finland. Data on DP were provided by FCP and added to the data set. Tampere University processed the pseudonymised data in the information safe environment provided by Statistics Finland.

Our initial data comprised 78 507 patients. The study material was limited to employees aged 18–68 years who had visited the OHS primary care face to face at least once during the study years 2014–2016. Only illness-related visits conducted face-to-face were included, and health check-ups that were not initiated by the patient were excluded. After these exclusions there were 59 676 patients in the study population. Twenty six patients could not be linked to other registers and were excluded at this point. After these exclusions our final study comprised 59 650 patients.

### Statistical analysis

FAs were defined as top decile of attenders based on their visits to the OHS primary care. Details on defining FA-groups can be found described in a previous study (4). Those patients who were in the top decile of attenders in 2014 were named 1-year-FA (1yFA). Those patients who were in the top decile in all three study years (2014–2016) were considered pFA. Patients who were never in the

top decile were considered a reference group, non-FA. Patients who were FA in 2015 and/or 2016 but not in all 3 years were excluded. A flow diagram of patient categorisation and exclusions can be found as an online supplemental appendix.

The sociodemographic variables were derived from the Statistics Finland FOLK-database. In the descriptive part we examined occupational class divided into manual (eg, cleaners, cooks, mechanics), lower non-manual (eg, sales assistants, nurses), upper non-manual (eg, managers, engineers, teachers), entrepreneurs combined with farmers and lastly the group others.<sup>27 28</sup> We also examined educational level (basic < 10 years, intermediate 10–12 years, high > 13 years),<sup>27</sup> unemployment (yes/no)<sup>27</sup> and living alone.<sup>27</sup> All these factors were drawn from 2015 which was in the middle of our study period for patients using parallel services and for those using OHS primary care only. These variables were included in the analyses as confounding factors to account for the known social determinants of health that influence also disability.

The employer size was divided into four groups according to the number of employees (micro: 1–10, small: 11–50, medium: 51–250 and large: >251 employees). Employer industry was categorised according to TOL 2008/NACE Rev. 2. These were drawn from 2015 and were used in the adjusted models.

The data were analysed using R-software. In all analyses, p values less than 0.05 were considered statistically significant. We examined the association of FA-status with the use of multiple healthcare sectors using binary logistic regression in unadjusted and adjusted models. We used binary logistic regression to analyse whether parallel healthcare use of FAs was associated with DPs granted between 2015–2018 (the DPs combined were partial and full fixed-term DP, and partial and full permanent DP) when compared with those FAs that did not use other healthcare sectors. We adjusted for sex, age, occupational class, educational level, living alone and employer's size and industry and unemployment. When examining DP in the groups 1yFA and pFA having used different healthcare sectors the groups became too small for analyses and therefore were combined.

### Patient and public involvement

No patients were involved in the design of the study.

## RESULTS

The study population constituted 59 650 patients during 2014–2016. There were 592 pFA and 2468 1yFA in 2014. Due to lost to follow-up, the group of 1yFA diminished so that in 2016 there were 1391 individuals in the 1yFA group. Men constituted 46%, 44% and 58% of patients for 1yFA, pFA and non-FA, respectively (table 1). FAs in OHS had more often used other healthcare service sectors than non-FAs.

During all the study years, 43.7% of the whole study population had not used public primary care services

**Table 1** Descriptive data of 1yFA, pFA and non-FA in occupational health primary care

	Patients 2014 – 2016, n=59 650					
	1yFA n=2468		pFA n=592		non-FA n=56 616	
	n	%	n	%	n	%
<b>Sex</b>						
Male	1134	45.9	262	44.3	32 550	57.5
Female	1334	54.1	330	55.7	24 040	42.5 43
<b>Age</b>						
18–34	631	25.6	108	18.2	18 483	32.7
35–44	546	22.1	132	22.3	13 213	23.3
45–54	628	25.4	188	31.8	13 990	24.7
55–68	663	26.9	164	27.7	10 904	19.3
<b>Used other primary care sectors 2014–2016</b>						
Public primary care	1635	66.2	352	59.5	31 593	55.8
Private care	1490	60.4	382	64.5	28 456	50.3
Used public secondary care	1833	74.3	494	83.4	29 602	52.3
<b>Total</b>	<b>2468</b>		<b>592</b>		<b>56 590</b>	

FA status was defined as the top decile of attenders (frequent attender 10%, FA10).

non-FA = Patients who were never in the top decile were considered as a reference group, non-frequent attenders.

pFA = Patients being in the top decile in all three study years (2014, 2015 and 2016).

1yFA = Patients being in the top decile of attenders in 2014.

non-FA, non-frequent attenders; pFA, persistent FA; 1yFA, 1-year-FA.

(table 2). Altogether, 49.2% had not used private care and 46.5% had not used public secondary care during the study years. Nearly a third (31.6%) of the pFA group had used public secondary care services in all 3 years, while 23.7% of 1yFA and 10.1% of non-FA, respectively, had used services during the 3 years. In total, 14.4% of pFAs, 17.2% of 1yFAs and 12.3% of non-FAs had used public primary care during the three study years.

The sociodemographic characteristics of different status groups using various healthcare sectors are shown in table 3. There were proportionally more pFAs with high educational level using other healthcare sectors in addition to OHS. Also, there were proportionally more women using additional healthcare sectors than only OHS. Both FA-groups were more likely to use other service sectors than non-FA (table 4). This was particularly true with public secondary care: pFA had adjusted OR 4.32 (95% CI 3.47 to 5.38) and 1yFA adjusted OR 2.41 (95% CI 2.19 to 2.65). Adjusting for confounding factors did not significantly alter the results.

FAs parallel use of services was associated with increased likelihood of them receiving a DP (table 5). The OR for receiving DP among those FAs having used any other service sector was 3.01 (95% CI 1.07 to 8.44) and among those having used all other service sectors was 4.53

(95% CI 1.54 to 13.34) in the adjusted model compared with those FAs not using parallel services. Use of public secondary care appeared to be the dominant factor.

## DISCUSSION

OHS FAs are more likely to use other service sectors despite their extensive use of OHS. Notably, pFAs, who were in the top decile of attenders during all three study years were likely to use public secondary care services. Those FAs of any category that use all healthcare sectors are also more likely to receive a disability grant than those FAs using only OHS. Use of public secondary care appeared to be the dominant factor in receiving DP decision.

The finding that FAs, both occasional and persistent, are more likely to use several healthcare sectors indicates that despite numerous visits in the OHS primary care, there is need for additional or complementary services. This may be due to several reasons. OHS sometimes concentrates on illnesses affecting work ability and care of chronic illnesses, such as diabetes, might be steered to public primary care. Analysing the impact of specific diagnoses in different service sectors is important, but not possible in our study due to missing data and data incompatibility. Also, although patients may have access to OHS, the employer's contract might limit the access to more expensive examinations thus creating need to find complementary services. On the other hand, reasons for choosing other service provider than OHS may also be found from distance to the nearest healthcare service provider, aim to maintain a sustainable patient–physician relationship or other factors that cannot be accounted for in this study. Interestingly, the group of pFAs had frequent visits to the OHS unit through all the study years, yet they were more likely to use other service sectors, too. A question rises of whether patients choose to treat some illnesses in OHS and some in other sectors or if this scattering of care is created by the system that aims to steer control visits from public secondary care to public primary care. These issues require further examination.

FAs have conducted some 20%–40% of visits in previous studies of primary care.<sup>7 11 29 30</sup> In OHS, FAs conducted 36% of the visits.<sup>18</sup> When added to the use of public and private healthcare, the number of visits and thus costs will increase. Use of several service sectors might also lead to overlapping examinations and treatments. This in return might lead to unnecessary costs in healthcare that could be avoided through careful planning. On the other hand, use of several service sectors might also be planned and appropriate, if FAs have chronic illnesses that are not related to work and thus save employers' costs. However, a possibility to use parallel services exists and if the patient suffers from chronic illnesses, a plan should be made to indicate where and by whom different aspects of care are covered. A coordinated view on the past and planned care should be available to all healthcare sectors taking part in the care. The Patient Data Repository is

**Table 2** Proportion of different FA-groups in OHS having visited the different service sectors in one, two or all study years

	No public primary care visits n (%)	Public primary care visits in 1 year n (%)	Public primary care visits 2/3 years n (%)	Public primary care visits all 3 years n (%)
Non-FA	24 997 (44.2)	14 749 (26.1)	9862 (17.4)	6982 (12.3)
1yFA	833 (33.8)	688 (27.9)	522 (21.2)	425 (17.2)
pFA	240 (40.5)	149 (25.2)	118 (19.9)	85 (14.4)
All	26 070 (43.7)	15 586 (26.1)	10 502 (17.6)	7492 (12.6)
P<0.0001				
	No private care visits	Private care visits in 1 year	Private care visits 2/3 years	Private care visits all 3 years
Non-FA	28 134 (49.7)	14 120 (25.0)	8516 (15.0)	5820 (10.3)
1yFA	978 (39.6)	636 (25.8)	488 (19.8)	366 (14.8)
pFA	210 (35.5)	158 (26.7)	97 (16.4)	127 (21.5)
All	29 322 (49.2)	14 914 (25.0)	9101 (15.3)	6313 (10.6)
P<0.0001				
	No public secondary care visits	Public secondary care visits in 1 year	Public secondary care visits 2/3 years	Public secondary care visits all 3 years
Non-FA	26 988 (47.7)	15 235 (26.9)	8635 (15.3)	5732 (10.1)
1yFA	635 (25.7)	662 (26.8)	586 (23.7)	585 (23.7)
pFA	98 (16.6)	141 (23.8)	166 (28.0)	187 (31.6)
All	27 721 (46.5)	16 038 (26.9)	9387 (15.7)	6504 (10.9)
P<0.0001				

FA status was defined as the top decile of attenders (frequent attender 10%, FA10).

non-FA = Patients who were never in the top decile were considered as a reference group, non-frequent attenders.

pFA = Patients being in the top decile in all three study years (2014, 2015 and 2016).

1yFA = Patients being in the top decile of attenders in 2014.

P value,  $\chi^2$  test of independence.

non-FA, non-frequent attenders; OHS, occupational health services; pFA, persistent FA; 1yFA, 1-year-FA.

a national information system service for archiving electronic patient data produced in the healthcare service in Finland. The user interfaces vary depending on the electronic medical record system in use, and unfortunately it appears that electronic health records do not necessarily support this aim.<sup>31</sup> Through better user interfaces and cumulating information, there is hopefully a brighter future ahead. Currently information is transferred often solely by the patient, which might lead to discontinuity of care and misunderstandings. In parallel healthcare sectors referral systems should be available from all service sectors to another. Additionally, work-related illnesses and work disability risks should be identified in all healthcare sectors and steered to OHS.

The illnesses treated in public and private care are possibly of the kind that affect work ability, such as mental or musculoskeletal disorders.<sup>13</sup> These chronic illnesses are likely to have work ability effects and their identification in other service sectors would be crucial for timely measures for disability prevention. There is need for education and mechanisms that support steering patients to OHS in these cases. Currently there are no widely used mechanisms to guide patients in need of OHS care to their service provider, other than through the patient's own initiative. However, it should be noted there are

initiatives that pilot these steering mechanisms aiming to ease availability and access to OHS primary care<sup>32</sup> and extensive availability of the OHS services are likely to aid this aim.<sup>33</sup>

To our knowledge, this study is the first to examine the association between multiple service sector use and DP among FAs through register data. The finding that FAs using all service sectors are more likely to receive a DP emphasises the need for coordination of FAs' care. Work disability, leading to part-time or full-time withdrawal from the work force, is an acknowledged problem in industrialised countries. Governments underline the importance of ensuring that workers do not leave the labour market prematurely for health reasons,<sup>34 35</sup> as illness-based retirement is not only a loss to the individual but also an economic and social challenge. In Finland in 2019, the expenditure created through DPs was 1.8 billion euros, mostly due to musculoskeletal and mental disorders.<sup>10</sup>

According to our study, FAs' use of all healthcare sectors is associated with likelihood of receiving a DP. If patients use several healthcare sectors their risk of work disability may not be identified in a timely manner and they might not receive the supportive interventions they need. Without coordination of care and services, OHS cannot support the employee or employer to for example tailor

**Table 3** Descriptive data of the sociodemographic characteristics of different status groups (1yFA, pFA and non-FA) using various healthcare sectors

	Only OHS visits				OHS and public secondary care visits				OHS and public primary care visits				OHS and private care visits			
	Non-FA		1yFA		Non-FA		1yFA		Non-FA		1yFA		Non-FA		1yFA	
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	
Sex																
Male	6856 (80.0)	115 (74.2)	27 (75.0)	15 648 (52.9)	811 (44.2)	212 (42.9)	16 277 (51.5)	661 (40.4)	132 (37.5)	13 020 (45.8)	558 (37.4)	135 (35.3)				
Female	1715 (20.0)	40 (25.8)	9 (25.0)	13 954 (47.1)	1022 (55.8)	282 (57.1)	15 316 (48.5)	974 (59.6)	220 (62.5)	15 436 (54.2)	932 (62.6)	247 (64.7)				
Occupational class																
Upper non-manual	2022 (24.1)	(14.4)	(8.3)	5073 (17.2)	190 (10.4)	(10.5)	4419 (14.0)	159 (9.8)	(11.4)	6226 (21.9)	195 (13.1)	(12.8)				
Lower non-manual	2209 (26.3)	(20.3)	(16.7)	9403 (31.9)	598 (32.8)	(34.8)	9832 (31.2)	549 (33.7)	(37.8)	9673 (34.1)	519 (34.9)	(36.1)				
Manual	2996 (35.7)	(50.3)	(69.4)	8985 (30.5)	599 (32.9)	(50.8)	10 159 (32.3)	479 (29.4)	(46.9)	6976 (24.6)	436 (29.4)	(46.3)				
Other entrepreneurs	323 (3.9)	-	-	1248 (4.2)	31 (1.7)	-	1150 (3.7)	18 (1.1)	-	1509 (5.3)	39 (2.6)	-				
Others	835 (10.0)	(13.7)	-	4774 (16.2)	403 (22.1)	(3.6)	5923 (18.8)	422 (25.9)	(3.7)	3986 (14.1)	296 (19.9)	(4.2)				
Educational level																
Basic	861 (10.3)	21 (13.7)	4 (11.1)	3240 (11.0)	228 (12.5)	52 (10.5)	3682 (11.7)	200 (12.3)	37 (10.5)	2431 (8.6)	149 (10.0)	37 (9.7)				
Intermediate	4030 (48.1)	83 (54.2)	25 (69.4)	14 819 (50.3)	1014 (55.7)	312 (63.2)	16 976 (53.9)	922 (56.7)	220 (62.5)	12 375 (43.6)	774 (52.1)	222 (58.1)				
High	3494 (41.7)	49 (32.0)	7 (19.4)	11 424 (38.7)	579 (31.8)	130 (26.3)	10 825 (34.4)	505 (31.0)	95 (27.0)	13 564 (47.8)	562 (37.8)	123 (32.2)				
Living alone																
Alone	1646 (19.8)	45 (29.6)	9 (25.0)	5542 (19.0)	412 (22.9)	123 (25.0)	5901 (19.0)	365 (22.8)	87 (24.9)	5139 (18.3)	317 (21.6)	96 (25.3)				
Not alone	6658 (80.2)	107 (70.4)	27 (75.0)	23 634 (81.0)	1386 (77.1)	369 (75.0)	25 232 (81.0)	1237 (77.2)	263 (75.1)	22 981 (81.7)	1149 (78.4)	284 (74.7)				
	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)				

--n missing when the information units were too small to be reported (guidelines of Statistics Finland, values <3 should not be reported).

FA status was defined as the top decile of attenders (frequent attender 10%, FA10).

non-FA = Patients who were never in the top decile were considered as a reference group, non-frequent attenders.

1yFa = Patients being in the top decile of attenders in 2014.

pFA = Patients being in the top decile in all three study years (2014, 2015 and 2016)

non-FA, non-frequent attenders; OHS, occupational health services; pFA, persistent FA; 1yFA, 1-year-FA.

**Table 4** Different FA-groups associated with service use in other service sectors in 2014–2016 compared with non-FA using binary logistic regression

	Public primary care		Private care		Public secondary care		Any other service sector	
	Unadjusted	Adjusted*	Unadjusted	Adjusted*	Unadjusted	Adjusted*	Unadjusted	Adjusted*
1yFA	1.55 (1.43 to 1.69)	1.31 (1.20 to 1.43)	1.51 (1.39 to 1.64)	1.41 (1.29 to 1.54)	2.63 (2.40 to 2.88)	2.41 (2.19 to 2.65)	2.66 (2.26 to 3.14)	2.22 (1.88 to 2.63)
pFA	1.16 (0.98 to 1.37)	1.09 (0.92 to 1.29)	1.80 (1.52 to 2.13)	1.66 (1.39 to 1.99)	4.60 (3.70 to 5.71)	4.32 (3.47 to 5.38)	2.76 (1.97 to 3.86)	2.45 (1.74 to 3.45)

Non-FA used as the reference group (OR=1.0)

nonFA = Patients who were never in the top decile were considered as a reference group, non-frequent attenders

pFA = Patients who were in the top decile in all three study years (2014, 2015 and 2016).

1yFA = Patients being in the top decile of attenders in 2014.

\*Adjusted for sex, age, occupational class, educational level, living alone, unemployment, workplace size and industry. Non-FA, non-frequent attenders; pFA, persistent FA; 1yFA, 1-year-FA.

**Table 5** Predictive value of parallel service use of OHS frequent attenders (1yFA and pFA) during 2014–2016 for any disability pension decision in 2015–2018 using binary logistic regression

	OR (95% CI)	
	Unadjusted	Adjusted*
Visits in OHS and public primary or private care	0.79 (0.24 to 2.59)	0.32 (0.07 to 1.56)
Visits in OHS and public secondary care	4.13 (1.52 to 11.25)	3.63 (1.29 to 10.25)
Visits in OHS and any other service sector	3.47 (1.27 to 9.43)	3.01 (1.07 to 8.44)
Visits in all service sectors	4.94 (1.80 to 13.57)	4.53 (1.54 to 13.34)

The reference group (=1.0) being FAs that have no parallel service use. 1yFA = Patients who were in the top decile of attenders in 2014 pFA=patients who were in the top decile in all three study years (2014,2015 and 2016).

\*Adjusted for sex, age, occupational class, educational level, living alone, unemployment, workplace size and industry.

OHS, occupational health services; pFA, persistent frequent attenders; 1yFA, 1-year-FA.

work tasks to support ability and to continue working. OHS has a legislated role in coordination of return to work programmes, work ability support and rehabilitation.<sup>36 37</sup> OHS has a contact with the workplace and knowledge on the possibilities of social security system to support for example training for a new profession when one is unable to continue in their previous work. A case manager in the OHS holding the threads, when care is scattered to multiple service sectors, could also add a rehabilitative perspective to the individual care plan. It can't be deduced based on our results, whether the DPs among our study population could have been prevented through supportive or rehabilitative measures.

The use of public secondary care appears to have the greatest effect on DP risk, which can be expected as patients who have severe illnesses are referred to public secondary care. On the other hand, it is possible that DPs are suggested for the patients more easily in public secondary care, if the specialists are not aware of rehabilitative possibilities and return to work programmes. An association between FA-status and work disability has been shown in a previous study,<sup>34</sup> and this was underlined with FAs in OHS and musculoskeletal disorders—often requiring evaluation and treatment in public secondary care. However, OHS has several ways to support work ability and return to work when given the possibility, such as job accommodation,<sup>38</sup> that might allow patients suffering from musculoskeletal disorders to continue working. There are indicative results of the effectiveness of this kind of measures also for mental disorders.<sup>39</sup>

The findings of the study can be cautiously generalised to the working population in Finland. Our findings could be indicative of similar risks in other populations where parallel services are used.

A strength of the study is the combination of OHS real world data with several good quality registers to examine all healthcare sectors. We were able to adjust for confounding factors given the comprehensive socio-demographic data available. Using the data of a nationwide operating OHS provider is likely to reduce the effect of possible geographic factors such as long distances. Use of medical record data and the large study sample dilute human error and recall bias. However, our study has also limitations. We have used only outpatient visits to public secondary care since they are more in line with other outpatient visits. We could not control for changes in occupational status during the study years—thus, occasional FAs might use more other service sectors in later years because they do not have access to OHS care or since they have been employed with a new employer not providing OHS primary care services. However, the same trend is seen with pFAs, who have access and visits in OHS primary care during all study years. Another limitation is the lack of data on the comprehensiveness of OHS contracts which might have an influence on need to use other service sectors. However, 90% of the working population has access to OHS primary care.<sup>40</sup> The OHS allows visits to physicians and nurses but might limit use of more refined laboratory tests or imaging. In this register study, it was not possible to account for personal reasons to choose a certain service sector such as distance to the service provider or diagnoses. We have included patients aged 18–68 years but patients cannot enter DP once they have reached their old-age pension limit, which is generally 65 years. There were 582 persons aged 65–68 years (non-FA=553, 1yFA=26, pFA=3). Service use and disability are intertwined and service use is likely to be consequence of perceived work ability issues particularly in the OHS context. Using this setting, it is not possible to evaluate the accurate paths that lead to disability.

## CONCLUSIONS

FAs of OH primary care who used several healthcare sectors have an increased likelihood to receive a DP. The association was emphasised with public secondary care. Coordination FAs' care in OHS should be improved between different sectors to enhance work ability support.

Further research is needed on whether OHS' interventions and care coordination could reduce DPs among patients using parallel services. More research is also necessary to examine patients' perspectives on why they choose or need a certain service provider, for example, through qualitative research or surveys.

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