

TIIA REHO

# Frequent Attenders of Occupational Health Primary Care and Work Disability



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ACADEMIC DISSERTATION

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ACADEMIC DISSERTATION  
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To my family



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Tiia Reho



# ABSTRACT

High consultation frequency in healthcare is associated with ill-health, chronic illnesses and multimorbidity. Frequent attenders (FA) also create a substantial share of primary care's workload and costs. This phenomenon has been researched widely in the field of general practice, but information is scarce on working-aged patients, not to mention the working population. Additionally, minimal knowledge exists about the association between frequent attendance and sickness absences or disability pensions (DP).

Occupational health services (OHS) aim to support work ability and staying in the working life. Identifying individuals at risk of work disability is needed to enable these aims. At the moment, sickness absences and surveys aid in identifying work ability risks but additional and possible earlier measures would be welcome to enable timely actions. The known association between frequent attendance and poor health and chronic illnesses suggests that FAs might also be at risk of disability.

This study's aim was to examine FAs in occupational health (OH) primary care in Finland, focusing on the working population. This study aimed to characterise FAs in this context and examine the differences between occasional and persistent FAs. The present study also looked into sickness absences of different lengths and diagnostic groups leading to sickness absences in different FA-groups compared with other users of OH primary care. This study also aimed to study differences in DPs of different FA groups and compare them to other users of OH primary care.

This study combined electronic medical record data and national pensions register data. The study consisted of cross-sectional and longitudinal studies and used routine medical record data (2014–2016) from a nationwide OHS provider in Finland. In total, 78 507 patients constituted the study population before exclusions; after exclusions, the study populations varied between 31 960 – 66 831 patients. FAs were defined across all the studies as the top 10% of patients using services in the study year(s). Patients categorised as FA in one year were considered occasional FA; patients who were FA in all three study years were considered persistent FA. The patients who belonged to the remaining 90% were considered as the reference group, non-FA. Additionally, to sociodemographic and

background data, sick-leave episodes and their lengths were collected along with associated diagnostic codes. DP decisions were obtained from the Finnish Centre for Pensions (FCP) from 2015 – 2017 and were linked to the data.

Frequent attendance in the context of OH primary care was associated with the female gender, working for medium or large employers and working in the manufacturing industry or human health and social services. One in five occasional FAs continued as persistent FAs for three consecutive years, and in one year, the FAs created 36% of all consultations. FAs created 40% of primary care consultations throughout the study years.

Both occasional and persistent FAs had more and longer sick leave (SL) durations than non-FAs through the study years. Persistent FAs had consistently high absence rates, and occasional FAs had elevated absence rates, even 2 years after their frequent attendance period. Both persistent FAs and occasional FAs were associated with long ( $\geq 15$  days) sickness absences when compared with non-FAs. Occasional and persistent FAs also had more DPs than non-FAs. During follow-up, 14.9% of pFA, 9.6% of 1yFA and 1.6% of non-FA had any of these incidents. Musculoskeletal disorders are the most common reason for illness-based retirement in all groups. However, occasional and persistent FAs had proportionally more DPs based on musculoskeletal disorders than other users of OH primary care and proportionally more than in the whole population as well.

FAs spend healthcare resources considerably, and frequent attendance was shown to be a risk for future sickness absence and DPs. Frequency of medical visits is a possible indicator that could be used to identify patients in need of care coordination and rehabilitation. The use of consultation frequency along with other indicators might enable earlier identification of disability risks, thus allowing timely interventions and follow-up planning.

# TIIVISTELMÄ

Terveysthuollon palveluiden suurkuluttajuus on tutkimuksissa yhdistetty huonoon terveyteen ja kroonisiin sairauksiin. Suurkuluttajat tekevät suuren osan perusterveydenhuollon käynneistä sekä tuottavat huomattavan osan terveydenhuollon kuluista. Suurkuluttajuutta on tutkittu laajalti perusterveydenhuollon kentässä ja erityisesti terveyskeskuksissa, mutta työikäisiin ja erityisesti työllisiin keskittyviä tutkimuksia on vähän. Nykyisen tutkimuksen pohjalta on myös liian vähän tietoa suurkuluttajuuden yhteydestä sairauspoissaoloihin ja työkyvyttömyyteen.

Työterveyshuollon keskeinen tehtävä on tukea työntekijöiden työkykyä sekä ohjata tarvittaessa kuntoutukseen. Tämän toteuttamiseksi on keskeistä tunnistaa yksilöt, joilla on työkyvyttömyyden uhka. Tällä hetkellä sairauspoissaoloseuranta ja kyselyt ovat pääasiallisia keinoja työkyvyttömyysriskin tunnistamiseen, mutta kuntoutuksen ja muiden työkykyä tukevien toimenpiteiden oikea-aikaisuuden varmistamiseksi, täydentävät ja mahdollisesti varhaisemmat keinot ovat tarpeen. Suurkuluttajuuden yhteys heikkoon terveyteen ja kroonisiin sairauksiin viittaa siihen, että suurkuluttajuus voisi liittyä myös työkyvyttömyyteen.

Tämä tutkimus selvittää suurkuluttajuutta työterveyshuollon sairaanhoidon kentässä keskittyen työssä olevaan väestöön. Tutkimus pyrkii kuvaamaan suurkuluttajia työterveyshuollon sairaanhoidossa ja tutkimaan satunnaisten ja pysyvien suurkuluttajien eroja. Tässä tutkimuksessa selvitetään myös suurkuluttajuuden yhteyttä sairauspoissaoloihin ottaen huomioon eri mittaiset ja eri diagnooseilla määrätyt sairauspoissaolot. Lisäksi tutkitaan satunnaisten ja pysyvien suurkuluttajien ja muiden työterveyshuollon sairaanhoitoa käyttävien potilaiden eroja sairauspoissaoloissa. Yksi keskeinen tutkimuskysymys on suurkuluttajien ja muiden käyttäjien työkyvyttömyyseläkkeiden alkavuus ja erot ryhmien välillä.

Tutkimuksessa käytettiin aineistona potilaskertomusrekisteriaineistoa ja yhdistettiin sitä eläkerekisteriaineistoon. Tutkimuksessa oli poikittaistutkimusosio sekä pitkittäistutkimuksia. Aineisto käsittää valtakunnallisen työterveyshuollon toimijan potilasrekisteriaineistoa vuosilta 2014 – 2016 ja Eläketurvakeskuksen aineistoa vuosilta 2015 – 2017. Tutkimuksen alkuperäinen tutkimusjoukko koostui yhteensä 78 507 potilaasta, joista tutkimuksesta riippuen poissulkukriteerien jälkeen

tutkittiin 31 960 – 66 831 potilasta. Suurkuluttajat määriteltiin ylimmäksi palveluita käyttäneeksi kymmenykseksi ja yhtenä vuonna kriteerin täyttäneet katsottiin satunnaisiksi suurkuluttajiksi ja kaikkina kolmena tutkimusvuonna kymmenykseen kuuluneet pysyviksi suurkuluttajiksi. Ne palveluita käyttäneet potilaat, jotka eivät kuuluneet ylimpään kymmenykseen olivat referenssiryhmä, ei-suurkuluttajat. Potilaskertomusaineistosta saatiin sairauspoissaolot ja niihin liittyvät diagnoosikoodit ja Eläketurvakeskuskelta työkyvyttömyyteen liittyvät eläkepäätökset.

Suurkuluttajuus työterveyshuollon sairaanhoidossa todettiin olevan yhteydessä naissukupuoleen sekä työskentelyyn keski- ja suurilla työnantajilla sekä teollisuudessa tai sosiaali- ja terveysalalla. Yksi viidestä satunnaisesta suurkuluttajasta jatkoi pysyvänä suurkuluttajana. Yhtenä tutkimusvuonna suurkuluttajat tekivät 36% kaikista sairaanhoidon käynneistä. Kaikkien kolmen vuoden käynneistä suurkuluttajat tekivät 40%.

Sekä satunnaisilla että pysyvillä suurkuluttajilla oli enemmän ja pidempiä sairauspoissaolopakkeja kuin muilla palveluiden käyttäjillä. Pysyvillä suurkuluttajilla oli kaikkina kolmena tutkimusvuonna toistuvia sairauspoissaoloja ja satunnaisilla suurkuluttajilla oli muita käyttäjiä enemmän sairauspoissaoloja myös sen jälkeen kuin heidän käyntimääränsä olivat vähentyneet. Sekä satunnaisilla että pysyvillä suurkuluttajilla todettiin korostunut yhteys pitkiin, yli 15 päivän mittaisiin sairauspoissaoloihin verrattuna muihin palveluiden käyttäjiin. Suurkuluttajilla – satunnaisilla ja pysyvillä – alkoi myös enemmän työkyvyttömyyseläkkeitä tutkimusaikana. Pysyvistä suurkuluttajista 14.9%, satunnaisista suurkuluttajista 9.6% ja muista kävijöistä 1.6% sai jonkun eläkepäätöksen tutkimusaikana. Tuki- ja liikuntaelämisen sairaudet olivat suurin syy eläköitymiseen kaikilla ryhmillä, mutta suurkuluttajilla tuki- ja liikuntaelämisen sairauksien osuus oli suurempi kuin muilla kävijöillä.

Suurkuluttajat käyttävät myös työterveyshuollon sairaanhoidon kentässä huomattavan osan resursseista ja suurkuluttajuus on yhteydessä lisääntyneisiin sairauspoissaoloihin ja työkyvyttömyyseläkkeiden alkavuuteen. Suurkuluttajuus on yksi mahdollinen indikaattori, jota voidaan käyttää niiden potilaiden tunnistamisessa, jotka tarvitsevat palveluiden koordinoitua ja kuntoutusta. Käyntitiheyden hyödyntäminen muiden työkyvyttömyysindikaattoreiden kanssa saattaa mahdollistaa työkykyriskien varhaisemman tunnistamisen mahdollistaen oikea-aikaiset toimenpiteet ja seurannan suunnittelun.

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# ABBREVIATIONS

1yFA	1-year frequent attender
2yFA	2-year frequent attender
DP	Disability pension
ED	Emergency department
FA	Frequent attender
FCP	Finnish Centre for Pensions
GP	General practitioner
HCU	High cost user
ICD-10	International Classification of Diseases, 10th edition
KELA	Social Insurance Institution of Finland (Kansaneläkelaitos)
non-FA	Non-frequent attender
MUS	Medically unexplained symptoms
OH	Occupational health
OHS	Occupational health services
OR	Odds ratio
pFA	Persistent frequent attender
SL	Sick leave
UK	United Kingdom





# ORIGINAL PUBLICATIONS

The thesis is based on the following original studies, referred to throughout the text by Roman numerals I – IV:

- I Reho T, Atkins S, Talola N, Viljamaa M, Sumanen M, Uitti J. Frequent attenders in occupational health primary care: a cross-sectional study. *Scandinavian Journal of Public Health*. 2019; 47(1):28-36.
- II Reho T, Atkins S, Talola N, Viljamaa M, Sumanen M, Uitti J. Comparing occasional and persistent frequent attenders in occupational health primary care – a longitudinal study. *BMC Public Health*. 2018; 18:1291. doi: 10.1186/s12889-018-6217-8
- III Reho T, Atkins S, Talola N, Viljamaa M, Sumanen M, Uitti J. Occasional and persistent frequent attenders and sickness absences in occupational health primary care: a longitudinal study in Finland. *BMJ Open*. 2018; 9:e024980. doi:10.1136/bmjopen-2018-024980
- IV Reho T, Atkins S, Talola N, Viljamaa M, Sumanen M, Uitti J. Frequent attenders at risk of disability pension: a longitudinal study combining routine and register data. *Scandinavian Journal of Public Health*. 2019; online first. doi: 10.1177/1403494819838663



# 1 INTRODUCTION

Work disability is a global issue. The unfavourable age structure in the high-income countries sets demands on preserving work ability and postponing early retirement. Timely measures that support staying in the working life are needed and often require the cooperation of healthcare providers and employers alike. However, a need exists to find effective ways to fulfil these aims.

A key issue in supporting employees' work ability is being able to identify individuals at risk of developing a work disability and provide them with care coordination and rehabilitation counselling. Currently, identification of disability risks is often based on sickness absence monitoring or assessment through questionnaires. However, sick leaves (SL) is a late indicator, and questionnaires do not reach all occupational health services (OHS) patients and might be conducted several years apart. A need exists for additional and earlier tools to identify those with increased risk of developing a work disability.

At the same time, high use of services has been associated with ill health, chronic diseases and poor quality of life in a general practice setting. Plenty of research has been conducted on frequent attenders (FAs) in a general practice setting, but we lack information concentrated on the working population. Although the existing knowledge suggests possible disability, information on the associations between frequent attendance and work disability are lacking.

Should frequent attendance be associated with disability risks, it could be used as one early indicator to identify patients in need of enhanced support. Service use data are routinely available in the medical records and identification of patients based on attendance rates could yield possibilities in earlier detection of disability risks. Early identification of possible work disability would allow better care coordination and timely rehabilitation measures.

This study aimed to examine the associations of frequent attendance in the context of occupational health (OH) primary care and work disability, as measured through sickness absences and disability pensions (DPs), to understand if frequent attendance could be used as an early indicator to identify disability risks.

## 2 REVIEW OF THE LITERATURE

### 2.1 Frequent attendance in healthcare services

A common perception exists among medical staff of those patients who visit recurrently. This perception has also been verified in several service sectors, such as general practice primary care: A small group of patients creates a disproportionate share of service demand. These patients are defined and characterised in various ways depending on the setting, but the most commonly used term is frequent attender (FA).

In addition to service demand, frequent attendance is associated not only with high costs but also with ill health and lower quality of life. Additionally, multiple and chronic illnesses and unfavourable socioeconomic positions are linked with frequent attendance. As a whole, FAs appear to be a group of patients who have diverse problems and whose needs have not been met. Although accumulating illnesses might indicate a threat to work ability, the current literature allows little understanding of frequent attendance's associations with work disability.

#### 2.1.1 Defining frequent attendance

The variety of definitions used to define high service use creates challenges when comparing FA studies. Perhaps the most commonly used term is FAs, but the terms frequent consulters (1), high users (2) and high utilisers (3) have also been used. The issue of high service use has been approached in some studies through costs, and instead of consultation frequency, high cost users (HCU) (4,5) have been used to describe high services use. It is also notable that studies on frequent attendance have been conducted in several settings: primary care in general practice setting, secondary care and out-of-hours services. I focus on primary care settings in this review, especially when it is possibly generalisable to the working population.

Frequent attendance was defined for some time through a fixed number of visits during a set time period (1,6–8). The time periods used varied from some

months to mostly up to a year (9). Thresholds linked to a practice-specific mean of visits were also used (10). Recently, the most often adopted definition has been proportional, defining FAs according to the chosen top proportion of visits. However, even in this definition, varying proportions have been used, such as the top 3% (11,12), top 10% (13–18) and top 25% of visits (19,20).

Three reviews conducted on FAs (1,9,21) all struggled with the varying definitions, varying inclusion and exclusion criteria and consultation initiative issues. As a whole, although there is a huge number of FA studies, the lack of widely accepted criteria allows only little comparison between the studies and complicates any synthesis formation. However, one of the conclusions drawn by Vedsted et al. in their review was that a proportional approach in defining FAs would allow better comparison between settings (9).

Recently, the proportional approach has been most often used and is perhaps the most widely accepted. A Spanish study in 2010 tested two different cut-off points in a proportional model, 25% and 10%, and concluded that the top decile cut-off appears more advisable (22). Lately, most studies have used the proportional limit of the top 10% of patients using services in a year's time (17,23). Still, studies differ in terms of which visits to include and how the visits are measured (self-report or patient registers). Several studies use self-reported consultation frequency (24,25), but the accuracy of self-reported use of healthcare services has been questioned (26).

## 2.1.2 Complexity of frequent attender definitions

Apart from the rather wide consensus to use proportional limits, no unanimity exists on what other characteristics should be used to define FAs. Sex and age stratification have been recommended by some (27), but another setting proved them to be of little usefulness (22), and stratification in determining FAS is sometimes deemed unnecessary (23,28) when studying restricted populations. The demands for stratification are naturally different in settings that include patients ranging from children to the elderly. In a more homogenous population, such as the working aged, stratification might not be necessary.

Another point to be taken into consideration is that in some FA studies, the visits included are limited to face-to-face contacts and to physician visits alone (29,30). However, the included and excluded visits are not always clearly stated (9). The reasoning behind leaving out staff other than physicians has been that visits to

nurses and other specialists might often be initiated by a physician and, thus, might not reflect patient needs (29). Whether other professionals' visits should also be included depends on the study's setting. It should be evaluated if the use of other professionals expresses patient needs and if patients also have an active role in initiating and actualising the visit.

Control groups are often referred to as non-frequent attenders (non-FA) in studies concerning FAs. Similar to the various definitions of FA, non-FAs are also defined in various ways. If background data are also available on those patients not visiting the healthcare unit, it might be natural to include them in the non-FA population (27). Thus, the control group also constitutes patients not using services at all. Some studies define non-FA as patients who had visited the healthcare unit but did not qualify as FA (13,31).

The use of different reference groups should be stated, as these groups might differ, thus affecting conclusions. When reference groups include patients who have used services at least once, the reference group patient population is likely to suffer from some conditions or symptoms that lead them to contact a healthcare unit. This might imply that there could also be more morbidity present in the control group when including only those who have used services at least once. However, we cannot control for the reasons for non-attendance, and there might be income related reasons, for example, for not attending.

It should be noted here that frequent attendance in healthcare services is no novel finding. Studies of high consultation frequency have been conducted since the 1950s (32). Some of the first studies were mainly conducted by general practitioners (GPs) seeking answers to why some of their patients consulted more often than others (2,33). The more recent trend is to study the persistence of high service use.

### 2.1.3 Defining occasional and persistent frequent attenders

Given the service demand that FAs create, the continuity of high service use has also been studied in recent years. The research is sparse, and the results on persistence of frequent attendance are somewhat incoherent, especially regarding characteristics associated with persistent FAs. Most patients move from one group to another, being FA in one year and not the other and vice versa (23,34,35).

FAs have recently been defined as the highest decile of attenders in a given time period (often a year), so persistent FAs are defined as patients continuing this high

service use in the following years (consecutive or otherwise). There is no uniform definition for persistent FAs, just as there is not for FAs in general. Persistent FAs have been defined as patients who were FAs in a consecutive three-year (36) period or as those patients who were FAs in three out of four study years (37), as well as those who were FAs in at least two out of three consecutive waves, measured several years apart (28). Other definitions of persistent FA have also been employed, for example, the total number of visits in a 2-year timeframe (38,39).

It has been questioned whether or not occasional FAs should be identified and included in interventions. If their service use diminished on its own, is there any reason to identify these patients and invest extra effort in their care (36)? The question, however, is not only a matter of service use. If the aim is simply to reduce visits that diminish on their own, then occasional FAs are not an appropriate group for interventions. However, the interesting question is, what else should be taken into consideration when defining the group in need of an intervention? We need more understanding of the risks associated with occasional frequent attendance – such as work disability – to answer this question.

#### 2.1.4 Frequent attendance internationally

Frequent attendance has been studied widely in the general practice setting. The organisation of primary care varies greatly between countries and, thus, it is difficult to make direct comparisons and adopt other countries' approaches. However, frequent attendance is a phenomenon that is perceived worldwide, despite the differences among healthcare systems. We will next explore the service demand that frequent attendance creates.

The proportion of service demand created by the FAs varies slightly between studies, but using the proportional 10% limit, it is somewhere between 25-40% of visits (13,14,29,40). The service demand has also been examined in light of the associated costs (5,41–44). The top 1% accounted for up to 28% of all healthcare costs and the top 5% over 55% of total healthcare costs (5) in Canada. The increased costs are associated with both primary and secondary care (45).

The studies show that a small proportion of the patients use a vast amount of resources, but there are also patients who use no services at all. Over a three-year period in the Netherlands, 80% of face-to-face visits were conducted by one third of the patients, and another third of enlisted patients did not visit their GP at all

(29). It should be noted that regarding service use, variation exists even inside a country. A Danish study found that the proportions of FAs varied between counties, and the proportion of FAs decreased with increasing urbanisation and the number of enlisted patients on a GP's list (31).

The continuity of frequent attendance varies between settings, but it appears that 15-25% of FAs continue high service use over several years (28,29,35,36), although even a share of 40% continuing as FAs two years in a row has been reported (46). This small group of patients might create a considerable share of the service demand: In the Netherlands, 1.6% of the study population accounted for 8% of contacts (29). The earlier studies that used a fixed number of visits as a definition for FAs found that the proportions of low and high users remained fairly stable, but the patients included in each group varied (47). The service use appeared to increase through the years, and when using proportional limits, more visits were needed to be defined an FA (23,35,48).

Interventions for FAs struggle with the same definition issues discussed earlier. The most promising results have come from an in-depth analysis of patients' needs, status consultations with their GPs to plan their future care, and providing depression management programs for depressed subgroups (49–52).

A noteworthy observation is that, in addition to the patients' characteristics, other factors might possibly influence service use as well. For example, the feedback doctors give on the visits' adequacy and invitations to return might affect patients' consulting patterns (53,54). The results regarding doctors' characteristics on consulting behaviour, however, are not unanimous (45).

## 2.1.5 Frequent attendance in Finland

Frequent attendance in Finland has been particularly researched in both the general practice and the secondary care settings. The definitions used for FAs have varied over the years. However, the service demand created by FAs is also marked in Finland. Some studies concentrate on costs, not attendance rates as such, but they use the costs to describe the demand created by high utilisers.

Some of the most recent studies have aimed to outline service use in different healthcare sectors, and sometimes they also include the social services (55–59). When all costs are combined, specialised care and social services create most of the costs, and OHS costs are minimal in the whole picture (56,57). Table 1 shows the Finnish studies describing high service use.



Additionally, efforts have been made to categorise high utilisers according to their service needs and reasons for attendance (60,61). The names of the groups have been informative and descriptive, for example, “information seekers” and “support seekers” (61).

**Table 1.** Studies describing high service use in Finland

Study	Study design	High service use limit	Age	N*	Source	Service use
Karlsson (62)	Cross-sectional	11 ≥ visits to GP in 1 year	18-64	96	Self-report, questionnaire filled in by GP	Almost 4 times more visits than controls. More visits to other surgeries than primary GP
Jyväskylä (6,63)	Case-control	8 ≥ visits to GP in 1 year	15≥	304	GP medical records	FAs made 23,5% of GP visits More visits than the control group in previous 2 years More visits without appointment 4.7% of the population in the city and 6.8% of healthcare centre's patients were FA
Koskela (37,64)	Longitudinal	8 ≥ visits to GP in 1 year	18-64	85	GP medical records	20% remained FAs in all 4 years. In the first year made on average 11 visits and in the last year 7 visits.
Kapiainen (65)	Cross-sectional	Cost-based cut-offs (expensive = 50 000€ and very-expensive = 75 000€) /year	All	162/705	Several registers	0,3% of metropolitan area inhabitants exceeded the lower limit and 0,1% the upper limit. They accounted for 4% and 14% of healthcare and costs respectively. In the subgroup of very expensive patients inpatient psychiatric care constituted 40% of the costs.
Leskelä (59)	Longitudinal	Top 10% of social and healthcare costs combined	All	-	Several registers	Top 10% created 81% of social and healthcare costs combined. 38% of the top 10% had used only healthcare services
Blomgren (66)	Cross-sectional	Top 5% of costs reimbursed by KELA	>25	-	KELA registers	Top 5% received 40% of reimbursement in private healthcare
Leskelä (58)	Longitudinal	Top 15% according to costs	All	21 068	HUS medical registers	3% of all patients were in the top 15% two years in a row Top 15% created 70% of costs in specialised care Expensive patients often use services from several specialties
Leskelä (57)	Cross-sectional	Top 10% of social and healthcare costs	All	-	Several registers	When also KELA costs are combined top 10% created 73% of costs. The proportion of OHS costs is minimal in the top 10% of all costs

\*Those defined as FA or high utilisers using other definitions of high service use

## 2.1.6 Frequent attenders' characteristics

A vast amount of research on FAs' characteristics exists, and the following will concentrate on those relevant to the working and working-aged populations.

### 2.1.6.1 General characteristics

Several studies conducted in the general practice setting show that FAs are more often female than male (8,9), and attendance rates for women compared to men are higher also in the general population (27,67). Additionally, older age is seen to be associated with high service use (9,27,67) in the general practice population, but contradicting results also exist (46,62), although from fairly small samples.

The results from other sociodemographic characteristics vary to a great degree. Having less vocational training and lack of professional education, having a lower social status, not being in the labour force and experiencing financial pressure were generally associated with FA status in general practice settings in several countries (6,28,62,68). Living alone and being on DP have also been associated with being an FA (16). However, some contradictory results have been presented (38,69).

Some studies suggest that FAs might be more vulnerable to negative life events. Negative life events have been associated with persisting frequent attendance (70), and negative life events were associated in Sweden with long-term SL or DP with FAs but not with control (15).

### 2.1.6.2 Morbidity

Although FAs' morbidity seems to vary from one setting to another, some similarities exist. Several studies have found that FAs have more diagnoses and chronic diseases than other healthcare users (6,9), more somatoform disorders, anxiety and other mental health problems and ill-defined pathologies (6,9,38). They have higher scores on depression scales, and depression was found to be predictive of frequent attendance (10). Multimorbidity is also seen as characteristic of FAs (9).

Mental health illnesses appear to play a crucial role in frequent attendance. Health anxiety has been linked to FA status in both GP and specialist services (71), and somatisation is seen as associated with FA status (72). Generalised anxiety disorder was associated in a large Finnish cohort with using more healthcare

services (25). Additionally, difficulties falling asleep and use of anxiolytics, antidepressants, sleeping medication and pain relief were associated with FA status compared to non-FAs and also persistent FAs compared to other FAs (28).

Musculoskeletal disorders have also been associated with frequent attendance in the working aged (14) and also in general practice settings not restricted to the working aged (6). FAs have more injuries than controls, and their consultations for these injuries were seen as medically appropriate (73). This suggests that FAs' high service use is not at least solely due to their lower threshold for seeking help.

In addition to the aforementioned, medically unexplained symptoms (MUS) have also been associated with FA status (54,74,75). Patients with MUS who are often referred to secondary care had higher odds for depression and anxiety, also untreated, than patients only rarely referred to secondary care (74). Self-perceived health and experienced symptoms are also associated with increased healthcare utilisation (76,77).

Table 2 lists the diagnostic groups found associated with FA status in the working aged. These studies, although conducted on working-aged populations, are conducted in the general practice setting, because GPs also treat the working population in several countries. The population using these services (including the unemployed, the disabled, those with financial problems, etc.) might differ from that in the OH primary care setting, possibly accentuating different characteristics than are present in the working population.

**Table 2.** Morbidity associated with frequent attender (FA) status in the working-aged patients

Study	Country	Study design	FA-limit	N	Source	Type of morbidity
Karlsson et al. (62)	Finland	Cross-sectional	11 $\geq$ visits to GP in 1 year	96	Self-report, questionnaire filled in by GP	Multiple diagnoses, mixed problems (psychiatric and physical)
Karlsson et al. (78)	Finland	Cross-sectional	11 $\geq$ visits to GP in 1 year	96 (53)	Self-report, questionnaire filled in by GP, psychiatric interview (53)	Previous psychiatric treatment, psychiatric symptoms, mixed problems (psychiatric and physical)
Karlsson et al. (79)	Finland	Cross-sectional	11 $\geq$ visits to GP in 1 year	96	Self-report, questionnaire filled in by GP	Elevated symptoms of anxiety or depression; the self-reported need for psychiatric care not similarly elevated
Vedsted et al. (18)	Denmark	Cohort	Top decile	48	Self-report questionnaire; GP medical records	Psychological distress is associated with becoming a FA
Bergh et al. (14)	Sweden	Cross-sectional	Top decile	183	GP medical records	Musculoskeletal diseases, Symptoms group, Respiratory diseases*
Gili et al. (80)	Spain	Cross-sectional	12 $\geq$ times in 1 year	318	Interview	Depressive disorders, somatoform disorders
Pymont et al. (28)	Australia	Cohort	Top decile	328	Self-report	Diabetes, Asthma, Thyroid, Arthritis, Depression

\*women only

### 2.1.6.3 Disability

Frequent attendance is linked to chronic illnesses and accumulating health problems as well as to unfavourable social conditions. These findings suggest that FAs might also be at risk of disability.

It has been noted that in general practice settings, being on a DP was associated with being an FA (6,62,68,81). Additionally, patients who were on an SL or a DP were more likely to use health services in excess (22,69). This is understandable, as sickness certification is an indication of health problems, and certification itself often requires visits to the physician. In Sweden the group of FAs received 44% of all SL certificates given (14). Pain-related disability was also associated with more self-reported healthcare use at the primary care level but also in other healthcare services (82).

A Swedish study aimed to find predictive factors on DP and long-term SL for FAs (15). During five years of follow-up, almost one out of four FAs received an SL over 180 days or a DP compared to 6% of controls (15). Chronic diseases were predictive of DP for both controls and FAs, but negative life-events also showed predictive value for FAs (15).

#### 2.1.6.4 Characteristics of persistent frequent attenders

Some patients persistently continue high service use. The characteristics associated with continuing frequent attendance in a general practice setting, not restricted to working-aged patients, have been female gender (35), long-term illness (29,83), self-reported limitations and disability (83), panic disorder (70) and feelings of anxiety (29), lack of mastery (70), illness behaviour (70), medically unexplained physical symptoms (29) and social problems (29). Use of a fixed number of visits as a limit for FAs hampers generalisation in some of these, and inclusion of all patients above 18 years does not allow generalisation to the working population.

The two studies focusing on working-age patients and persistent frequent attendance have detected an association with depression, diabetes and asthma (28). Previous frequent attendance, female gender, fear of death, irritable bowel syndrome, abstinence, low patient satisfaction and overweight were predictive of persistent FA (37,64) in Finland in a small, selected sample. Both were based on self-reports, and the scarcity of studies allows few conclusions to be drawn.

Prediction of frequent attendance has proven difficult. Predictive value has been shown in chronic somatic disease, number of active medical problems and existence of a psychological problem (36), particularly anxiety and depression (84). Analgesic prescriptions also showed predictive value but no other medications did (36,85). Previous high service use is predictive of future service use, and a specific diagnosis is associated with a future visit for the same illness (83).

Care for the working aged is scattered in several countries and managed mostly by GPs without contact with the workplace. However, the working population has demands set by working life, and in Finland, occupational health services (OHS) is specialised in care-coordination of the working. Next, we will look into how OHS is organised and how frequent attendance in this context could be taken into consideration.

## 2.2 Occupational health services

The role of OHS delivery varies between countries. The working population is treated in most countries by GPs, and OHS has only preventive functions. In Finland, OHS also provides primary care services and has an essential role in supporting work ability through cooperation with employers. FAs of the working population could be identified in the OHS when primary care services are

available, and this allows for timely interventions at the workplace and evaluation of patient needs.

## 2.2.1 Occupational health services internationally

OH services are organised in various ways depending on the country. Although a common goal exists to provide OHS for all, major inequalities in access to OHS are still seen (86). Most countries have a policy to cover OH and safety, but other areas related to workers' health are often varied or missing (87).

OHS policies and planning of OHS exist in most countries, but their implementation is inadequate in most countries (88). Primary care services in the OHS are rare (89). For example, in the Netherlands, where OHS coverage is almost 100%, OHS include inventories of health hazards, periodic health examinations, pre-employment check-ups and rehabilitation on return to work (89).

## 2.2.2 Occupational health services in Finland

OHS in Finland has a significant role in sustaining and improving an employee's work ability and health through mandatory, preventive functions. Additionally, the Finnish OHS plays an essential role in providing primary care services for the working population and, thus, in supporting the preventive functions.

### 2.2.2.1 Organisation of occupational health services

The OHS organisation and functions in Finland are legislated by law (90,91). The OH services are divided into obligatory preventive services and voluntary primary care services. All employees must be covered by preventive OHS, paid by the employer and free of charge for the employee. The costs of OHS are partly subsidised by KELA to the employers (92), and this funding is collected from employers and employees through an insurance plan.

The key mission of the OHS is to prevent work-related hazards and work disability and to foster employee health. OHS can be organised by the employers in several ways and by different service providers (90). Through the 21<sup>st</sup> century, there has been a tendency to form larger units to provide OHS, and more and

more of these services are concentrated among private service providers (93). The coverage of the Finnish OHS is good and is evaluated to be 96% (93). It is noteworthy, however, that employers can freely choose their OHS provider and, thus, there can be several changes in the OHS provider, leading to discontinuity of care. Unemployment leads to transition of care to other service sectors.

OHS is a multidisciplinary field in which the necessary professionals are to be used in planning and executing the mandatory functions (90). The OHS multiprofessional team constitutes a physician, nurse, physiotherapist and psychologist, and most OHS professionals are specialised in OH (90,93). Physiotherapists, psychologists and other medical specialists can be consulted after a referral from a nurse or a physician. The multiprofessional approach is seen as necessary to take advantage of the diverse knowledge on the associations between work and health.

#### 2.2.2.2 Preventive functions of occupational health services

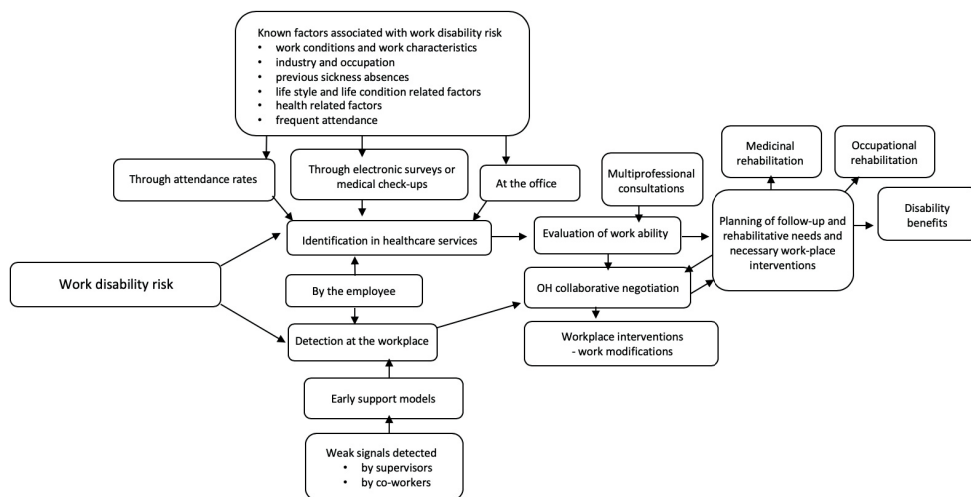
The preventive functions of the OHS in Finland include, among others, promotion of employees' health, work ability and functioning capacity (90). The OHS provides OH check-ups, participates in prevention of occupational hazards and illnesses and promotes work place health and well-being (94). Counselling on rehabilitative needs and evaluation and follow-up of work ability in patients with lowered work ability is also mandated.

The weight of the preventive services has shifted in the past 10 years from workplace hazard prevention to work ability support and disability prevention (95). Promotion and follow up of work ability are seen as a crucial tasks of the OHS, and better co-operation between different service sectors is seen as necessary (96). The coordinating role of the OHS is also perceived as necessary when evaluating long-term work ability (97). This coordinating role of the OHS could be exploited in the care coordination of the FAs, if seen as necessary. Timely actions to detect decline in work ability and to initiate rehabilitative actions, both in the workplace and outside, are essential functions of the OHS (98–100). Effective measures are still needed to identify patients at risk of work disability, such as the FAs (figure 1).

A special feature of the Finnish OHS is OH collaborative negotiation. This is a three-party negotiation during which the employer, employee and OH professional, mostly physicians, meet to discuss work ability issues. The negotiation is confidential and focuses on work-ability issues rather than illnesses



and is often initiated by long sickness absences (101). The negotiation is often essential when work place modifications are needed, and a modification to an employee's work or working time was agreed upon in one third of negotiations (102).



**Figure 1.** Attendance rates as one of the means to identify an employee's work disability risk.

### 2.2.2.3 Occupational health primary care

OH is an important primary care provider for the Finnish working population; it functions in parallel with both municipal and private primary care services. It is voluntary to organise, but it is well used and is available to almost 90% of the working population (93). Acute and chronic illnesses and typical primary care issues are treated in the Finnish OH primary care system, in addition to work-related issues and issues related to work ability. A patient can choose where to attend for primary care issues, but three out of four patients having visited OHS named their OHS unit as their main primary care provider (103). OH primary care is often used as the sole primary care provider for the working population (104).

The emphasis of the OHS in primary care is steered through regulation and primary care is used to support the preventive functions of the OHS by identifying individuals at risk of lowered work ability from the primary care appointments.

The work-relatedness of patients' visits and their work ability should be evaluated during primary care visits (105,106). Additional indicators of work disability, such as attendance rate, can add to the existing indicators, thus allowing for earlier and more complete identification of those patients in need of more support.

When primary care is included, it is used well. Patients with a primary care plan visit OH physicians more than other physicians (107) and often consider their OH physician as their preferred physician (104). The role of OHS in primary care also appears to have increased through the years (103,108,109). Age and gender are probably not associated with visits to OHS, although female gender was previously associated with physician visits in OH primary care (107,108). Despite the multiprofessional approach in the OHS, physician visits comprise 70% of primary care visits conducted in the OHS (110). The use of OH primary care probably depends on service's availability and on the primary care plan's coverage (111). Employers can decide the contents of the primary care provided in the OH primary care services; thus, there might be limitations, for example, to the laboratory examinations available. Physician and nurse services are usually available on demand.

Musculoskeletal and mental disorders are the most common reasons for work-related visits in OH primary care; musculoskeletal disorders were the main reason for 22% of the visits to OH physicians (112). Visits to OH primary care are also associated with work-related symptoms and long-lasting illnesses affecting work ability (108,113). Work-related illnesses are also common in the working population: One fourth of employees reported long-lasting, work-related illnesses during the past 6 months and two thirds reported long-lasting or recurrent musculoskeletal symptoms in the past month (114). Additionally, musculoskeletal disorders are one of the typical illnesses of the working-aged FAs in general practice settings.

Finnish OH primary care is an excellent setting to study primary care of the working population. The GP manages the primary care of the working population in other countries. GPs are less equipped to manage issues related to work and work ability without close contact with the employees and specialisation in OH issues (115). For example, an early consultation with OH has proven effective in reducing sickness absences (116).

## 2.3 Work disability in Finland

Findings from studies on FAs are suggestive of possible work disability, because FAs suffer from accumulating illnesses and illnesses often related to work disability. Being out on SL or DP is also associated with FA status.

### 2.3.1 Sickness absences

Sickness absences in Finland are estimated to cost 3,4 billion euros every year (117). Over 280 000 individuals received a sickness allowance (paid after 10 days of sickness absence) from KELA (118) in 2017. The largest diagnostic groups which are compensated through sickness allowances are musculoskeletal and mental disorders. Over 4 million days were compensated through KELA for both these groups (118). When measured as compensated days, mental and musculoskeletal disorders both have a share of approximately 30% (118).

There was a downward slope in sickness absences for years, but recently this positive development has stopped. The change was observed in mental disorders, which showed an ascent, while the decline in musculoskeletal disorders ended (119). The majority of mental health-based SLs are due to depression and anxiety disorders, and the ascent was seen in both groups (120).

Sickness absences generally require a medical certification from a physician, at least when the absence persists. Self-certified sickness absences have recently become increasingly common (121) in multiple sectors. Partial sickness absence solutions (122) are also employed more often and are seen associated with a partial DP instead of a full DP (123).

No comprehensive record exists of short-term sickness absences (<10 days), because these are not present in the KELA registers. A research study of public sector employees from Helsinki has shown that short (1-3 days) sickness absences based on self-certification were most common with young employees (124). These short sickness absences are also noteworthy, however, as they are seen as indicative of longer absences (125,126). Additionally, it has been shown that recurrence of sickness absences is particularly strong with musculoskeletal and mental diseases (127).

Particularly important are the long SLs. Sickness absences longer than 15 days are shown to predict future disability (128), and the association grows stronger as sickness absence persists (129). This is particularly true for mental disorders and musculoskeletal diseases (130,131). Long sickness absences are also seen as predictive of unemployment (132,133) and are associated with unfavourable economic conditions (134). Thus, to prevent work disability and withdrawal from the working force, early detection of individuals at risk of disability is necessary. At the present, OHS units conduct follow-up OHS based on sickness absences (135), but earlier measures, such as attendance rates, would be welcome. A study conducted in OH primary care found that a sickness absence certificate was given on 21% of all visits (112). The proportion was even larger when the reason for consultation was mental (47%) or musculoskeletal disorders (38%) (112). When evaluating sickness absences, it should be noted that factors other than illness also affect sickness absenteeism. For example, education (136), occupational differences (137), age (138), gender (139), low decision latitude (140) and work-family characteristics (141) might affect sickness absences.

Some patterns of sickness absences are widespread, and musculoskeletal and mental disorders also dominate sickness absence statistics elsewhere (142). Even though there are differences in the social security system, even between the Nordic countries, that hamper comparisons, the distribution of sickness absences of different lengths is fairly similar (122). When considering the European countries, variation in social security is even larger; thus, a meaningful comparison is difficult (143).

### 2.3.2 Disability pensions

DPs in Finland were on a positive decreasing slope for years, just as sickness absences were. This positive development ended in 2018 for reasons yet unknown. The vast majority of DPs are linked to the same diagnostic groups as are sickness absences – musculoskeletal and mental disorders (144). Concurrently, the same illnesses are linked to FAs. In Finland in 2017, 42% of DPs were based on mental and 26% on musculoskeletal disorders – the proportions are alike also in fixed-term DPs (144).

The DPs are funded by legislated insurance paid by both employees and employers. A DP may be granted to an individual with a lowered work ability due to an illness over a one-year duration. One can receive several kinds of disability

benefits when entitled to them. Partial fixed-term and fixed-term DPs are granted when rehabilitation is expected, and the benefit is given for the duration expected for rehabilitation. Full-time DP and partial DP may be granted permanently when no rehabilitation is expected. Work ability must be reduced by at least 3/5 to receive a full DP and by 2/5 for partial disability benefit (144).

Additionally, a vocational rehabilitation allowance is a possibility that can be used when there is work ability left, but someone is unable to continue in their previous work. During the years 2005-2014, the time spent on DPs decreased in all other groups except for women with DPs based on mental and nervous diseases (145). The increased use of fixed-term DP benefits might affect the time spent on DPs, because this more flexibly allows return to the workforce (145).

Certain risk factors associated with DPs are known, such as age (146), poor self-perceived health (147), chronic disease (147), comorbid common mental disorders (148) and physical illnesses (149), short education (150), occupational class (151) and previous long-lasting sickness absence (129). Unemployment has also been found to be predictive of DPs (152), especially when associated with a DP based on mental disorders.

Patients suffering from mental and musculoskeletal disorders have particularly shown an increasing number of sickness absences even 10 years prior to a DP (153). The same analysis showed that participation in rehabilitative measures increases in the year prior to a DP grant, but that is not well used during the previous ten years (153). It should also be noted that one study found an increase in symptoms such as depression, anxiety and somatic symptoms prior to a DP award, but after the DP, symptoms returned to the levels prior to the DP award (154). A Scottish study also found an increase in GP use three years prior to a disability claim (155).

These disability benefits (permanent full-time and partial DP, fixed-term full-time and partial DP and vocational rehabilitation allowance) grouped together embody the possibilities to support return to work force when feasible but which are also part of social security. They are all awarded when there is threat of disability to one's work and thus signal work ability risk or already actualised disability.

## 2.4 Gaps in previous literature

Although a vast amount of research on FA characteristics in general is available, the information on the working-age population is sparse. There is also no previous research concentrating on the working population. Given that work has beneficial effects on both the health (156) and on the demands it makes on a person's performance, it is crucial to also study the working population separately.

We lack information on the characteristics of FAs in OH primary care in the context of Finnish healthcare system. OH primary care is a large service provider for the working population; thus, it is necessary to evaluate which factors are associated with high service use in this context. We also need information on occasional and persistent FAs' characteristics in this context and the factors that possibly differentiate these groups.

Additionally, very little is known about the associations of frequent attendance and work disability. Being on a DP or an SL is associated with FA-status, but otherwise the associations of frequent attendance and SLs and DPs are unknown, especially since long sickness absences are associated with the risk of DP in the future (128). We need more information on the associations of occasional and persistent frequent attendance with SLs of different lengths. We also lack information on how occasional and persistent FAs possibly differ in this aspect and whether the illnesses leading to DP are different.

Understanding of the associations of frequent attendance and disability is crucial when determining which groups to identify for greater support and interventions.

### 3 AIMS OF THE STUDY

Frequent attendance is linked to ill health, chronic diseases and poor quality of life. Attendance rates can be detected through electronic medical records, and if associations with future risks of disability are found, they could be an indicator used in early detection of disability risks and rehabilitation needs. However, so far there little is known about the associations of frequent attendance with work disability. We also lack information on frequent attendance in the context of the working population.

This study's aim was to characterise frequent attenders in the context of OH primary care and to examine the associations of frequent attendance with work disability that is evaluated through sickness absences and disability pensions.

The specified aims were:

I. To clarify what characterises frequent attenders in occupational health primary care.

II. To clarify how occasional and persistent frequent attenders in occupational health primary care differ in terms of characteristics, attendance rate and morbidity.

III. To analyse how occasional and persistent frequent attenders differ from each other and from non-frequent attenders in terms of sickness absence lengths and reasons for absence.

IV. To analyse associations between occasional and persistent frequent attenders and disability pensions.

## 4 MATERIALS AND METHODS

### 4.1 Study setting

I-IV: Two different settings were employed in the study. The first study (I) was a cross-sectional study using data from 2015. The later studies (II, III and IV) were longitudinal using data from years 2014-2016; study IV used follow-up data until 2017. All studies were conducted using electronic medical record data from Pihlajalinna Työterveys (I-IV) and combining it with register data from FCP (IV).

Pihlajalinna is a large, private OH provider operating nationwide. Pihlajalinna has several business units, but this study used data only from the OH units. Visits to OH units are registered in a different record base, although using the same medical record system as private units, and can be thus analysed separately. Pihlajalinna Työterveys's (later Pihlajalinna) clientele consists of a wide range of the working population around Finland from a variety of industries, from both rural and urban areas, and with representation from different company sizes. The comparison to the general working population in Finland is challenging due to varied company size categorisations, but it is fairly representative of the general working population (appendix A).

Corporate acquisitions and organic growth occurred during the study period (2014-2016), which increased the study population during the study years. At the end of 2014, there were 60 427 individual OH clients, while at the end of 2016 there were 89 282 registered OH clients.

The data were obtained from Pihlajalinna medical records, including pseudonymised ID-numbers. Data used for the study included all primary care visits to healthcare professionals (physicians, nurses, physiotherapists and psychologists) and also specialist consultations. The aim was to include all visits initiated by patients' needs and, thus, illness-related visits in the KEELA I (preventive services) category were also included. Diagnostic codes using the International Classification of Diseases, 10th edition (ICD-10), were also obtained for the visits registered through the study years 2014-2016. The data also included employee sex and age and their employers' industry and size. We also obtained sickness absences registered through the study years. The short (1-3 days) self-



certified sickness absences and sickness absences given outside of the OHS are also registered for most employers to ensure correct sickness absence data. The OH collaborative negotiations held were also collected.

Study IV combined the medical record data with register data acquired from the FCP. Data obtained from the FCP included decisions on disability benefits and the diagnostic codes associated with the decision (decisions in years 2015-2017). The FCP data were combined using pseudonymised ID number at the FCP, and the pseudonymised data were sent to Tampere University for analysis.

The study was approved by the Pirkanmaa Hospital District Ethics Committee (ETL R16041) and the National Institute of Health and Welfare (THL/556/5.05.OO/2016). According to the Personal Data Act (22.4.1999), individual consent was not needed, because this is a large-scale, register-based study in which no single participant could be recognised.

## 4.2 Study design

The inclusion criteria were same in the cross-sectional and the longitudinal studies. The inclusion criteria were age between 18–68 years, a primary care plan and at least one primary care face-to-face contact with an OH primary care unit during the study years (2015 in I and 2014-2016 in II–IV). Based on invoice codes, all visits that were general medical examinations or mandatory occupational safety examinations were excluded, because they are not initiated by the patient nor necessarily illness related. Contacts that were not conducted face-to-face (e.g., telephone calls or prescription renewals) were also excluded.

FAs were categorised in the same manner in all the studies (I-IV). Frequent attendance was defined as the top decile of attenders for each year. Visits to physicians, nurses, physiotherapist and psychologists were used to determine the top decile of attenders (frequent attender 10% = FA). Based on this, the limit for FA was set at 8 visits. The patients who had at least one visit to the OH unit but could not be considered FA were used as the reference group (non-FA); they made 1-7 seven visits yearly.

In the first cross-sectional study (I) the whole OH clientele consisted of 68 370 employees. Of these, 45 999 patients visited the OHS in 2015. After the exclusions there were 31 960 patients included in the study. To determine FAs, visits to OH units during 2015 were used.

In study II our initial data comprised 78 507 patients (2014-2016). After the exclusions our study comprised 66 831 patients. In this study those patients who were in the top decile of attenders in any one of the study years (2014, 2015 or 2016) were named 1yFA. The patients in the top decile in any two study years were named 2-year-FA (2yFA). Those patients in the top decile in all three study years were considered persistent frequent attenders (pFAs). Patients who were never in the top decile were categorised non-FA.

The initial data comprised 78 507 patients in studies III and IV. Patients who were FA in 2014 but not after this were categorised as 1yFA representing occasional FA. Patients who were FAs during 2014–2016 were categorised as pFAs. Patients who were never FAs were used as a reference group (non-FAs). To account for confounding, patients who were FAs in 2015 or 2016 but not during all study years were excluded, because they might represent neither occasional nor persistent FAs, nor could they not be considered non-FAs. Their follow-up time might also have varied. Thus, the whole study population in studies III and IV comprised 59 676 patients.

## 4.3 Measures

Different measures characterising FA and associated with FA status were studied. Those most crucial measures when examining frequent attendance in OH primary care are presented here.

### **Characteristics (I and II)**

The study population was divided by sex and into four age categories (18–34, 35–44, 45–54, 55–68) for characterisation purposes. Employers were 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; the ten largest industries were analysed separately, and the ten smallest were combined as one group and named as others. Studies I and II analysed the characteristics of FAs and their associations with FA status.

### **Morbidity (I and II)**

The main diagnoses (the first diagnoses) registered for each physician visit were categorised according to the chapter headings of ICD-10. Material was used from the study years 2014-2016. The ten largest ICD-10 groups were considered

separately, and smaller groups were combined into others. In a deeper analysis, subgroups were defined in more detail based on the leading causes for DP and sickness absence in Finland (for example depression, F32–F33) and linkage to frequent attendance in previous studies (14,29,64,78). These were used to analyse reasons for attendance in more detail. Studies I and II analysed the morbidity associated with visits.

### **Attendance rate (I and II)**

Studies I and II analysed the different FA groups' attendance rates. Attendance rates with different healthcare professionals (physicians, nurses, psychologists, physiotherapists and specialists) were also analysed separately for different study years 2014-2016 (II).

### **OH collaborative negotiation (I, II, IV)**

Attending an OH collaborative negotiation during the study period (2014-2016) was examined as a characteristic of the different groups; Study II tested the statistical significance between the different groups.

### **Sickness absence (III)**

Sickness absences were analysed for the study years 2014-2016. Sickness absence episodes were divided into groups according to their length: no absence, short (1–3 days), intermediate (4–14 days) and long ( $\geq 15$  days) absence (83). Additionally, the total number of sickness absence days yearly was analysed with two different categorisations (0, 1–15 or  $>15$  days per year and short (1–3 days) intermediate (4–14 days) and long ( $\geq 15$  days)) (128).

Self-certified and nurse-certified sickness absences were included when sickness absences yearly were examined. Only physician-certified sick leaves were used in the analysis of diagnostic codes associated with sickness absenteeism. All sickness absences are thoroughly registered into Pihlajalinna's database for one of the largest employers in Pihlajalinna's client list. The proportion of short sickness absences (including self-certified) of this employer was compared to the proportion of the rest. The proportions were fairly similar, indicating that the short absences are also adequately represented in the registers.

## **Disability pensions (IV)**

Data from the FCP included decisions on different disability benefits and the diagnostic codes associated with the decisions. The decisions were obtained from years 2015-2017. The main outcome measure was permanent full-time DP as registered on FCP registry. Secondary outcome measures included partial fixed-term DP, partial DP, fixed-term DP and vocational rehabilitation allowance. Study IV analysed the associations of FA status and different disability benefits.

## **4.4 Statistical analysis**

Descriptive statistics were used to examine and characterise the data. The first study (I) compared FA to non-FA. The second study (II) compared 1yFA to 2yFA, pFA and non-FA. The later studies (III and IV) compared groups of 1yFA, pFA and non-FA and analysed differences between the groups. Statistical significance was tested using Pearson's chi square when examining the number and distribution of visits between different professional groups, the distribution of diagnoses, attendance at OH collaborative negotiations, demographics, and data concerning the employer size, industry and FA status (I, II, III). One-way ANOVA was used to analyse the number of visits to different health care professionals as a whole and the distribution of visits between different professional groups in the different study years and all study years (II). The Kruskal-Wallis test was used to analyse differences between the groups in the number of diagnoses (II) representing morbidity and in sickness absence lengths (III). P values less than 0.05 were considered statistically significant. Statistical analyses were conducted using IBM Statistics V.23 and R.

Multinomial logistic regression was used to analyse the association of frequent attendance with the chosen variables. The first study (I) analysed the associations of FA status with gender, age, participation in OH collaborative negotiations, chosen diagnostic groups and employer background data. The second study (II) used logistic regression to analyse associations of these variables with different FA status allowing comparison between the groups. The third study (III) used multinomial logistic regression to examine the lengths of sickness absences associated with different FA groups. The fourth study (IV) examined different DP decisions with multinomial logistic regression and compared the FA groups with each other. Adjusting for confounding factors was conducted using sex, age, field of industry, company size, cancer-diagnosis, and the number of ICD-10 diagnoses

were used when possible. Cancer diagnosis was chosen, because these patients are often treated outside the possibilities of the OHS. A certain number of sickness absence days is usually required before disability benefits can be granted. Despite this, the analyses were adjusted for sickness absence days in the IV study model 2 to show the close association between prior sickness absence and DPs and to examine could independent association be shown.

## 5 RESULTS

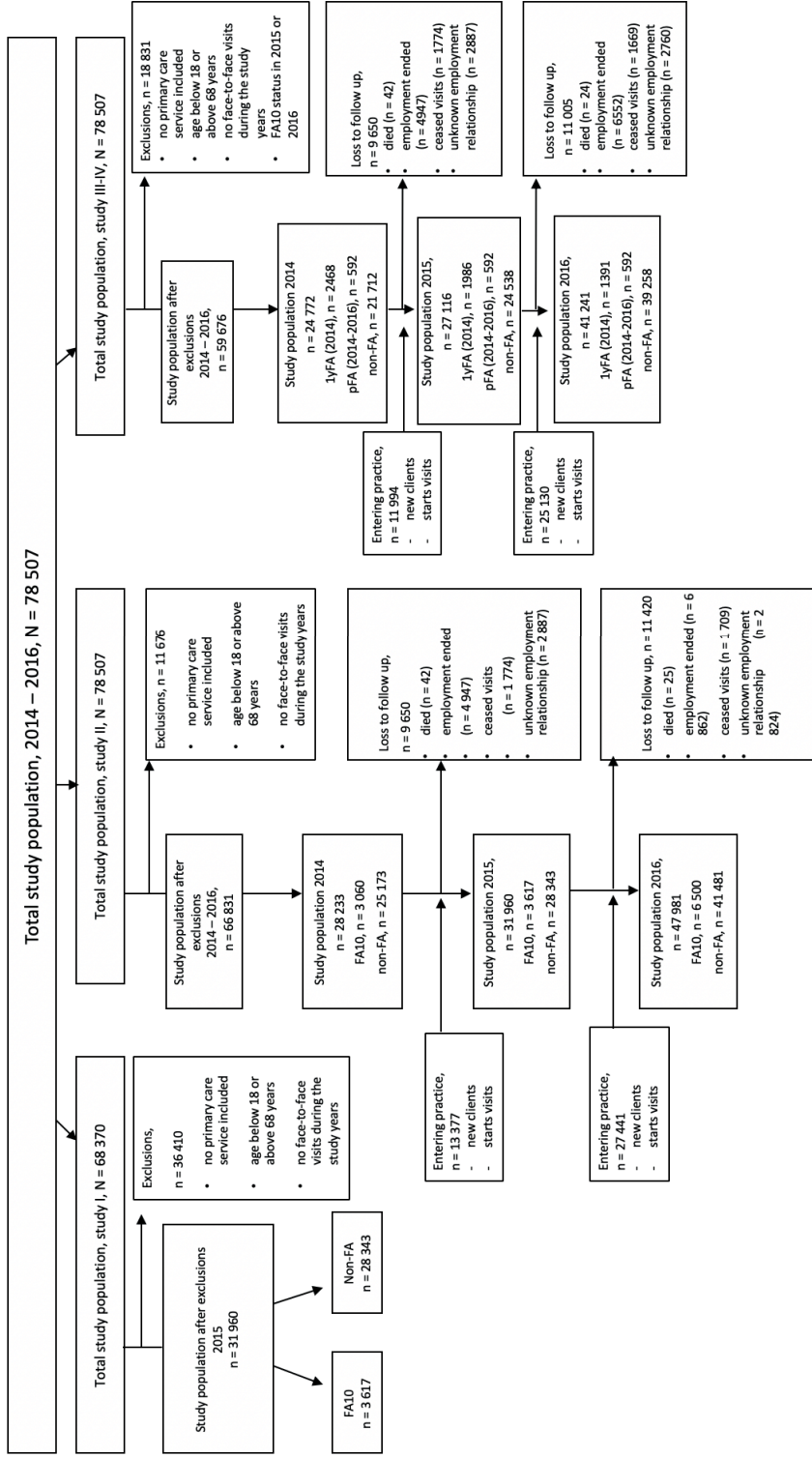
### 5.1 Characteristics of frequent attenders in occupational health primary care

The first study characterised FAs in OH primary care. Altogether, 31 960 employees with a mean age of 43 years met the inclusion criteria in 2015 (figure 2). The FA group (n = 3617) accounted for 36% of all visits to the OH primary care. The mean number of visits for the whole study population was 3.7 per year per person, and the FA group consulted the OH unit at least eight times. The maximum number in the group of visits was 60 in 2015; the average number of visits for FAs was 12 (median 10) times in 2015.

Half of the FAs were men (n = 1811), while 58% were men in the whole study population (table 3). FAs were proportionally more often employed in large and medium size organisations than in micro and small employers. The FAs' visits were mostly with the physician (70%), and the rest were with a nurse, physiotherapist or psychologist (14%, 11% and 5%, respectively). One fifth of the FAs had visited a specialist, while only 8% of the non-FAs had done so.

Female sex and working within the manufacturing industry or human health and social work were associated with FA-status in this setting of OH primary care. There was no association with older age and FA-status.

When looking at the visits conducted by the FA group, 30% were due to musculoskeletal diseases, 19% due to respiratory diseases, 12% to injuries and 8% to mental and behavioural disorders, while the proportions were 23%, 24%, 10% and 4% for the non-FA groups, respectively.



**Figure 2.** Flow of the study populations in studies I-IV

**Table 3.** Characteristics of frequent attenders (FA) in 2015 compared with non-FA in logistic regression (adjusted for age, sex and industry when possible) (N = 31 960).

Factor	FA (n = 3 617)				non-FA (n = 28 343)	
	n	%	OR	95% CI	n	%
Sex						
Male	1811	50	1.00		16496	58
Female	1806	50	1.41	1.31-1.51	11847	42
Age						
18-34	840	23	1.00		8307	29
35-44	908	25	1.07	0.93-1.26	6741	24
45-54	984	27	0.84	0.65-1.08	6754	27
55-68	886	25	0.86	0.61-1.22	5641	20
OH collaborative negotiation	323	9	9.58	8.11-11.33	266	1
Specialist consultation	901	25	3.89	3.56-4.24	2224	8
Physiotherapist consultation	1489	41	6.04	5.59-6.52	2868	10
Psychologist consultation	232	6	2.12	1.82-2.47	825	3
Industry						
Manufacturing	1398	39	1.65	1.53-1.78	8510	30
Wholesale and retail trade; repair of motor vehicles and motorcycles	313	9	0.74	0.66-0.84	3214	11
Human health and social work	433	12	1.18	1.05-1.32	2584	9
Public administration and defence; compulsory social security	346	10	1.10	0.97-1.25	2117	8
Professional, scientific and technical activities	183	5	0.88	0.75-1.03	1680	6
Construction	124	3	0.64	0.53-0.77	1706	6
Transporting and storage	141	4	0.78	0.65-0.93	1516	5
Information and communication	119	3	0.68	0.56-0.82	1421	5
Administrative and support service activities	79	2	0.63	0.50-0.80	1002	4
Accommodation and food service activities	73	2	0.58	0.45-0.73	168	3
Others	409	11			3625	13

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

FA = Patients who were in the top decile of attenders in 2015

non-FA = Patients who were not in the top decile were considered as a reference group, non-frequent attenders.

Modified from I, with permission.

Mental and behavioural disorders and musculoskeletal diseases increased the likelihood of belonging to FA more than other diagnoses in this setting. Both increased the probability of being in the FA group fourfold. When looking in more detail at the diagnostic codes associated with FA-status (data not shown), in particular depression, phobic and anxiety disorders, adjustment disorders and reactions to severe stress and bipolar disorders was associated with FA-status in 2015. Illnesses of the back, spine and upper extremities and illnesses of the neck, cervical spine and tension headache increased the probability of being FA over threefold.

OH collaborative negotiation, specialist and physiotherapist consultation and, to a lesser extent, psychologist consultation were also associated with being FA.



## 5.2 Differences between occasional and persistent frequent attenders in occupational health primary care

The second study examined differences between occasional and persistent FAs. The study population that met the inclusion criteria comprised 66 831 patients in 2014-2016 (figure 2). The study population was categorised into pFA (592, 0.9%), 2yFA (1603, 2.4%), 1yFA (6528, 9.8%) and non-FA (58 108, 86.9%). The proportion of women FAs increased in 2yFAs (53%) and pFAs (56%) compared to 1yFAs (50%).

As frequent attendance persisted, the proportion of physician visits also increased so that 72% of 2yFAs' and 74% pFAs' visits were with a physician, while 71% of 1yFAs' consultation were physician visits in the 2014-2016 study population (table 4). The use of other healthcare professionals increased as frequent attendance continued. The group of pFAs consulted with psychologists, physiotherapists and specialists more often than non-FAs and 1yFAs do. The likelihood of having attended an OH collaborative negotiation also increased continuing frequent attendance (table 4).

**Table 4.** Comparison of occasional (1yFA) and persistent frequent attenders (pFA) (2014-2016)

Characteristic	1yFA (2014-2016), n = 6528		pFA (2014-2016), n = 592	
	n	%	n	%
Sex				
Male	3270	50	262	44
Female	3258	50	330	56
Age				
18-34	1661	25	128	21
35-44	1641	25	147	25
45-54	1889	29	187	32
55-68	1337	21	130	22
Professionals visited				
Nurse	4119	63	460	78
Physiotherapist	2932	45	425	72
Psychologist	1174	18	196	33
Specialist consultation	1851	28	348	59
OH collaborative negotiation	219	3	139	23

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

1yFA = Patients who were in the top decile of attenders in one of the study years (2014, 2015 or 2016)

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

Modified from II, with permission.

The group of pFAs visited a healthcare professional yearly more than five times more often than non-FAs do. The differences were especially marked for physician visits, but there was the same kind of tendency for any professional (table 5). pFAs made 10 times more primary care visits, most of which were physician visits, compared to non-FA for all three study years. When comparing pFA with 1yFA,

there were 3 times more visits to any professional during the study years and a similar tendency for physician visits. The median visits also increased over the study years in the 1yFA group.

Physiotherapists were consulted on average 1.3, 4.0 and 0.2 times (md 0, 2 and 0) by 1yFA, pFA and non-FA, respectively, over the three-year period. Psychologists were consulted on average 0.6, 1.4 and 0.08 (md 0) times by 1yFA, pFA and non-FA, respectively, over the same period. Psychologist and physiotherapist use were associated with pFAs. The association with physiotherapist, psychologist, and specialist consultations increased as frequent attendance persisted.

**Table 5.** Association between visits and frequent attender status (1yFA, pFA and non-FA) (n = 28233-66831)

Characteristics	Visits, any professional		p-value
	md	md	
2014 (n = 28 233)			<0.001
1yFA	4	3	
pFA	11	9	
non-FA	2	2	
2015 (n = 31 960)			<0.001
1yFA	5	4	
pFA	13	10	
non-FA	2	2	
2016 (n = 47 981)			<0.001
1yFA	8	5	
pFA	11	8	
non-FA	2	1	
2014-2016 (n = 66831)			<0.001
1yFA	13	9	
pFA	37	28	
non-FA	3	2	

p<0.001 in all values (one-way ANOVA), md = median, FA status was defined as the top decile of attenders (frequent attender 10%)

1yFA = Patients who were in the top decile in one of the study years (2014, 2015 or 2016)

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

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

Modified from II, with permission.

The diagnostic codes associated with the visits for any group were most commonly respiratory or musculoskeletal diseases. Diseases of the musculoskeletal system were accentuated for FAs, and this proportion grew larger towards persisting frequent attendance. The same trend was also visible for mental and behavioural disorders, injuries and unclassified symptom.

When studying the associations with logistic regression, the same ICD-10 categories dominated for all FA groups, but the proportions differed to some extent (table 6). Diseases of the musculoskeletal and respiratory system had the highest odds among pFAs, followed by unclassified symptoms (R00-R99). However, musculoskeletal and mental disorders were the leading diagnoses among

1yFAs, and diseases of the nervous system had the third highest OR. Certain diagnostic groups were examined in more detail, and one can see that the association with musculoskeletal disorders and depression is more prominent than with hypertension of cardiovascular diseases.

**Table 6.** Diagnoses associated with occasional and persistent frequent attenders (FA) in multinomial logistic regression (n = 66 831)

Factor (ICD-10 groups)	1yFA			pFA		
	n	OR	95% CI	n	OR	95% CI
M00-M99 Diseases of the musculoskeletal system and connective tissue	4796	4.59	4.33 - 4.86	559	26.85	18.9 - 38.2
Illnesses of the back and the spine	2305	3.28	3.10 - 3.47	410	13.45	11.3 - 16.1
Illnesses of the neck, cervical spine and tension headache	1271	3.17	2.95 - 3.40	270	10.47	8.86 - 12.38
Illnesses of the upper extremities	1611	3.25	3.05 - 3.46	285	8.91	7.54 - 10.54
Illnesses of the lower extremities	1292	3.02	2.82 - 3.24	239	7.92	6.66 - 9.42
J00-J99 Diseases of the respiratory system	4254	2.88	2.73 - 3.05	536	15.55	11.79 - 20.52
R00-R99 Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	2309	2.91	2.75 - 3.08	401	11.15	9.36 - 13.29
S00-T98 Injury, poisoning and certain other	2198	2.87	2.71 - 3.03	349	8.58	7.25 - 10.15
F00-F99 Mental and behavioural disorders	1595	3.67	3.44 - 3.92	270	9.68	8.19 - 11.44
Depressive episodes	469	4.71	4.20 - 5.29	95	12.02	9.52 - 15.19
L00-L99 Diseases of the skin and subcutaneous tissue	1335	2.32	2.17 - 2.48	220	5.21	4.39 - 6.18
A00-B99 Certain infectious and parasitic diseases	1102	2.37	2.21 - 2.55	228	7.70	6.49 - 9.13
I00-I99 Diseases of the circulatory system	1129	2.13	1.98 - 2.29	168	4.00	3.32 - 4.83
Essential hypertension	571	1.81	1.64 - 2.00	80	2.94	2.29 - 3.77
G00-G99 Diseases of the nervous system	976	3.03	2.80 - 3.27	220	10.00	8.41 - 11.89
K00-K93 Diseases of the digestive system	934	2.60	2.40 - 2.81	202	7.93	6.65 - 9.44

ICD-10 = International Classification of Diseases, OR = Odds ratio (adjusted by sex, age, company size and field of industry), CI = Confidence interval  
 FA status was defined as the top decile of attenders (frequent attender 10%)

1.0 = reference group (non-FA = non-frequent attenders, patients who were never in the top decile were considered as a reference group)

1yFA = Patients who were in the top decile of attenders in one of the study years (2014, 2015 or 2016)

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

The table presents the 10 largest ICD-10 groups and their subcategories. For a full explanation of which ICD-10 codes are included in subgroups, see Appendix B.

### 5.3 Frequent attenders and sickness absences

The third study concentrated on differences between occasional and persistent FAs and non-FAs in terms of sickness absences. The study population constituted 59 676 patients (2014-2016), of whom 592 were pFAs. The group of 1yFAs was determined in 2014 and included 2468 individuals. The group of 1yFAs diminished in the following years, with 1986 individuals in 2015 and 1391 individuals in 2016 (figure 2). The proportion of males decreased as frequent attendance persisted (57%, 46% and 44% of non-FA, 1yFA and pFA, respectively).

Sick-leave certificates were given to 90% of pFAs throughout the study years and 90% of 1yFAs in 2014 (table 7). In the following two years, when not frequent attenders, over 70% of 1yFAs still received a sick-leave certificate. The proportion was constantly at 47% for non-FAs. The number of sickness absence days yearly was >15 days for 61% of 1yFAs in 2014, their year of frequent attendance, and still 30% in 2016. For the group of pFAs, more than 69% of them had more than 15 sickness absence days through 2014-2016. For comparison, 9-10% of non-FAs had sickness absence days over 15 days yearly.

The group of pFAs as a whole had a median of 16 absence episodes during all three study years, while the 1yFA group had a median of 7 episodes and the non-FAs had a median of 2 episodes. These were all physician-certified absences. Absences in the pFA group were constantly at a level of five to six absence episodes yearly. The 1yFA-group had a median of four sickness absence episodes in 2014, after which the frequency of episodes diminished so that in 2016 they had a median of 2 absence episodes. However, the frequency of sickness absence episodes remained higher among the 1yFA group than in the non-FA group even two years after the 1yFA group's visit frequency had diminished to normal (table 8).

**Table 7.** Characteristics of different groups (1yFA, pFA and non-FA) yearly (2014–2016), n = 59 676

	2014, n = 24 772			2015, n = 27 116			2016, n = 41 241			2014-2016											
	1yFA	pFA	non-FA	1yFA	pFA	non-FA	1yFA	pFA	non-FA	1yFA	pFA	non-FA									
	n	%	n	%	n	%	n	%	n	%	n	%									
Sex																					
Male	1 134	46	262	44	262	44	14 628	60	679	49	262	44	22 277	57	1 134	46	262	44	32 566	57	
Female	1 334	54	330	56	8 929	41	1 062	54	1 062	54	330	56	16 981	43	1 334	54	330	56	24 050	43	
Age																					
18–34	704	29	130	22	6 751	31	501	25	121	20	7 434	30	12 106	31	631	26	108	18	18 494	33	
35–44	552	22	145	25	5 135	24	465	24	137	23	5 841	24	9 467	24	546	22	132	22	13 218	23	
45–54	638	26	186	31	5 673	26	521	26	190	32	6 532	27	10 139	26	628	25	188	32	13 996	25	
55–68	574	23	131	22	4 153	19	499	25	144	25	4 731	19	7 546	19	663	27	164	28	10 908	19	
Sickness absences																					
Sick leave certified by physician	2 219	90	551	93	10 309	47	1 511	76	556	94	11 642	47	18 350	47							
0 SA days /year	207	8	33	6	9 554	44	377	19	26	4	10 374	42	16 873	43	118	6	11	2	20 946	37	
1–15 SA days /year	768	31	147	25	10 026	46	873	44	127	22	11 722	48	18 906	48	459	21	21	3	26 806	47	
>15 SA days /year	1 493	61	412	69	2 132	10	739	37	439	74	2 442	10	3 479	9	1 891	73	560	95	8 864	16	

Statistically significant results with Chi square tests,  $p < 0.001$ , SA = sickness absence  
 FA status was defined as the top decile of attenders (frequent attender 10%)  
 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)  
 non-FA = Patients who were never in the top decile were considered as a reference group, non-frequent attenders

The total length of absences during the study years was a median of 96 days for pFAs, a median of 41 days for 1yFAs and a median of 7 days for non-FAs. However, the median lengths of a single episode did not differ to a great degree: the median length for pFAs and 1yFAs was four days, while it was three days for non-FAs. The length of sickness absences was high for both pFAs and 1yFAs during the first study year. The duration remained high for the group of pFAs during all study years but diminished for the 1yFAs during the follow-up. It was a median of 10 days in 2016, which is, however, still twice as long as for non-FAs. When examining the two major diagnostic groups leading to disability (mental and musculoskeletal disorders), 1yFAs had longer median length of a single absence episode compared to pFAs and non-FAs.

**Table 8.** Median lengths of sickness absence episodes, median number of absence days yearly and median number of written sickness absence certificates yearly (2014–2016) by status (1yFA, pFA and non-FA), n = 33 592 (patients with a sick-leave certified by a physician)

	Total length of sickness absences per year	Average length of a single sickness absence episode	Number of written sickness absence certificates	p-value
	md (days)	md (days)	md	
2014 (n = 23 232)				<0.001
1yFA	23	4	4	
pFA	25	4	5	
non-FA	6	3	1	
2015 (n = 25 151)				<0.001
1yFA	14	4	3	
pFA	29	4	6	
non-FA	5	3	1	
2016 (n = 38 054)				<0.001
1yFA	10	4	2	
pFA	24	4	5	
non-FA	5	3	1	
2014 – 2016 (n = 56 042)				<0.001
1yFA	41	4	7	
pFA	96	4	16	
non-FA	7	3	2	

Kruskal-Wallis Test,  $p < 0.001$ , md = median

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

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)

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

Modified from III, with permission.

When examining the diagnostic codes of sickness absences, musculoskeletal disorders (M00-M99) were the main cause in a majority of long absences (>15 days or more yearly) for any group studied. However, the proportions varied slightly so that 47% of pFAs' and 1yFAs' long absences were due to musculoskeletal disorders, while the proportion was 31% for non-FAs. Injuries (S00-T98) were the second largest diagnostic group causing long absences for non-FAs, while the second largest group was mental and behavioural disorders (F00-F99) for 1yFAs and pFAs. Together, musculoskeletal and mental disorders caused 64% of long sick-leave episodes for 1yFAs and 63% for pFAs, while the proportion was 46% for the non-FA group. There were slightly more episodes caused by musculoskeletal disorders for pFAs than for 1yFAs and non-FAs for short absences of 1-3 days. The short episodes were mainly caused by respiratory diseases, and their proportion was slightly larger for the group of non-FAs than 1yFAs and pFAs.

No difference for short absences was seen between the groups (table 9) in the logistic regression model (adjusted for age, sex, field of industry, cancer-dg and number of different ICD-10 diagnoses). However, when examining intermediate and long absences, pFAs and 1yFAs had greater odds for absence than non-FAs. When comparing pFAs to 1yFAs, their odds did not differ in the first year, but pFAs had higher odds for long absences than 1yFAs (OR 3.73, 95%CI 2.49 – 5.60 in 2016) in the second and third years. Through the study years, both 1yFAs (OR 1.44, 95%CI 1.23 – 1.69 in 2016) and pFAs (OR 2.08, 95%CI 1.39 – 3.10 in 2016) had a higher risk for intermediate absences than non-FA. This association was enhanced when studying long absences. In 2016, the group of 1yFAs had nearly three times the odds (OR 2.95, 95% CI 2.50 – 3.49) of having a  $\geq 15$  days' absence than non-FAs, and the odds were manifold for pFAs (OR 11.0, 95% CI 7.54 – 16.06).



**Table 9.** Lengths of sickness absences (SA) associated with different groups (1yFA, pFA and non-FA) in multinomial logistic regression (adjusted for sex, age, field of industry, cancer-dg and number of different ICD 10-diagnoses given by a physician), n = 24 772 – 41 241

	1yFA vs. non-FA		pFA vs. non-FA		pFA vs. 1yFA	
	OR	95 % CI	OR	95 % CI	OR	95 % CI
Sickness absences in 2014						
no SA	1.0		1.0		1.0	
1-3 days SA	1.15	0.91 – 1.45	1.06	0.61 – 1.85	0.93	0.52 – 1.67
4-14 days SA	2.34	1.96 – 2.80	2.33	1.55 – 3.51	1.00	0.65 – 1.53
15 or more days SA	13.10	11.07 – 15.50	18.27	12.54 – 26.60	1.39	0.94 – 2.07
Sickness absences in 2015						
no SA	1.0		1.0		1.0	
1-3 days SA	1.20	1.01 – 1.42	1.32	0.72 – 2.40	1.09	0.59 – 2.04
4-14 days SA	1.89	1.64 – 2.17	2.92	1.87 – 4.57	1.55	0.97 – 2.46
15 or more days SA	4.48	3.88 – 5.16	17.96	11.83 – 27.25	4.01	2.60 – 6.18
Sickness absences in 2016						
no SA	1.0		1.0		1.0	
1-3 days SA	1.08	0.89 – 1.29	0.93	0.54 – 1.59	0.86	0.49 – 1.52
4-14 days SA	1.44	1.23 – 1.69	2.08	1.39 – 3.10	1.44	0.94 – 2.20
15 or more days SA	2.95	2.50 – 3.49	11.00	7.54 – 16.06	3.73	2.49 – 5.60

OR = Odds ratio, CI = Confidence interval, 1.0 = reference group, FA status was defined as the top decile of attenders (frequent attender 10%)

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)

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

Modified from III, with permission.

## 5.4 Frequent attenders and disability pensions

This study aimed to examine differences in DPs in occasional and persistent FAs and non-FAs. The study used the same study population as in study III (figure 2) with the same characteristics as previously described. The study population constituted 59 676 patients (2014-2016), of whom 592 were pFAs; the group of 1yFAs in 2014 consisted of 2468 patients and 1391 in 2016.

The group of pFAs had proportionally the greatest number of any DP decisions during the follow-up period (DP decisions 2015 – 2017), followed by the group of 1yFAs. During the three-year follow-up, 14.9% of pFA, 9.6% of 1yFA and 1.6% of non-FA received any of these decisions. Most permanent, full-time DP decisions were granted for 1yFAs (2.7% of 1yFAs, 2.2% of pFAs and 0.4% of non-FAs) (table 10). Most vocational rehabilitation allowances and partial and fixed-term disability resolutions were granted for pFAs.

**Table 10.** Distribution of disability benefit decisions for the different groups (1yFA, pFA and non-FA) in 2015-2017, n = 59 676

	Patients 2014 – 2016, n = 59 676						p-value*
	1yFA		pFA		non-FA		
	n	%	n	%	n	%	
Disability grants (2015–2017)							<0.001
Permanent full-time DP	67	2.7	13	2.2	214	0.4	
Partial DP	34	1.4	24	4.1	140	0.2	
Fixed-term DP	37	1.5	13	2.2	197	0.3	
Partial fixed-term DP	8	0.3	6	1.0	49	0.1	
Vocational rehabilitation	91	3.7	32	5.4	298	0.5	

\*Statistically significant results with Chi square -tests, p<0.001

OH = occupational health

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

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)

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

Modified from IV, with permission.

Both pFAs and 1yFAs appear to have an increased risk of any disability grant compared to non-FAs (table 11). The association grows stronger when adjusted for sex, age, field of industry, number of different ICD-10 diagnoses and cancer dummy (model 1). When the ratios are also adjusted for the total number of preceding sickness absence days (model 2), the group of 1yFAs has an increased risk of partial DP (OR 2.26, 95% CI 1.36-3.76) and vocational rehabilitation allowance (OR 1.89, 95% CI 1.29-2.78) compared to non-FAs. The pFA group also has an increased risk of partial DP (OR 6.02, 95% CI 3.02-12.00) compared to non-FA in the fully adjusted analyses, while the risk for permanent, full-time DP is smaller (OR 0.12, 95% CI 0.05-0.29). When comparing groups of pFA and 1yFA, pFA have a lower risk of permanent full-time DP (OR 0.21, 95% CI 0.10-0.45) and a higher risk of partial DPs (OR 2.66 95% CI 1.46-4.87).

More than half (55%) of pFAs' permanent, full-time DP decisions were based on musculoskeletal disorders, while the proportion for 1yFAs was 46% and 31% for non-FAs. The proportion of mental disorders was 23% for pFA, 16% for 1yFA and 12% for non-FA. Neoplasms were the second largest (17%) diagnostic group for non-FAs, and their proportions were smaller for pFAs and 1yFAs (8% and 9%, respectively). Diseases of the musculoskeletal system constituted 59% of decisions for 1yFA and pFA and 39% for non-FA for any DP decision. The second largest group leading to any DP was mental and behavioural disorders with 16%, 14% and 21% share for 1yFA, pFA and non-FA, respectively.

**Table 11.** Different disability benefit decisions associated with different groups (1yFA, pFA and non-FA) in multinomial logistic regression, n = 59 676

	Crude ratios						Adjusted ratios: model 1						Adjusted ratios: model 2							
	1yFA vs. non-FA		pFA vs. non-FA		1yFA vs. 1yFA		1yFA vs. non-FA		pFA vs. non-FA		1yFA vs. non-FA		pFA vs. non-FA		1yFA vs. 1yFA		pFA vs. non-FA		1yFA vs. 1yFA	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Partial fixed-term DP	3.75	1.78 - 7.94	11.82	5.04 - 27.70	3.15	1.09 - 9.11	4.68	2.03 - 10.79	28.73	9.06 - 91.11	6.14	1.86 - 20.28	0.71	0.28 - 1.84	2.38	0.64 - 8.86	3.34	0.97 - 11.55	0.78	0.37 - 1.68
Fixed-term DP	4.36	3.06 - 6.21	6.43	3.65 - 11.34	1.48	0.78 - 2.79	5.11	3.36 - 7.75	10.59	5.18 - 21.64	2.07	1.03 - 4.16	0.73	0.42 - 1.28	0.57	0.24 - 1.39	0.78	0.37 - 1.68	0.78	0.37 - 1.68
Partial DP	5.64	3.87 - 8.22	17.05	10.97 - 26.49	3.03	1.78 - 5.14	4.45	2.85 - 6.94	15.44	8.44 - 28.26	3.47	1.93 - 6.24	2.26	1.36 - 3.76	6.02	3.02 - 12.00	2.66	1.46 - 4.87	2.66	1.46 - 4.87
Permanent full-time DP	7.36	5.57 - 9.71	5.92	3.36 - 10.42	0.81	0.44 - 1.47	7.83	5.54 - 11.06	7.64	3.84 - 15.21	0.98	0.51 - 1.89	0.56	0.34 - 0.92	0.12	0.05 - 0.29	0.21	0.10 - 0.45	0.21	0.10 - 0.45
Vocational rehabilitation allowance	7.24	5.70 - 9.18	10.80	7.43 - 15.70	1.49	0.99 - 2.26	9.31	6.96 - 12.45	17.76	10.76 - 29.33	1.91	1.19 - 3.05	1.89	1.29 - 2.78	1.63	0.89 - 2.96	0.86	0.52 - 1.43	0.86	0.52 - 1.43

Model 1 adjusted for sex, age, field of industry, number of different ICD 10-diagnoses and cancer dummy.

Model 2 adjusted for the same and total number of sickness absence days.

OR = Odds ratio, CI = confidence interval, DP = disability pension

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

1yFA = Patients who were in the top decile of attenders in 2014

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

Modified from IV, with permission.

## 6 DISCUSSION

Frequent attendance in OH primary care creates a similar service demand as was previously perceived in the general practice setting: FAs made over a third of visits to OH primary care in a year. The associations between musculoskeletal and mental disorders and FA-status were accentuated in this context. Specialist consultation and OH collaborative negotiation were also associated with frequent attendance.

FAs – both occasional and persistent – had more and longer sickness absences than other users of OH primary care. A third of occasional FAs had SL longer than 15 days even two years after their frequent attendance. The proportion of musculoskeletal disorders in sickness absences was greater for both groups of FAs compared with non-FAs. The association with mental disorders was also accentuated.

In the two-year follow-up, 15% of pFAs and 10% of 1yFAs received any DP. Only 2% of the non-FA group received a DP. Both occasional and persistent FAs showed an increased risk for any DP grant, and the association was enhanced when adjusted for confounding factors such as age and sex. This association is closely associated with preceding sickness absence days, of which both FA groups have more than non-FAs. Both occasional and persistent FAs have more permanent full-time DPs based on musculoskeletal disorders and mental disorders than non-FAs.

## 6.1 Main findings

### 6.1.1 Factors associated with frequent attendance in occupational health primary care

Frequent attendance as a phenomenon exists in OH primary care, much like in other primary care settings. The top 10% accounted for 36% of visits, which is comparable to the proportions seen in other primary care settings (11,29).

Frequent attendance is often associated with the female gender and older age (9) in previous studies in the general practice primary care setting. Female gender was also associated with FA status in the present study of OH primary care. However, in the context of OH primary care, age was not significantly associated with FA-status, unlike in previous studies. This might be due to the restriction of the study population to working-age patients. Several studies conducted in the general practice setting use study populations that include all patients above 15 or 18 years of age. The study population in the present study restricted the population to working-age patients in working life, which makes this group more homogenous than patients treated in general practice setting. This might suggest that age is not a critical factor in terms of service use in a restricted population, such as the working population. This might be due to some extent to the healthy worker effect (157).

The previous research was mainly conducted in general practice setting (or emergency services or secondary care), so no previous data are available on how frequent attendance is linked to a patient's working environment. Information on patients' employers' company size and industry were present in the present study. The results indicate that working in medium size or large industries is associated with frequent attendance in the context of OH primary care. Working within the manufacturing industry or human health and social work were also associated with FA status. These findings are novel and are not previously published elsewhere. The reasons for the association cannot be concluded based on this study but might stem from a low level of vocational education in manufacturing also being linked to frequent attendance (9) as well as to the physical and psychological demands of these industries or the workplace culture. It is also possible that the culture of service use is different in the very small versus large companies, although the

service level is alike. It might also be linked to some extent to the service level possibly restricting the use of professionals other than doctors and nurses.

The setting's focus on the working population also accentuated certain diagnostic groups above others. Chronic illnesses such as diabetes and circulatory diseases are often associated with FA-status in previous studies (28,158). This is very comprehensible in a GP's population with the elderly, because these illnesses often require monitoring. However, a Swedish study found that musculoskeletal diseases were the most common reasons for consultation among 45-64 old FAs in a general practice setting (14). Diseases of the musculoskeletal system were accentuated in this context of the working population. Together with the industries associated with frequent attendance, this might suggest that frequent attendance in OH primary care is affected by the demands of working life. This conclusion is supported by the previous studies from OH primary care demonstrating that OH primary care visits are often associated with work-related issues (112,159). Previous studies have also detected an association between musculoskeletal disorders and OH physician visits (159). The impairment that musculoskeletal disorders cause on functioning and work ability may require several visits if the disorder persists.

The association between frequent attendance and specialist consultation has been previously shown in several studies (42,160). This association was confirmed here in the setting of OH primary care. One fourth of FAs visited a specialist, while less than one tenth of non-FAs had done so. Specialist consultation was also significantly associated with FA-status. Several explanations are possible for this association. Based on previous literature, FAs suffer more often from chronic diseases and multimorbidity (6,9,29). Multimorbidity was evaluated in the present study through the number of ICD-10 diagnoses, showing that the group of FAs had more ICD-10 diagnoses than the non-FA group. Comorbidity has previously been linked to the use of several healthcare sectors and is in line with the findings from this study (161). The reasons for specialist consultation might also be associated with issues of sickness absences and work ability discussed later.

Most previous studies are conducted using solely the visits to physicians (29); thus, there is little previous information on the use of other professionals (161). Visits to all OHS professionals were included in the present study, and evaluation of the proportions of visits to different professionals could be evaluated. Of all the visits conducted by the FA group, 70% were conducted with a physician, and the proportions of the other professionals were minimal. However, visits to physiotherapists and psychologists were associated with FA-status; physiotherapist consultation was particularly associated with FA-status. This is in line with the

previously discussed finding of an accentuated association with musculoskeletal disorders.

### 6.1.2 Differences between occasional and persistent frequent attenders

Almost one in five FAs continued their frequent use of services in the following two years. This finding is fairly similar to the proportion perceived in previous studies (28,29,35). Persistent FAs, although a small group of patients, demand a large proportion of services, with 0.9% of study population making 6% of all visits. This is somewhat similar to the Dutch finding from the general practice setting where 1.6% made 8% of visits (29). When combined, all the FA groups together made 40% of all visits during the three study years.

Consultation frequency between occasional and persistent FAs differed throughout the study. The group of pFAs made more visits than occasional FAs during the study years. This is visible in all consultations as well as in physician consultations alone. The finding indicates that the group of persistent FAs not only creates more service demand because their increased consultation frequency persists over the years, but they also consult more frequently than occasional FAs. This is in line with a previous study from the general practice setting (29).

Although the limit for FA status remained the same over the years, an increase in consultation frequency can be seen for the group of 1yFAs. It should be noted that availability of services is associated with use of services, and more resources are linked with higher utilisation (111). There was organic growth and growth through corporate acquisitions during the study years 2014 – 2016 that might have increased the supply of services. As stated previously, there also appears to be a general tendency for the increases in visit frequency that are perceived in several settings (23,35,48). Changes in the supply of services might also have affected the perceived increase in visit frequency in this material, but this is unlikely because there was no perceived difference in the non-FA groups median visits over the years. Over the study years (2014-2016) there is no general tendency increasing visits to be seen in physician visits or visit to OH primary care in general (110,162). On the contrary, there were more OH primary care visits in 2014 than 2016, also in the private units (110,162).

Persistent FAs also use more health care professionals other than physicians. The proportion of physician visits out of all visits is greater for persistent FAs, but proportionally more pFAs have also visited a physiotherapist, psychologist and

specialist. Their service demand appears to be greater but also more diverse than non-FAs and occasional FAs. These differences between occasional and persistent FAs in terms of service use of other healthcare professionals are novel.

As previously discussed, the association between FA status and musculoskeletal disorders is enhanced in the working population compared to other settings. The reasons for this might be due to the demands of working life or to their symptoms' work-relatedness. Interestingly, this association is further accentuated in persistent FAs compared to occasional FAs. Given that musculoskeletal disorders are one of the most common reasons for sickness absences (118), the setting of OH primary care probably accentuates symptoms and illnesses affecting work ability and those that are work-related. This might explain their enhanced association with persistent frequent attendance.

Musculoskeletal diseases are illnesses that can have a strong influence on work ability and even incapacitate workers, but the treatment is often conducted and coordinated through primary care when surgical possibilities have been evaluated. This might lead to increased visits at the primary care level when surgical treatment is not needed. The role of Finnish OH primary care is often described as primary care with occupational emphasis, which encourages OH to stress work-related problems and illnesses impairing work ability, such as musculoskeletal diseases. It should also be noted that with illnesses impairing work ability, OHS can coordinate and initiate workplace modifications, rehabilitation (occupational and medical), which are often discussed in OH collaborative negotiations.

Interestingly, this study association of frequent attendance and mental disorders shows a decline in persisting frequent attendance. Although diagnoses of mental and behavioural diseases are significantly associated with occasional and persistent FA status, and the proportion of patients suffering from these conditions increases in the pFA group, several other diagnostic groups are more closely associated with persistent FA status in the analysis. The reasons remain unclear in this study with no access to service use data from other health service sectors, and this should be studied in the future. Possible explanations might be effective recovery, since most of the diagnoses are depression and anxiety disorders. An earlier study from Estonia found that depressed patients did not visit a physician more than other patients in a three-year follow-up (163). However, another possible explanation is that these patients' treatments are transferred into other service sectors, such as psychiatric secondary care and mental health services functioning at the primary care level.



MUS and multimorbidity have been associated with frequent attendance in previous studies, and this association is also visible in this setting. Diagnoses indicating unclassified symptoms (R00-R99) are overpresented in the FA population, which could be indicative of MUS as seen previously (54,74,75). MUS has been associated in previous literature with increased risk of long-term sick leave (164). The number of different ICD-10 diagnoses increases as frequent attendance persists, which could be interpreted as an indication of multimorbidity, particularly in the group of persistent FAs. Differences in morbidity are a likely explanation for the differences between occasional and persistent FA, and further studies should look into other possible reasons.

Previous studies associated frequent attendance with specialist care and secondary care (42,160,165), and this association was also perceived here. The present study also indicates that this association is enhanced in persistent FAs. We had no access to service use in other service sectors in this study, so it is possible that occasional FAs' treatments were transferred to other service sectors, although their service need continues.

It has been sometimes argued whether FAs' service demands are only based on their lower threshold to consult. This has been overturned, for example, in studies examining the appropriateness of FAs seeking consultation for injuries (73). This study also looked into OH collaborative negotiations. These negotiations are held whenever there are concerns over issues affecting employees' work ability, and both occasional and persistent FAs attend these negotiations more than non-FAs. OH collaborative negotiations are often summoned by the OH staff or the employer, which can also be perceived as an indication of FAs' actual service needs and associations with work ability issues. However, it is surprising that only a little more than one fifth of persistent FAs have attended an OH collaborative negotiation.

### 6.1.3 Frequent attenders and sickness absences

This study provided new insight into FAs' sickness absences and how occasional and persistent FAs differ in this aspect. A novel finding was that occasional FAs have increased odds for long sickness absences, even two years after their consultation frequency has dropped. The new approach to study different diagnosis groups that lead to sickness absences showed that FAs have more

sickness absences due to musculoskeletal and mental disorders than do other OH primary care users.

Previous research has found that FAs are more often on SL than other healthcare users (22,69). This information is often based on questionnaire data and allows little understanding of the timespan spent on SL or the reasons behind it. This present study indicates that FAs receive slightly longer SL, but the major difference in sickness absences yearly is due to the number of SL episodes, which is greater with FAs. Occasional FAs did not differ from persistent FAs in their year of frequent attendance, but after their consultation frequency diminished, the median length of their yearly SLs also diminished. However, it remained higher than non-FAs throughout the study years.

The median length of a single absence episode remained slightly longer for both occasional and persistent FA compared to non-FA through the study years. This might be partly due to the diagnoses leading to sickness absences. Short sickness absences are mostly due to respiratory diseases in all the groups, but their proportion is larger in the non-FA group. Musculoskeletal and mental disorders are more common diagnoses in the FA groups even for the short absences. FAs also have more musculoskeletal disorders and fewer respiratory diseases than non-FAs in the intermediate-length absences. This could possibly explain longer median lengths of single-absence episodes in the FA groups. The finding that FAs' absence episodes are longer on average than non-FAs could also reflect the severity of the diseases. Previous literature has suggested that FAs would have more severe diseases than other healthcare users and these findings could support this conclusion (166).

The majority of long sickness absences are due to musculoskeletal disorders on all study groups. The second largest group is mental and behavioural disorders for both FA groups but for the non-FA injuries are the second largest group causing long absences. Previous research has shown that in particular musculoskeletal and mental disorders are associated with recurrent SLs (127). Interestingly, when looking at the median lengths of certain diagnostic groups, it appears that occasional FAs have longer single absence episodes when suffering from musculoskeletal and mental disorders. This might be indicative of their illness severity but the reasons behind this can only be speculated.

The finding that FAs have an increased likelihood of longer sickness absences in particular is in line with previous research that has showed that FAs have an increased risk of long (over 180 days) sickness absence or DP (15). The present study found that compared to non-FA, both FA groups have an increased

likelihood of intermediate and in particular long sickness absences. Given that most long absences in the FA groups are due to musculoskeletal and mental disorders, and that sickness absences due to these groups are predictive of future disability (130,131) this is suggestive of FAs increased DP risk. The findings are also indicative of increased disability risk of both FA groups as sickness absences longer than 15 days are linked to risk of DP in the future and the longer the absence the higher the risk for DP (128,135).

These findings also accentuate the importance on identifying not only persistent but also occasional FAs and the evaluation of their service needs. Previous studies saw a status consultation and in-depth analysis of patient's needs as a purposeful intervention to tackle frequent attendance (49,52). These should be evaluated also in the context of OH primary care and should include evaluation of rehabilitation needs.

#### 6.1.4 Frequent attenders and disability pensions

FAs have more DPs than other OH primary care users. Both occasional and persistent FAs have an increased likelihood of receiving a DP grant. The differences between these FA groups in their disability risks and diagnoses that lead to disability grants are novel findings.

This is the first study to examine the different disability grants and their distribution between different FA groups and other OH primary care users. Previous evidence exists that FAs have an increased risk for DPs and long sickness absences (15). Prior research has also found that FAs are more often on pension or DP, when studied in the general practice context (69). This study adds to this previous knowledge by indicating that frequent service use is also indicative of future disability risks and both occasional and persistent FAs are at risk.

As previously discussed, FAs' sickness absences, in particular the long ones, are more often due to musculoskeletal and mental disorders than sickness absences of non-FAs. Sickness absences due to these illness groups are particularly associated with a future risk of DPs in previous research (130,131). This alone, is suggestive of increased disability risk in the FA groups.

The group of pFAs in this study received proportionally most of the fixed-term or partial disability decisions and also most of the vocational rehabilitation allowances. However, occasional FAs were granted the most permanent full-time DPs that led to their withdrawal from the workforce. All resolutions other than

permanent full-time DP aim to keep patients in the work force, and use of these alternative allowances has increased in the past years (145). A permanent, full-time DP is often the sole possibility in illnesses deemed uncurable and severe enough to impair work ability by 60% or more. The perceived differences might lead back not only to OHS measures but also to differences in morbidity and their severity.

Both FA-status groups had an increased risk for any disability grant in the analysis, and the association was accentuated when most of the confounding factors were added into the analysis. However, when the preceding sickness absence days were also added, the increased risk was only associated with partial DP and vocational rehabilitation allowance in occasional FAs, and partial DP in persistent FAs. Partial DP and vocational rehabilitation allowance can also be acquired without prior sickness absences. This finding could be indicative that these partial and fixed-term solutions are employed more often with patients using OHS repeatedly, but it could also be due to the possibility of their employers modifying their work or to the severity of their illness, which could not be measured here.

The finding that pFAs in particular have more resolutions other than permanent full-time DP could be interpreted as a positive sign of the work conducted in the OHS to support work ability. Work modifications can be employed in cooperation with the employer when the OHS team identifies lowered work ability. This, and the broader use of different professionals in the OHS, can also be seen as a sign of active rehabilitative measures conducted by the OHS to support work ability. Despite the reasons for their more extensive use of these other resolutions, using fixed-term and partial grants allows one to employ the remaining work ability or return to the work force after sufficient recovery. DPs as a whole lead to shortening of working careers by over 10 years (167), so any delay of premature retirement is welcome in the current aim of prolonging working careers. A positive finding in the four-year follow-up is that approximately only one half of fixed-term DPs turn into permanent full-time DPs (145).

The declining association of mental disorders and persistent FAs compared to other illnesses was previously discussed. It appeared that the odds for being a pFA was greater with diagnostic groups other than mental disorders, although proportionally more patients suffer from mental disorders in the group of pFAs. This study found that proportionally more persistent FAs have permanent full-time DPs based on mental disorders than do the group of occasional FAs. These groups were fairly alike when examining any DP. It appears that those occasional FAs who do not continue high service use do not suffer from more serious mental illnesses

that would lead them to retire from the workforce and, thus, not continue as FA. The proportion of DPs based on mental disorders, however, is smaller in this context than in FCP statistics, which is probably due to the study population consisting solely of the working population and, thus, not including the most severe mental illnesses that would probably inhibit entering the work force.

Both FA groups have more DPs due to musculoskeletal disorders as a whole, when compared with FCP statistics portraying all decisions in Finland. Over half of occasional and persistent FAs' DPs are awarded based on musculoskeletal disorders, while the proportion for non-FAs is more similar to that of the FCP statistics, less than one third (144). There appear to be slightly more permanent full-time DPs based on musculoskeletal disorders in the group of pFAs than in the group of occasional FAs, which adds to the knowledge that the association of musculoskeletal disorders is accentuated in persistent FAs. However, it should be noted that pFAs also have proportionally more partial and fixed-term resolutions and vocational rehabilitation allowances than occasional FAs and non-FAs. In the case of musculoskeletal disorders, when work ability remains, work modifications might be more easily employed than those suffering from systemic or mental disorders.

The role of OHS in maintaining FAs at work can be speculated. OH collaborative negotiation was held for 23% of pFAs but for only 3% of 1yFAs. OH collaborative negotiation is the process in which workplace interventions are agreed upon, which suggests that possibilities to modify work are probably more thoroughly examined with pFAs. However, the finding that only slightly less than one in four persistent FAs had attended an OH collaborative negotiation in the study years is surprising. At the same time, 15% of these pFAs received any DP decision and, as discussed earlier, their median length of sickness absences is 24-29 days yearly. Over 69% of pFAs had a sickness absence longer than 15 days indicating a disability risk in any of the study years, yet only one in five had an OH collaborative negotiation. It appears that identification of individuals in need of enhanced support still needs to be fortified.

Frequent attendance appears to be associated with DPs and is closely associated with sickness absences, which FAs have more than non-FAs. Sickness absences have been previously shown to be predictive of future DPs (128,135). However, the detected association allows OH to use attendance rates as an early marker for possible disability risk and to identify individuals with a disability risk based on their service use. Thus, it is possible to employ preventive measures before long sickness absences develop. It has been previously noted that rehabilitation is most

often employed in the year prior to a disability allowance grant but not in the preceding 10 years (153). A need exists for earlier evaluation of rehabilitative needs, and service-use patterns might be a clue to initiate this.

## 6.2 Ethical considerations

Identifying individuals based on their risk for disability or sickness absences is a delicate issue. Disability and sickness absences create costs to employers and might also have other adverse effects on their business. Confidentiality is essential when identifying individuals in the OHS based on their disability risks. The aim should always be to advance treatment and rehabilitation and agree on follow-up schemes to ensure adequate services. Analysis of risks should be used in the OHS to enable planning for purposeful services and early interventions, if deemed necessary, and this information should not be shared with the employer, as we do not share medical data with the employer either.

It should be noted that, although data on individual risks is confidential, the discourse on factors associated with disability risks raises these questions and might draw attention to these factors. The key question is, “What is done after these individuals are identified?”. Earlier identification might allow wider options in supporting work ability when work ability is still left and possibly advance necessary interventions, thus preventing sickness absences and disability. High service use should not be seen as a negative phenomenon that should be restrained or pruned but as a chance to evaluate the reasons behind it and to thoroughly evaluate the needs and possible solutions.

## 6.3 Strengths and limitations

This study is the first to define and study frequent attendance in the context of OH primary care. Since OH primary care is available to approximately 90% of the working population, it is crucial to examine these patients separately. This context also provides a unique possibility to examine the working population. Several studies on occasional and persistent FAs were previously conducted, but only a few focused on working-age patients and none concentrated on the working population.

OH primary care as such does not exist in other countries, but this context allows a novel perspective on the working population alone. Work has beneficial health effects (156), but it also puts demands on performance; thus, the working population should also be studied separately. It has previously been discussed whether employment in itself is an important factor in the need and decision to attend a physician (168), and the socioeconomic differences between the working and unemployed might require these groups to also be studied separately.

The current study offers insight into which illnesses and characteristics are associated with frequent service use among the working population and that can be generalised at least in the setting of Finnish OHS. Primary care of the working is organised in various ways outside Finland and only cautious presumptions can be made that possibly the same tendencies can be found elsewhere in the working populations' primary care. Given that patients included in this study have been able to enter the workforce, the most severe illnesses are probably missing. Given this, the study reflects the working population, not the GP population.

The patients in this study were limited to those with a primary care plan in OHS. Although OH primary care is available to 90% of the working population (93), there are differences in availability depending on the industry (114). The coverage of OH primary care is often less comprehensive in the more strenuous industries with smaller employers. These are also the industries that are often physically demanding and those patients might be at an increased risk of disability due to their lower socioeconomic position and less vocational education (150,151).

A strength of the study is the large study population constituting almost 80 000 patients originally and with nearly 600 patients in even the smallest pFA group. The large study population dilutes human error when present. Although the data are from a single OH service provider, they include employees and employers from both rural and urban areas in Finland. The distribution of industries and company sizes is fairly representative of the general distribution in Finland, which allows for generalisation outside this particular service provider, but there are some differences to be noted. The manufacturing industry is slightly overrepresented in enterprises but less so when examining the number of employees (Appendix A and (169)). Conversely, micro organisations are underrepresented compared to Statistics Finland, and Pihljalinna has slightly more small companies (169). When compared with other industries and company sizes, the manufacturing industry does not use primary care services more extensively than other industries (110). Micro employers use fewer primary care services (/100 employees) than larger companies, but the differences plateau when preventive services are included (110).

The aspect of work ability has scarcely been examined in previous studies concerning FAs. The combination of medical record data and FCP data on pensions allows for unbiased evaluation of the end point – DP. The view on work ability of FAs that this study provides is unique. The possibility to compare occasional and persistent FAs in terms of future DPs and sickness absences is also novel. This allows for more understanding of the risks associated with frequent attendance than previously available.

The use of electronic medical record data imposes limitations but also provides advantages. When using medical record data, we used readily available data; thus, results can be more easily transformed into actual processes. The data used for the study were collected by the service provider; thus, for example, systems alerting on patients who would be categorised as FA are possible to create using the existing data. However, routine medical record data are sensitive to human error. The sickness absence data were checked for errors in the long absences, and the large study population dilutes random error.

One of the study's strengths is its aim to include all patient-initiated visits irrespective of the so-called KELA category. The KELA reimbursement policy allows categorisation of some illness-related visits under preventive services. This study conducted a thorough review of the invoice codes that include these visits, which were also included. This allows for a more complete view of visits initiated by patients' needs in the setting of OH primary care.

The present study has several limitations. Due to the nature of medical record data, we lack information on several sociodemographic and socioeconomic factors that are previously noted to be associated with frequent attendance. The absence of occupation is common in medical records and when present, the data are not in structured form. The inclusion of the employers' industry and size allows interpretation of the field in which the patients work, but it does not substitute for the occupational information.

The end point (any type of disability benefit) was drawn from FCP registers, which is a reliable source. It lacks, however, state pensions, which might be granted when a person's work history does not qualify for a DP from the insurance. These state pensions are registered in different registers and are not available through FCP. This might affect the young employees who have entered the work force only recently.

This study grouped together all disability decisions received from the FCP, placing occupational rehabilitation allowance together with disability pensions grants. It should be noted that the occupational rehabilitation allowance is one



crucial rehabilitative action available to retain employees in the workforce. At the same time, it is not granted without the risk of work disability in the near future and requires a long-term decrease in work ability. Thus, it is at the same time an indicator of work disability and a rehabilitative action. This endpoint was examined both separately and together with disability grants. This approach was chosen to reflect long-term disability risks, but only permanent full-time DP means permanent withdrawal from the workforce.

Use of a single service provider's medical record data might lead to more loss-to-follow-up than in the general practice setting. When employees move from one employer to another, their OHS provider might change, so these patients are lost from any follow-up. Additionally, when an employee's work is discontinued and they become unemployed, their service provider will probably shift to public primary care. These shifts between different primary care providers should be examined in the future. Shifts between employment and unemployment and its effect on healthcare service use should also be studied. Additionally, parallel service use and the effect on disability risks should be researched in the future.

The present study determined the group of FAs according to visits to physicians, nurses, physiotherapists and psychologists. This is different from the most commonly used definition, which is often based only on physician visits. The reason stated for inclusion of only physician visits is that other professionals in the primary care units are often employed after a request or a specific appointment by the physician. The setting in OH primary care is slightly different, because the multiprofessional work is much more commonly used. This definition based on visits to all professionals was chosen for the context of OH primary care because of the multiprofessional working environment and the demand for multiprofessional work in OHS in general. Naturally, this choice might affect the results. A confirmatory analysis was conducted in study I that defined FAs solely according to physician visits. The results remained fairly uniform and unaltered.

The chosen definition of the top decile appears to be appropriate, because the service demand is comparable with results from the general practice setting. The top decile resulted in eight visits yearly, but this limit should always be determined based on proportional limits in the future, because there seems to possibly be a trend for increasing service demand. The group of pFAs creates a substantial service demand, but occasional FAs, although not equally prominent in service demand over the years, also pose risks for work disability and ought to be identified. Top decile of users assumably includes also patients with no disability risks. A stricter limit would allow aiming resources at the individuals with highest

risks, but using a wider scope might also allow work ability promotion and prevention at primary and secondary level.

This is also the first study to examine the use of other healthcare specialists in the primary care context. This is naturally affected by the availability of services, which is generally good in OHS, though they might be more restricted in other service sectors. Physician and nurse visits are available on request in this OH primary care context, and access to physiotherapists and psychologists is often easily available after a referral from a nurse or a physician. However, access to physiotherapists and psychologists can be restricted to some extent by the employer's service agreement. This applies to specialist visits, as well. These service agreements might naturally restrict the use of these professionals. Data on specialist consultations are available within the same service provider. Information on the specialist consultations conducted in secondary care are lacking, because they are registered in different registers. No previous studies exist on the use of other healthcare professionals at the general practice level. These proportions might be varied in other health service sectors due to availability. However, the majority of visits are conducted with a physician, and the proportion of physician visits grows larger as frequent attendance persists.

## 6.4 Implications

This study's findings allow some practical implications to be suggested. As frequent attendance – occasional or persistent – appears to be linked to DPs in the near future, it might be useful to use consultation frequency as a means to identify potential disability risks in OHS. Consultation frequency over 8 times per year, or FA status defined as the top 10% of the particular service provider's data, could be one indicator among others to alert the OHS team of potential disability risk. This might enable earlier evaluation and identification of disability risks when used alongside other indicators, rather than relying solely on sickness absence data.

Disability risks are, at the moment, evaluated in OHS and are most often based on sickness absences. Evaluation of work disability risk at the office is also sometimes used (170). Consultation frequency is a marker easily available through medical records and could possibly be used as an additional indicator of potential disability risks and probably when combined, these indicators provide most information and timely identification.

This would allow the OHS team to invite the identified patients for a planned, possibly multiprofessional, health examination, conduct a status consultation and compose a treatment and rehabilitation plan and follow-up scheme. The status consultation should also take socioeconomic factors and employing social workers within OHS into consideration. A status consultation with the team physician examining a patient's needs (49,52) could be an approach for an intervention. Ensuring adequate diagnostics and taking MUS into consideration could be worth evaluating at the office. In the light of these results, cooperation with the employer through OH collaborative negotiations should still be fortified.

Thorough evaluation of service needs and planned treatment schemes making use of all OHS professionals might address the many-sided service needs and possibly unmet needs. Work-place interventions and OH collaborative negotiations should be employed more when working in close contact with the employer. Additionally, the mandated coordinating role of the OHS within health services and rehabilitation should be utilised promptly in the care of the FAs.

These approaches should be evaluated as an intervention in the context of OH primary care, and should include evaluation of rehabilitation needs in this setting. However, this research raises several other questions about where future research should be conducted. Parallel use of services and transitions between different service providers should be examined to grasp the full picture of FAs of OH primary care. Disability risks associated with different FA groups – those using other services and those not – should also be looked into in the future. It would also be important in the future to examine the changes in the use of different health service providers and the possibility that occasional FAs' treatments are carried out in other service sectors. Additionally, the transitions between employment and unemployment and the effect on service use should be researched.

Future research should combine service-use data from other service sectors and possibly also evaluate the reasons to choose different service sectors to fully understand frequent attendance in OHS. Qualitative studies on patients' reasons to attend and choose between different primary care providers would add to the existing knowledge. This would allow for a more complete understanding of collateral use of services and of how service use fluctuates between service providers. It was not possible in this study to evaluate simultaneous use of other service sectors or the transition between service sectors.

## 7 SUMMARY AND CONCLUSIONS

The present study showed that frequent attendance as a phenomenon is found in OH primary care, much as in other health service sectors previously. The service demand that frequent attendance creates is also substantial in the context of OH primary care. This study adds to the previous knowledge of frequent attendance by providing information on which characteristics are accentuated in FAs of OH primary care and how occasional and persistent FAs differ in this context. This study also provides novel information on sickness absences separately for occasional and persistent FAs and also on their risk for different lengths of sickness absences and disability benefits. The findings on different diagnostic groups leading to FAs' sickness absences and to their DPs are also unique.

These results indicate that both occasional and persistent frequent attendance are associated with work disability in the near future and that service use could perhaps be used as an early indicator of disability risks. Use of easily available medical record data on consultation frequency allows OHS providers to use this information and establish alert systems to enable early interventions and rehabilitation. Further research is needed on interventions in the OHS, parallel service use and changes between service providers and how these are associated with disability risks.

Additionally, the results of the present study highlight the working population as a patient group that should also be studied separately in terms of service use. Illnesses affecting work ability appear to drive service use more in this context than in the general practice setting; thus, different diseases are emphasised more in this context than in the general practice context. This study also indicates that age is not a significant factor driving frequent attendance in the working population, but a patient's employer and working industry might affect service needs and use.

It is crucial to understand that frequent service use might be indicative of future disability risk and that FAs are possibly in need of more support and perhaps rehabilitation. Together with other indicators of work disability, service use may be used to evaluate and initiate necessary functions to support employees staying in the workforce.

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Appendix A. Comparison between Statistics Finland Suomen yritykset 2016 (TOL 2008) and Pihlajalinn Työterveys clients from the year 2016 (in Finnish)

Toimiala (Suomen yritykset 2016, TOL 2008)			Toimiala (Pihlajalinn 2016)		
Yrityksiä	%	Henkilöstöä	Yrityksiä	%	Henkilöstöä
		1 000			%
Maatalous, metsätalous ja kalatalous	20,5	52	399	5,9	1 169
Teknillinen	5,7	289	618	9,2	1 966,3
Rakentaminen	11,5	158	855	12,7	6 210
Tukku- ja vähittäiskauppa, majoitus- ja neuvonantajien ja moottoripyörien korjaus	12,0	238	1 110	16,5	10 077
Kuljetus ja varastointi	5,8	121	435	6,5	3 880
Majoitus- ja ravitsemistoiminta	3,4	58	262	3,9	1 986
Informaatio ja viestintä	2,8	82	290	4,3	4 541
Rahoitus- ja vakuutus toiminta	2,2	42	112	1,6	1 970
Kiinteistöalan toiminta	7,7	20	134	2	780
Ammatillinen, tieteellinen ja tekninen toiminta	10,0	100	693	10	5 885
Hallinto- ja tukipalvelutoiminta	3,9	128	295	4,4	3 674
Terveys- ja sosiaalipalvelut	5,2	71	368	5	7 713
Muut toimialat	9,4	70	1 137	16,9	16 063
Kaikki toimialat	100	1 428	6 698	100	83 611
Henkilöstön määrä					
0-4	89,2	262	5 413	77	14 756
5-9	5,3	123			
10-19	2,8	135	1 062	15,1	14 864
20-49	1,7	178	297	4,2	10 297
50-99	0,5	122	139	1,9	9 737
100-249	0,3	144	58	0,8	9 261
250-499	0,1	112	30	0,4	9 984
500-999	0,0	109	17	0,2	17 878
1 000-	0,0	253			
Yhteensä	100	1 428	7 016	100	86 777

Tilastokeskus Suomen virallinen tilasto. Yritysten rakenne- ja tilinpäätöstilasto Yritykset 2016 [Internet]. Helsinki: Tilastokeskus [viitattu: 21.5.2018]. Saattilpa: <http://www.stat.fi/til/yty/index.html>



**Appendix B.** Diagnoses included in subcategories (table 6).

Subcategories presented in table 6	ICD-10
Illnesses of the back and the spine	M40-M54
Illnesses of the neck, cervical spine and tension headache	G44.2, M43.3, M43.4, M43.5, M43.6, M47.8, M47.80, M50, M50.0, M50.1, M50.2, M50.3, M50.8, M50.9, M53, M53.0, M53.1, M53.3, M53.8, M54.2
Illnesses of the upper extremities	M18, M18.0, M18.1, M18.2, M18.3, M18.4, M18.5, M18.9, M65, M65.0, M65.1, M65.2, M65.3, M65.4, M65.8, M65.9, M70.0, M70.1, M70.2, M70.3, M75, M75.0, M75.1, M75.2, M75.3, M75.4, M75.5, M75.8, M75.9, M77.0, M77.1, M77.2,
Illnesses of the lower extremities	M16-M17; M20.1-M20.6; M23; M24.7-M24.8; M70.4-M70.7; M71.2; M72.2; M76; M77.3-M77.5; M79.4
Depressive episodes	F32-F33
Essential hypertension	I10



# PUBLICATIONS



# PUBLICATION

I

## **Frequent attenders in occupational health primary care: a cross-sectional study**

Reho T, Atkins S, Talola N, Viljamaa M, Sumanen M, Uitti J

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## ORIGINAL ARTICLE

## Frequent attenders in occupational health primary care: A cross-sectional study

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### Abstract

**Aims:** This study characterizes frequent attenders in primary care provided by occupational health services (OHS) in Finland. **Methods:** This is a nationwide cross-sectional study using medical record data from an OHS provider in 2015. Frequent attenders were defined as persons who were within the top decile of annual visits to healthcare professionals (frequent attender 10%, FA10) at any of the OHS's 37 stations. FA10s within this study consulted the OHS primary care unit eight or more times during 2015. We used logistic regression to analyse factors associated with frequent attendance in OHS primary care. The independent variables were age, gender, employer size and industry, health professionals visited and diagnoses given during visits to the OHS. The dependent variable was belonging to the FA10 group. **Results:** Altogether 31,960 patients met the inclusion criteria and were included in the study. The FA10 group included 3617 patients, who conducted 36% of visits to healthcare professionals. The findings indicate that working within the manufacturing industry, health and social services, or public administration, and being employed in medium or large companies, are associated with frequent attendance. Frequent attendance was also associated with being female, diagnoses of the musculoskeletal system, or mental and behavioral disorders. In particular, depressive episodes and anxiety were associated with FA10s. **Conclusions: This research characterized FA10 clients at a Finnish OHS. Illnesses of the musculoskeletal system and mental and behavioral disorders were accentuated among FA10s. The stability of the FA10 group, along with their sickness absences and work disabilities, should be investigated further.**

**Keywords:** Frequent attender, frequent attendance, occupational health services, primary care, employee, healthcare utilization, working age

### Background

Frequent attendance is widely recognized throughout healthcare systems internationally. Frequent attenders are often defined according to a chosen cut-off in consultation frequency or according to a fixed number of visits, although the definitions vary between studies [1,2]. They constitute a substantial proportion of visits to the physician; internationally, the top 3 and 10% of visitors make up to 15 and 40% of all face-to-face visits, respectively, and contribute to a substantial proportion of healthcare costs [3,4].

In Finnish frequent attendance studies in the private sector, the top 5% of visiting clients used 40% of the costs, and in specialized healthcare, 15% of clients used 70% of the expenditure [5,6].

Because of the burden on the healthcare system, much research has recently been conducted on frequent attenders. However, studies have focused on general practice, specialized care or emergency services, and no research has been conducted on the working population attending occupational healthcare

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services (OHSs) [1,7,8]. Research suggests that frequent attendance is linked to higher costs in both primary and specialized care, but also to lower quality of life and worse self-perceived health [8–10]. Frequent attenders are often chronically ill with multiple conditions, are prone to injuries, and often have medically unexplained physical symptoms (MUPS) and ill-defined pathophysiology such as chronic pain [1,4,6,11,12]. In addition, mental disorders such as anxiety and depression are often present, and when further examination is conducted on already examined frequent attenders, untreated depression and anxiety can be found [4,13]. In studies on the general population, frequent attendance has been associated with unemployment [1,14]. Due to the beneficial health effects of employment, it is crucial to examine occupational health (OH) frequent attenders as a separate group [15]. As this heterogeneous group of patients appears to be vulnerable and burdened with multiple problems, their services should be carefully planned and special attention should be paid to careful diagnostics.

Coordination of care and identifying frequent attenders is particularly challenging in Finland, as the country has three different healthcare sectors in which primary care is provided: first, public or municipal, funded by the state with a service fee; second, OHSs, funded mostly by employers (approximately 80–85%); and third, private, funded by the individual and partly subsidized by the state. OHS coverage including the prevention of OH hazards is legislated. In addition, most employers voluntarily purchase primary healthcare services from the OHS, which is currently available to 90% of Finland's workforce [16]. Employees of organizations that have purchased OHS primary care services can use these services for free. The goal of OHSs is to foster employee health and prevent working disability, and OHSs strive to find cost-effective ways to fulfill this aim. It has been previously noted that chronic illnesses affecting working ability are associated with visiting OHS primary care [17]. Categorizing patients in terms of contacts with OHSs and diagnoses, for example through medical records, would allow resources and preventive measures to be directed towards chosen patient groups [18]. This would also allow the investigation and management of possible underlying and unnoticed reasons for repetitive contacts [19–21]. Interventions aimed at frequent attenders have achieved promising effects in the management of depression, reducing visits and improving quality of life [19–21]. To date, this categorization within OHSs has not been possible, as primary care frequent attenders may use different healthcare professionals without being identified for

more detailed follow-up, and no studies have been conducted on frequent attenders in OH primary care in Finland or elsewhere.

Our study aims to characterize frequent attenders in OHS primary care and to explore how frequent attenders in private OHSs differ from non-frequent attenders (non-FAs).

## Methods

### *Setting and participants*

This study was conducted using the register data of a large private Finnish OHS provider, Pihlajalinna. Pihlajalinna had 37 OHS units around the country and 68,370 registered OHS clients at the end of 2015. Pihlajalinna's clientele consists of a wide range of the working population around Finland from a variety of industries and lengths of employment history. In Pihlajalinna, as in other OHSs, employees can use the services of OH nurses, physicians, physiotherapists and psychologists, all of whom are usually specialized in OH. Consultations with physiotherapists and psychologists are available after a referral from a nurse or physician. At each visit to a physician, the patient is evaluated and a diagnosis using ICD-10 (the International Statistical Classification of Diseases and Related Health Problems, 10th revision) is recorded. As part of protecting work ability, OHSs can organize a confidential consultation between the employer, employee and the OH physician to discuss working ability (referred to as OH collaborative negotiation).

### *Data collection*

Pihlajalinna extracted all data from 2015 on face-to-face primary care visits to physicians, nurses, psychologists and physiotherapists, consultations with other medical specialists and OH negotiations held from electronic medical records and transferred these to a separate platform for pseudonymization. The pseudonymized data were sent to the Tampere University Occupational Health Group for analysis. The data also contained demographic information including employee age and gender, and the size and main industry of the employer. No sampling was done.

The whole clientele consisted of 68,370 employees at the end of the year 2015. Of these, 45,999 patients visited the OHS in 2015. The inclusion criteria were employees aged 18–68 years who had a comprehensive primary care plan and who had had at least one curative face-to-face contact with an OHS primary care unit in 2015. We excluded all visits that were general medical examinations, mandatory occupational safety examinations or that were not



conducted face-to-face (telephone calls or prescription renewals). ICD-10 diagnoses were collected from visit data and only the first (i.e. the main) diagnosis recorded for the visit was considered in analysis.

#### Statistical analysis

We used the widely accepted definition of frequent attenders as the top decile of attenders (FA10) [1,2]. Data from all the visits to the above-mentioned professionals were used to determine the FA10 group. We examined the distribution of the dependent variable, FA10, in four age categories (18–34, 35–44, 45–54 and 55–68), divided further by sex.

For the independent variables of employer size, industry, and main diagnosis, further categorization was done. Employers were divided to four groups according to the number of employees (micro: 1–10, small: 11–50, medium: 51–250 and large: > 251 employees). Statistical classification of economic activities in the European Community (NACE Rev. 2). The main diagnoses were categorized according to the chapter headings of ICD-10. From these, subgroups were defined in more detail based on the leading causes for disability pension and sickness absence in Finland (for example depression, F32–F33) and linkage to frequent attendance in previous studies [4,12,13].

We compared the FA10 to the rest of the study population (non-FAs). We used descriptive statistics to examine the number and distribution of visits between different professional groups, the distribution of diagnoses, attendance at OH collaborative negotiations, demographics, and data concerning the employer size, industry and FA10 status. Statistical significance was tested using the  $\chi^2$  test. We used logistic regression analysis to test whether gender, age group, OH collaborative negotiation, employer size, industry and diagnosis group were independently associated with the dependent variable FA10. Diagnostic groups were analyzed as dummy variables (no/yes) and were adjusted for sex, industry and age (as a continuous variable). Odds ratios (ORs) with 95% confidence intervals (CIs) were determined. Team statistician N.T. conducted statistical analyses using IBM SPSS Statistics version 23. *P* values less than 0.05 were considered statistically significant.

#### Ethical considerations

The study was approved by The Ethics committee of Pirkanmaa Hospital District (ETL R16041) and by the National Institute of Health and Welfare (THL/556/5.05.OO/2016). Individual consent is not required in Finland for large samples of register studies.

## Results

Altogether, 31,960 employees with mean age of 43 years visited OHS primary care during the study year and met the inclusion criteria. The mean number of visits was 3.7 per year per person and the top 10% (FA10) consulted the OH unit eight or more times. The FA10 group ( $n = 3617$ ) accounted for 36% of all visits to the OHS primary care. Most consultations were with a physician (70%) and the rest were with a nurse, physiotherapist or psychologist (14, 11 and 5%, respectively). Although the entire data set contained more men than women ( $n = 18,307$ , 57%), in the FA10 group, the gender distribution was equal (male  $n = 1811$ , 50%). See Table I for further descriptive data of the FA10 versus non-FA groups.

The age distribution in the FA10 group was fairly equal. More frequent attenders were employed in medium or large employers than in micro and small organizations. FA10s were more often employed in the manufacturing industry, public administration and defence, or human health and social work activities. FA10s consulted physiotherapists and psychologists more than non-FAs. FA10s also used specialist consultations and OH collaborative negotiations extensively when compared with non-FAs.

There was no linear association between age and FA10s (Table II). Women were more likely to be frequent attenders in OH primary care than men. OH collaborative negotiation and specialist visits, working in the manufacturing industry, public administration, and human health and social work increased the odds of belonging to the FA10 group. Physiotherapist consultation and, to a lesser extent, psychologist consultation were also associated.

Mental and behavioral disorders, and diseases of the musculoskeletal and connective tissue, were associated with FA10s more than other ICD-10 chapters (Table III). Both mental and behavioral disorders and diseases of the musculoskeletal system increased the probability of being in the FA10 group by over fourfold. In 2015, 23% of the FA10 group had been diagnosed with a mental and behavioral disorder and 69% with a disease of the musculoskeletal system, compared to 7 and 35% of the non-FA group, respectively (data not shown). In addition, injuries and diseases of the nervous system stood out from the other ICD-10 chapters.

Specific chapters of ICD-10 were examined more closely (Table IV: see Table V for the ICD-10 codes included in each group) to investigate the ICD-10 diagnoses associated with FA10s in more detail. The association of FA10s was most obvious with all mental and behavioral disorders. Depressive episodes increased the probability of being in the FA10 group

Table I. Characteristics of frequent attender 10% compared with non-frequent attender groups,  $N = 31,960$ .

Characteristics	FA10 $n = 3617$		Non-FA $n = 28,343$		<i>P</i> value
	<i>n</i>	%	<i>n</i>	%	
Sex					< 0.001
Male	1811	50	16,496	58	
Female	1806	50	11,847	42	
Age					< 0.001
18–34	840	23	8307	29	
35–44	908	25	6741	24	
45–54	983	27	7654	27	
55–68	886	25	5641	20	
Company size					< 0.001
0–10	227	6	4016	14	
11–50	862	24	8049	28	
51–250	1111	31	7050	25	
> 250	1417	39	9228	33	
Professionals visited in 2015					< 0.001
Doctor	3609	100	25,868	91	
Nurse	2068	57	8026	28	
Physiotherapist consultation	1489	41	2868	10	
Psychologist consultation	232	6	825	3	
Specialist consultation	901	25	2224	8	
Occupational health collaborative negotiation					< 0.001
No	3294	91	28,077	99	
Yes	323	9	266	1	
Industry					< 0.001
Manufacturing	1398	39	8510	30	
Construction	124	3	1706	6	
Wholesale and retail trade; repair of motor vehicles and motorcycles	313	9	3214	11	
Transporting and storage	141	4	1516	5	
Accommodation and food service activities	73	2	968	3	
Information and communication	119	3	1421	5	
Professional, scientific and technical activities	183	5	1680	6	
Administrative and support service activities	78	2	1002	4	
Public administration and defence; compulsory social security	346	10	2117	8	
Human health and social work activities	433	12	2584	9	
Others	409	11	3625	13	

The results of the study are presented according to the latest industry classification system from 2008 that is based on the Statistical classification of economic activities according to NACE Rev 2.

FA10: frequent attender 10%; non-FA: non-frequent attender.

over sixfold. In addition, phobic and anxiety disorders, adjustment disorders and reactions to severe stress and bipolar disorders increased the odds of being FA10 over fourfold. Illnesses of the back, spine and upper extremities, and illnesses of the neck, cervical spine and tension headache increased the probability of belonging to the FA10 group over threefold.

## Discussion

This study found an association of FA10s with industry, public administrations and human health and social services. We also found that FA10s are more often employed in medium and large organizations. These are novel findings not yet published elsewhere. The association of FA10s to musculoskeletal

disorders, in particular those of the back and neck, and mental disorders was accentuated in this context. Given the link of these disorders to disability pensions in Finland, the findings suggest that frequent attenders in OHS primary care might be at risk of working disability [22].

The association of manufacturing with the FA10 group could be explained by manufacturing often being physically demanding and many employees having a low level of vocational education, which has been previously linked to frequent attendance [1]. In addition, the human health and social services, also linked to the FA10 group in this study, are often both physically and psychologically demanding and employees are predominantly women, which may contribute to the association [23]. Our finding that

Table II. Factors associated with frequent attender 10% (adjusted for age, sex and industry where possible),  $N = 31,960$ .

Factor	Frequent attender 10%	
	OR	95% CI
Sex		
Male	1.00	
Female	1.41	1.31–1.51
Age		
18–34	1.00	
35–44	1.07	0.93–1.26
45–54	0.84	0.65–1.08
55–68	0.86	0.61–1.22
Occupational health collaborative negotiation	9.58	8.11–11.33
Professionals visited in 2015		
Specialist consultation	3.89	3.56–4.24
Nurse	3.43	3.19–3.68
Physiotherapist consultation	6.04	5.59–6.52
Psychologist consultation	2.12	1.82–2.47
Industry		
Manufacturing	1.65	1.53–1.78
Construction	0.64	0.53–0.77
Wholesale and retail trade; repair of motor vehicles and motorcycles	0.74	0.66–0.84
Transporting and storage	0.78	0.65–0.93
Accommodation and food service activities	0.58	0.45–0.73
Information and communication	0.68	0.56–0.82
Professional, scientific and technical activities	0.88	0.75–1.03
Administrative and support service activities	0.63	0.50–0.80
Public administration and defence; compulsory social security	1.10	0.97–1.25
Human health and social work activities	1.18	1.05–1.32
Others	0.83	0.74–0.92

1.0 = reference group in age and sex.

In the analysis, the other factors were used as dummy variables (no = reference group = 1.00).

The results of the study are presented according to the latest industry classification system from 2008 that is based on the statistical classification of economic activities according to NACE Rev 2.

OR: odds ratio; CI: confidence interval.

frequent attenders are more often employed in medium and large companies is interesting, and we can only speculate on the reasons behind it. One of these could be that large companies can afford to find replacement work for those with musculoskeletal disorders, whereas micro and small companies have more limited possibilities for shaping work around individuals' limitations.

In addition to the above factors, having attended an OH collaborative negotiation was associated with being in the FA10 group. OH collaborative negotiations are a unique feature of the Finnish OHS system, where negotiations are held when an employee's work ability is deemed to be at risk. These negotiations are often held when an employee is suffering from musculoskeletal or mental disorders, and the employees usually have prior sickness absence periods [24]. This suggests that at least some frequent attenders can be at risk of work disability, an issue that should be studied further.

Our study found an association of musculoskeletal disorders with frequent attendance in OHS primary

care similarly to previous studies in a general practice context [2,9,12]. A Swedish study of attendance in a primary healthcare center found musculoskeletal disorders to be the most common diagnoses for frequent attender consultation in working age women and in men aged 45–64 years [12]. Our finding also confirms this for the working population in Finland. Musculoskeletal disorders are also the leading cause of sickness absence and disability pensions in Finland, again linking the FA10 group to potential disability [25]. In our study, illnesses of the back and spine, and illnesses of neck, cervical spine and tension headache were closely associated with the FA10 group. Back pain has been associated with frequent attendance in primary care, and our study confirms this association [2]. Illnesses of the upper extremities had a stronger association with the FA10 group than illnesses of the lower extremities. We assume that diminished function or pain in the upper extremities affects work ability in most occupations of the employees included in this study more than that of the lower extremities, which might explain this result.

Table III. Diagnoses associated with frequent attender 10% (registered for physician consultations, adjusted for age, sex and industry),  $N = 29,380$ .

ICD-10		Number of FA10s		FA10	
		<i>n</i>	%	OR	95% CI
A00-B99	Certain infectious and parasitic diseases	480	13	2.43	2.18–2.71
C00-D48	Neoplasms	193	5	1.89	1.61–2.23
D50-D89	Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism	24	1	2.27	1.42–3.62
E00-E90	Endocrine, nutritional and metabolic diseases	199	6	1.52	1.29–1.78
F00-F99	Mental and behavioral disorders	838	23	4.34	3.96–4.76
G00-G99	Diseases of the nervous system	425	12	2.74	2.44–3.08
H00-H59	Diseases of the eye and adnexa	319	9	1.67	1.47–1.89
H60-H95	Diseases of the ear and mastoid process	365	10	2.15	1.90–2.43
I00-I99	Diseases of the circulatory system	461	13	1.82	1.63–2.03
J00-J99	Diseases of the respiratory system	2105	58	2.47	2.30–2.66
K00-K93	Diseases of the digestive system	409	11	2.45	2.18–2.75
L00-L99	Diseases of the skin and subcutaneous tissue	566	16	2.18	1.97–2.41
M00-M99	Diseases of the musculoskeletal system and connective tissue	2479	69	4.09	3.79–4.41
N00-N99	Diseases of the genitourinary system	339	9	2.31	2.03–2.63
O00-O99	Pregnancy, childbirth and the puerperium	16	0	1.45	0.84–2.50
P00-P96	Certain conditions originating in the perinatal period	–	0	–	–
Q00-Q99	Congenital malformations, deformations and chromosomal abnormalities	14	0	2.51	1.35–4.64
R00-R99	Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	1036	29	2.92	2.69–3.17
S00-T98	Injury, poisoning and certain other consequences of external causes	1093	30	3.11	2.87–3.38
V01-Y98	External causes of morbidity and mortality	39	1	1.70	1.19–2.42
Z00-ZZB	Factors influencing health status and contact with health services	359	10	2.12	1.88–2.40

The diagnostic groups were used as dummy variables (no = reference group = 1.00).

FA10: frequent attender 10%; OR: odds ratio; CI: confidence interval; ICD-10: International Statistical Classification of Diseases and Related Health Problems, 10th revision.

This result might be accentuated by the industries associated with frequent attendance, as both manufacturing and human health and social services can be physically demanding. As musculoskeletal disorders are common in the FA10 group, physiotherapists were extensively used in their care. In previous studies, the association of frequent attendance with back pain and musculoskeletal disorders in general has been reported, but our findings suggest that other musculoskeletal disorders are more closely associated with the phenomenon [2,12].

In addition to musculoskeletal disorders, we found an increased probability of belonging to the FA10 group when diagnosed with mental and behavioral disorders. Similarly to previous studies, frequent attendance was associated with depression, anxiety and sleep disorders [4,26]. Compared to a study in Spanish primary care, our findings suggest that anxiety disorders have a stronger association [26]. Reactions to severe stress and adjustment disorders also increased the probability of being in the FA10 group in our study, and an association of frequent attendance with experienced stress and insufficient coping strategies has also been perceived in previous literature [27]. Some diagnostic groups, such as

burn-out, schizophrenia and fibromyalgia, are too small to draw any conclusions on their association with the FA10 group. The association perceived with ICD-10 class R might be indicative of MUPS, a connection also perceived in previous studies [4]. It is alarming that, although the FA10 group is associated with mental and behavioural disorders, psychologists are rather infrequently engaged in their care.

The top decile of attenders in OHS primary care made up to 36% of the visits. This is roughly in line with results from other settings [3,4]. As the FA10 group comprised approximately 5% of the entire clientele of Pihlajalinna Työterveys, it means that 5% of registered patients attend over one third of all consultations. As the employers mostly provide the services, it is crucial to study whether service use of this magnitude is a persistent phenomenon. If, as indicated by our research, certain characteristics are associated with persistent use of services, the identification of these patients through electronic patient data and focusing resources to their care before their health problems lead them to frequent attendance should be explored. The top decile visited the OHS primary care eight or more times during the year, the same number of visits that has been used in other studies

Table IV. Diagnoses associated with frequent attendee 10% (registered for physician consultations, adjusted for age, sex and industry),  $N = 29,380$ .

Factor	Number of FA10s		FA10	
	<i>n</i>	%	OR	95% CI
Illnesses of the back and the spine	1149	32	3.41	3.15–3.69
Illnesses of the neck, cervical spine and tension headache	562	16	3.51	3.16–3.91
Illnesses of the upper extremities	709	20	3.24	2.94–3.56
Brachial plexus disorders	19	0.5	6.25	3.34–11.69
Carpal tunnel syndrome	52	1	3.08	2.21–4.29
Illnesses of the lower extremities	578	16	2.75	2.48–3.05
Fibromyalgia	13	0.4	4.99	2.39–10.41
Non-organic sleep disorders	254	7	3.44	2.94–4.01
Depressive episodes	272	8	6.39	5.41–7.55
Phobic and other anxiety disorders	211	6	5.14	4.30–6.16
Schizophrenia, psychotic and delusional disorders	6	0.2	8.13	2.46–26.84
Bipolar disorder	14	0.4	7.91	3.70–16.90
Reaction to severe stress and adjustment disorders	266	7	4.27	3.65–5.00
Burn-out	15	0.4	5.11	2.62–9.96
Other mental and behavioral disorders	330	9	3.93	2.95–5.24
Diabetes mellitus	63	2	1.27	0.96–1.66
Essential hypertension	221	6	1.40	1.20–1.63
Ischaemic heart diseases	17	0.5	1.85	1.08–3.18
Acute upper respiratory infections	1797	50	2.58	2.40–2.77
Influenza, pneumonia and other acute lower respiratory infections	661	18	2.39	2.17–2.63
Asthma and COPD	137	4	3.10	2.52–3.80
Gastroenteritis	251	7	2.79	2.40–3.24
Irritable bowel syndrome	37	1	2.24	1.54–3.25

The diagnostic groups were used as dummy variables (no = reference group = 1.00). For the International Statistical Classification of Diseases and Related Health Problems (10th revision) codes included in each group see Table V. FA10: frequent attendee 10%; OR: odds ratio; CI: confidence interval; COPD: chronic obstructive pulmonary disease.

as a cut-off for frequent attendance [28]. We used visits to all OHS specialists to define the FA10 group, which may affect the results by accentuating the illnesses that require the use of physiotherapists and psychologists. However, in confirmatory analysis made with only physician appointments (data not included), the results remained fairly uniform with our initial analysis and the proportions were not altered. Similarly to other studies, being female was associated with frequent attendance, possibly as women tend to use services more than men [3,14]. However, age had no linear association with the FA10 group.

Our study has some limitations. The study population differs from other settings in terms of patient age and employment status, which might accentuate different factors from those in the general practice setting. On the other hand, this study offers unique insights to this group in particular, as our study includes participants from all industries, equally distributed age groups within the working age population and equal sex distribution, thus allowing for generalization outside this particular context. It is important to note that the working population may

not have the most difficult illnesses, emphasizing less severe illnesses. The strengths of our study are the large sample and nationwide data. Though human error might affect individual results, the size of the study dilutes this effect. For example, diagnostic codes were missing in only 1% of the sample. The gaps in our data include information on occupation and education, as this is not available in medical records. Parallel use of primary care services from other sectors is possible, but in a Finnish study, 52% of all participants (not restricted to employees with primary care provided by the employer) consulted OHSs as their sole primary care provider [29]. In this study, we did not have access to records from other healthcare providers. The cross-sectional retrospective study design limits the interpretation of causal relations. However, this is the first study to characterize frequent attendance in the OHS setting and provides unique information.

## Conclusions

In OHS primary care, frequent attendance was associated with female gender and medium or large

Table V. Additional information for Table IV.

Diagnoses in Table 4	International Statistical Classification of Diseases and Related Health Problems, 10th revision
Illnesses of the back and the spine	M40-M54
Illnesses of the neck, cervical spine and tension headache	G44.2, M43.3, M43.4, M43.5, M43.6, M47.8, M47.80, M50, M50.0, M50.1, M50.2, M50.3, M50.8, M50.9, M53, M53.0, M53.1, M53.3, M53.8, M54.2
Illnesses of the upper extremities	M18, M18.0, M18.1, M18.2, M18.3, M18.4, M18.5, M18.9, M65, M65.0, M65.1, M65.2, M65.3, M65.4, M65.8, M65.9, M70.0, M70.1, M70.2, M70.3, M75, M75.0, M75.1, M75.2, M75.3, M75.4, M75.5, M75.8, M75.9, M77.0, M77.1, M77.2
Brachial plexus disorders	G54.0
Carpal tunnel syndrome	G56.0
Illnesses of the lower extremities	M16-M17, M20.1-M20.6, M23, M24.7-M24.8, M70.4-M70.7, M71.2, M72.2, M76; M77.3-M77.5, M79.4
Fibromyalgia	M79.7
Nonorganic sleep disorders	F51
Depressive episodes	F32-F33
Phobic and other anxiety disorders	F40-F41
Schizophrenia, psychotic and delusional disorders	F20-F29
Bipolar disorder	F31
Reaction to severe stress and adjustment disorders	F43
Burn-out	Z73.0
Other mental and behavioral disorders	F
Diabetes mellitus	E10-E14
Essential hypertension	I10
Ischaemic heart diseases	I20-I25
Acute upper respiratory infections	J00-J06
Influenza, pneumonia and other acute lower respiratory infections	J10-J22
Asthma and chronic obstructive pulmonary disease	J44, J45, J46
Gastroenteritis	A09
Irritable bowel syndrome	K58

employers, the manufacturing industry, public administration, and human health and social services. In addition to these, frequent attendance in OHS primary care was closely associated with mental and behavioral or musculoskeletal disorders. As these are the leading causes of sickness absence and disability, this calls for further research on sickness absence and disability grants among OHS primary care frequent attenders. We suggest that OHS primary care units should screen frequent attenders, especially when diagnosed with musculoskeletal and mental disorders, to enable careful diagnostics and case management. In addition, the stability of frequent attendance in this context should be investigated.

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### Conflict of interest

The authors declare that there is no conflict of interest.

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# PUBLICATION II

## **Comparing occasional and persistent frequent attenders in occupational health primary care – a longitudinal study**

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RESEARCH ARTICLE

Open Access



# Comparing occasional and persistent frequent attenders in occupational health primary care – a longitudinal study

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## Abstract

**Background:** The aim of the study was to compare occasional and persistent frequent attenders in occupational health (OH) primary care and to identify the diagnoses associated with persisting frequent attendance.

**Methods:** This is a longitudinal study using electronic medical record data from 2014 to 2016 from an OH service provider. Frequent attenders were defined as patients in the top decile of annual visits to healthcare professionals (frequent attender 10%, FA10). FA10 were categorized to three groups according to the persistence of frequent attendance (1-year-FA, 2 year-FA, and persistent-FA = frequent attenders in all three years). This was used as the dependent variable. We used patient sex, age, employer size, industry and distribution of visits and diagnostic codes to characterize the different frequent attender groups.

**Results:** In total, 66,831 patients were included, of which 592 persistent frequent attenders (0.9% of the study population) consulted the OH unit on average 13 times a year. They made altogether 23,797 visits during the study years. The proportion of women and employees of medium and large employers increased among persistent-FAs when compared to the other groups. Multinomial logistic regression accentuated musculoskeletal disorders and to a lesser extent diseases of the respiratory and nervous system and mental disorders. One in five FA becomes a persistent-FA.

**Conclusions:** Our results indicate that in the context of a working population the association of musculoskeletal disorders and persistent frequent attendance is emphasized. Persistent frequent attenders also create a substantial demand on physician resources. When planning interventions aimed at working age frequent attenders, subgroups suffering from musculoskeletal disorders should be identified as they are associated with persisting frequent attendance.

**Keywords:** Frequent attender, High user, High utilizer, Occupational health services, Persistent frequent attendance, Primary health care, Health care utilization, Longitudinal studies

## Background

Frequent attenders demand a substantial portion of physician's time and consume a considerable share of health care resources [1–3]. Some patients consult their physician repeatedly for a short period and return to an irregular pattern of attendance after some time [3, 4]. Another group of patients, often referred to as persistent frequent attenders, visit health care providers frequently one year after another [3, 5]. Though studies on persistent frequent attendance are sparse, and concentrate on a

general practice setting, it appears that a combination of somatic, psychological and psychiatric, and social factors lead to persistent frequent attendance [4–6]. In order to purposefully direct resources and to provide adequate treatment and rehabilitation, we need to be able to recognize individuals at risk of continuous high use of services with the routine data available during consultations. In addition, the differentiation of occasional and persistent frequent attenders could be useful for service planning as studies suggest that persistent FA's consume an even larger proportion of physicians time yearly than occasional FA's, and present more social problems and higher morbidity [3, 5] than occasional FA's.

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Previous research suggests that frequent attenders suffer from multimorbidity [6, 7] and low quality of life [8]. Studies also indicate that unemployment is associated with frequent attendance especially among men [9, 10] but few studies thus far have concentrated on frequent attendance among the working population [11]. Studies conducted in general practice or secondary care setting do not address the demands of the working life. Given that work has beneficial effects on health [12] but also places demands on work ability, the working population should be examined also separately. Studying the working population could yield different results possibly emphasizing illnesses that restrict work ability. Finnish occupational health (OH) primary care is an appropriate environment to study frequent attenders in working population, as it covers 90% of the employees [13] and maintains comprehensive health records.

Visits to occupational health services (OHS) primary care are associated with chronic illnesses affecting work ability and work related symptoms [14]. Chronic health issues are also associated with lower productivity at work [15] and lowered work ability, which supports their being treated and managed in OHS. The most common work-related visits to the OH physician are musculoskeletal and mental disorders [16], which are both also leading causes of disability in Finland [17] and linked to frequent attendance in general practice setting and OH primary care [11, 18, 19]. This suggests that frequent attenders in OH primary care might be a vulnerable group of patients demanding careful assessment of work ability, work relatedness and follow up. Given the complexity of frequent attenders' conditions and the resource demand they create, it is crucial that their conditions are identified as early as possible. It is also pertinent to differentiate characteristics and factors associated with occasional and persistent frequent attendance to determine which groups need OH interventions. Identifying the risk groups would allow targeted OH examinations, where health plans and necessary rehabilitative measures and work place interventions can be planned to prevent disability [20].

We aimed to compare occasional and persistent frequent attenders and to define factors associated with persistent frequent attendance in OH primary care.

## Material and methods

### Study setting and design

Primary health care services in Finland are organized in three parallel structures: municipal, private and occupational health care (OH). Preventive occupational health services are mandated by law and employers arrange these services for employees. In addition most employers arrange for the same health care provider that provides legislative services also to provide primary care services for employees –

OH primary care covers approximately 90% of the working force [13].

This is a longitudinal retrospective study using routine medical record data from a large private OHS provider Pihlajalinna Työterveys which has 40 OH units around the nation. A longitudinal study design was chosen to analyze predictive factors associated with persisting frequent attendance. Pihlajalinna Työterveys' clients represent the working population of Finland including companies from a wide range of industries and rural as well as urban areas. In OHS primary care patients can use services of different health care professionals who are usually specialized in occupational health: physicians, nurses, physiotherapist and psychologists. A referral from a nurse or physician is required for a physiotherapist or psychologist consultation and physicians can consult other medical specialists. In Finland occupational health negotiations (referred to as OH collaborative negotiation) [21] are held confidentially between the occupational health physician, employee and employer whenever concerns are raised on the individuals work ability.

### Data collection

Our data consisted of routine information, including diagnostic codes, entered during all visits to healthcare professionals in 2014–2016. The data also included background data, such as age and sex of the employee and employer's size and industry. Information on OH collaborative negotiations held was also obtained. The data were collected by Pihlajalinna and sent in pseudonymized form to the University of Tampere. Pseudonymization was carried out by Pihlajalinna Työterveys and University of Tampere received the data including only ID-number than cannot be associated with a single patient. The corresponding social security number and ID-list was kept by Pihlajalinna. Based on Finnish legislation (Personal Data Act, Finland, 22.4.1999) individual consent is unnecessary since no individual could be identified due to the size of the study population.

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. All general and mandatory health check-ups and contacts not conducted face-to-face (prescription renewals, telephone calls etc.) were excluded based on invoice codes. General and mandatory (occupational) health check-ups were excluded as they are not initiated by the patient nor are they necessarily illness related. After these exclusions our study comprised 66,831 patients. Diagnostic codes (ICD-10) registered for each physician visit were collected and the first (i.e. the main) diagnosis was used in the analysis.

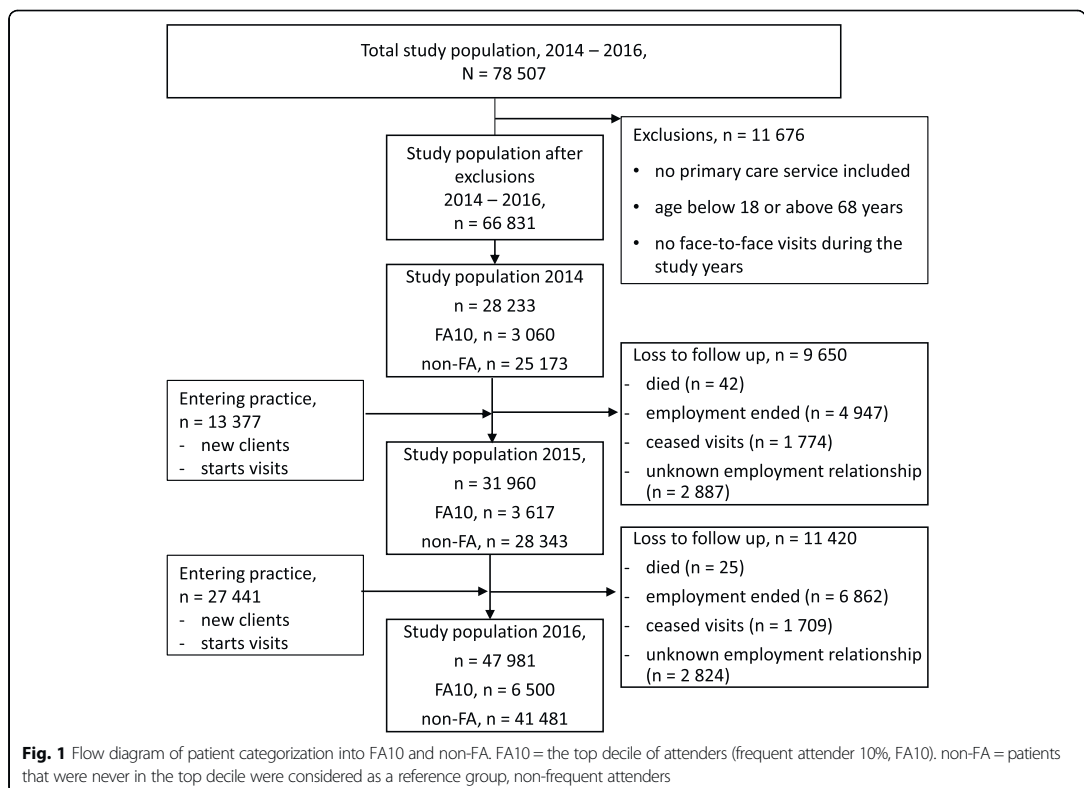
**Statistical analysis**

Frequent attendance was defined as top decile of attenders [3, 22]. Visits to physicians, nurses, physiotherapist and psychologists were used to determine the top decile of attenders (frequent attender 10%, FA). Patients were then categorized into four groups for analysis. Those patients that were in the top decile of attenders in one of the study years (2014, 2015 or 2016) were named 1-year-FA (1yFA). The patients that were in the top decile in any two study years were named 2-year-FA (2yFA). Those patients that were in the top decile in all three study years were considered persistent frequent attenders (pFA). Patients that were never in the top decile were considered as a reference group, non-frequent attenders (non-FA). A flow diagram of patient categorization and loss to follow up is shown in diagram 1 (Fig.1).

The study population was divided into four age groups (18–34, 35–44, 45–54, 55–68) and further by sex. In further analysis no age stratification was done since the whole study population consists of working age population. Employers were categorized according to number of employees (micro 1–10, small 11–50, medium 51–250 and large > 251 employees). The employer industry was classified

according to Statistics Finland (TOL2008/Nace Rev. 2) and the 10 largest industries were analyzed separately and the 10 smaller industries were combined as one group (others). Diagnoses registered at the physician visits were categorized according to the chapter headings of ICD-10. ICD-10 subgroups were defined in more detail based on previous literature [3, 18, 19] and to examine the largest diagnostic groups more closely [11].

Descriptive statistics were used to examine demographic data, OH collaborative negotiation and background data including employer size and industry of the frequent attenders groups (1yFA, 2yFA, pFA or non-FA). Differences between the groups in characteristics were analyzed using Pearson’s chi-square. One-way ANOVA tests was used to analyze the number of visits to different health care professionals as a whole and the distribution of visits between different professional groups. Kruskal-Wallis –test was used to analyze differences between the groups in the number of diagnoses. In multinomial logistic regression the outcome variable was categorized into four: non-FA, 1yFA, 2yFA and pFA. We used the non-FA group as a reference group. The analysis was adjusted by sex, age, employer’s field of industry and size. Odds ratios (OR) with 95%



confidence intervals (95% CI) were determined for each factor (professionals visited, diagnosis). *P* values under 0.05 were considered statistically significant. Statistical analyses were performed with IBM SPSS Statistics version 23 (IBM Corp., Armonk, NY, USA) software by NT.

## Results

The study population after exclusions comprised 66,831 patients (2014–2016). When divided into four categories 592 (0.9%) patients were pFAs, 1603 (2.4%) 2yFAs, 6528 (9.8%) 1yFAs and 58,108 (86.9%) non-FAs. Proportionally more women (50% of 1yFA, 53% of 2yFA and 56% of pFA) than men were frequent attenders (and the proportion of women increased in 2yFAs and pFAs). Frequent attenders were predominantly employed in medium and large companies (Table 1). The three largest industries employing frequent attenders were manufacturing, public administration and human health and social work (data not shown). The use of other professionals besides physicians increased as frequent attendance continued. 2yFAs and pFAs consult with a psychologists, physiotherapists and specialists more often than non-FAs and 1yFAs do. In addition, the likelihood of occupational health negotiation increased as frequent attendance persisted. See Table 1 for further characteristics.

The average and mean consultation rates can be seen in Table 2. Persistent frequent attenders consult with a healthcare professional yearly over five times more than non-FAs do. The differences between consultation rates were notable in physician consultations but the same trend was seen also with other health care professionals. Over the three study years, pFAs attended their OH primary care unit 40 times on average whereas a non-FA visited on average 4 times. Most of these consultations were doctor's appointments. Over the three year period physiotherapists were consulted on average 1.3, 2.6, 4.0 and 0.2 times (md 0, 1, 2 and 0) by 1yFA, 2yFA, pFA and non-FA respectively. Over the same period psychologists were consulted on average 1.4 times by pFA and 0.6, 1.3 and 0.08 times (md 0) by 1yFA, 2yFA and non-FA respectively.

Table 3 includes the distribution of diagnoses for 1yFA, 2yFA, pFA and non-FA. When examining the diagnostic codes registered for each physician visit, the most common diagnostic codes for any group were diseases of the respiratory system and of the musculoskeletal system. Diseases of the musculoskeletal system were overrepresented in frequent attender groups and their frequency increased towards persistent frequent attendance. The same trend is visible in all the diagnostic groups and is accentuated also in mental and behavioural disorders, injuries and unclassified symptoms. During the three study years average number of different diagnoses was 4.2 (md 4), 5.8 (md 6), 6.9 (md 7) and 2.0 (md 2) for 1yFA, 2yFA, pFA and non-FA respectively ( $p < 0.001$ , Kruskal-Wallis -test).

Table 4 shows the adjusted OR for factors associated with frequent attendance of varying lengths. The same ICD-10 categories dominated in all three categories but the proportions differed to some extent. Among pFA diseases of the musculoskeletal and respiratory system had the highest odds, followed by unclassified symptoms (R00-R99). On the other hand among 1yFAs musculoskeletal and mental disorders were the leading diagnoses and diseases of the nervous system had the third highest OR. Among 2yFAs musculoskeletal and respiratory diseases dominated but mental and behavioural disorders were third most common. Diseases of the nervous system and injuries stood out in all three FA categories. When examining the ICD-10 F-codes more closely we noted that for depressive episodes the adjusted OR for pFA was 12.0 (95% CI 9.5–15.2) and for phobic disorders 8.5 (95% CI 6.5–11.0). For illnesses of the back and spine OR for pFA was 13.5 (95% CI 11.3–16.1) and illnesses of the neck, cervical spine and tension headache the OR was 10.47 (95% CI 8.9–12.4). For illnesses of the upper extremities the OR was 8.9 (95% CI 7.5–10.5) and for illnesses of the lower extremities 7.9 (95% CI 6.7–9.4). Again, for pFA the OR for asthma and COPD was 8.3 (95% CI 6.4–10.7) while for acute upper respiratory infections the OR was 13.4 (95% CI 10.7–16.9) (data not shown). We also saw that psychologist and physiotherapist use was associated with 2yFAs and pFAs (Table 4). The OR increases over years when frequent attendance continues especially with regard to physiotherapist, psychologist, and specialist consultations.

## Discussion

Nearly one in five frequent attenders in 2014 continued frequent use of services for the following two years. Persistent FAs are frequently women and employed in medium and large enterprises. Musculoskeletal disorders are more closely associated with pFA than other diagnostic groups. The association with mental disorders weakens as frequent attendance continues. The reasons for this effect should be examined further.

This study verifies in Finnish OH primary care environment that persistent frequent attenders create proportionally the most demand for the health care unit as previously seen in general practice (GP) setting [3]. The use of services and in particular physician consultations is substantial compared to non-FAs and also 1yFAs and 2yFAs. The pFA group of 592 patients made 23,797 visits to their primary care unit during the three study years. Given the cost of a physician visit compared to visits to other health care professionals, the economic effect created by this small group is notable. In our study nearly one out of five (19%) of FAs in 2014 continued as persistent frequent attenders, which is slightly more than in a Dutch study in general practice setting [3]. While the group of pFAs constituted 0.9% of the study

**Table 1** Study population 2014–2016, characteristics of 1-year-FA, 2-year-FA, pFA and non-FA (*n* = 66,831)

Characteristics	1-year-FA 2014–2016		2-year-FA 2014–2016		pFA 2014–2016		non-FA 2014–2016		<i>p</i> value
	<i>n</i>	(%)	<i>n</i>	(%)	<i>n</i>	(%)	<i>n</i>	(%)	
Sex	6528	(10)	1603	(2)	592	(1)	58,108	(87)	< 0.001
Male	3270	(50)	754	(47)	262	(44)	33,236	(57)	
Female	3258	(50)	849	(53)	330	(56)	24,872	(43)	
Age									< 0.001
18–34	1661	(25)	354	(22)	128	(21)	19,630	(34)	
35–44	1641	(25)	413	(26)	147	(25)	13,648	(23)	
45–54	1889	(29)	473	(30)	187	(32)	14,351	(25)	
55–68	1337	(21)	363	(22)	130	(22)	10,479	(18)	
Company size									< 0.001
0–10	507	(8)	77	(5)	19	(3)	8544	(15)	
11–50	1601	(25)	350	(22)	129	(22)	16,036	(28)	
51–250	1767	(27)	513	(32)	195	(32)	14,165	(24)	
> 250	2287	(35)	663	(41)	249	(42)	16,451	(28)	
Missing	2	(0)					16	(0)	
Specialist consultation									< 0.001
No	4677	(72)	894	(56)	244	(41)	51,622	(89)	
Yes	1851	(28)	709	(44)	348	(59)	6486	(11)	
Professionals visited									< 0.001
Physician	6513	(100)	1603	(100)	592	(100)	53,945	(93)	
Nurse	4119	(63)	1192	(74)	460	(78)	18,918	(33)	
Physiotherapist	2932	(45)	1023	(64)	425	(72)	7910	(14)	
Psychologist	1174	(18)	467	(29)	196	(33)	1966	(3)	
OH collaborative negotiation (2014–2015)									< 0.001
No	6309	(97)	1424	(89)	453	(77)	57,490	(99)	
Yes	219	(3)	179	(11)	139	(23)	618	(1)	

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

1-year-FA = Patients that were in the top decile of attenders in one of the study years (2014, 2015 or 2016)

2-year-FA = Patients that were in the top decile in any two study years (2014, 2015 or 2016)

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

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

population, they made 6% of all visits in the three study years. The three frequent attender groups (pFA, 2yFA and 1yFA) made up in total 40% of all consultations.

Our study is the first to describe how the use of other healthcare professionals varies between occasional and persistent frequent attenders. Visits to physiotherapists and psychologists were associated with persisting frequent attendance in particular and having consulted either them or a specialist increases the OR of belonging to pFA to almost 15. In this study we described how frequent attenders consult other healthcare professionals. It appears that although the use of physiotherapists and psychologists increases with pFAs, the dominance of physicians' appointments is marked. Previously, in a GP setting specialist consultations have been linked to frequent attendance

and use of multiple healthcare services to multimorbidity [7, 23]. Our study verifies the association of specialist consultation and frequent attendance and specifies the association with particularly persisting frequent attendance.

The significance of musculoskeletal disorders accumulates towards persisting frequent attendance. If diagnosed with a musculoskeletal disorder, the OR for being a pFA are over 26-fold (when adjusted for age, sex, employee size and industry). Although the association of musculoskeletal disorders and frequent attendance has been noted previously [18, 24, 25] its significance seems emphasized in the working population. Previous studies noted that musculoskeletal disorders are associated with visits to OH physicians and are one of the main work-related reasons for healthcare consultations [26, 27], which might explain this result in

**Table 2** Association between consultation visits and frequent attender status ( $n = 28,233-66,831$ )

Characteristics	Consultations, all		Physician		Nurse	
	av.	md	av.	md	av.	md
2014 ( $n = 28,233$ )	***		***		***	
1-year-FA	4.9	4	3.6	3	0.7	0
2-year-FA	7.7	8	5.6	5	1.1	0
pFA	13.2	11	9.6	9	1.8	1
non-FA	2.9	2	2.3	2	0.4	0
2015 ( $n = 31,960$ )	***		***		***	
1-year-FA	5.7	5	4.1	4	0.8	0
2-year-FA	10.2	9	7.3	7	1.4	1
pFA	14.3	13	10.6	10	1.8	1
non-FA	2.7	2	2.1	2	0.4	0
2016 ( $n = 47,981$ )	***		***		***	
1-year-FA	7.8	8	5.5	5	1.2	0
2-year-FA	9.4	9	6.7	6	1.2	0
pFA	12.6	11	9.4	8	1.5	1
non-FA	2.4	2	1.9	1	0.4	0
2014–2016 ( $n = 66,831$ )	***		***		***	
1-year-FA	13.8	13	9.9	9	2.1	1
2-year-FA	26.4	25	19.0	19	3.6	2
pFA	40.0	37	30.0	28	5.1	3
non-FA	4.0	3	3.1	2	0.6	0

One-way ANOVA –test, av. = average, md = median,  $p < 0,001$  in all values  
FA status was defined as the top decile of attenders (frequent attender  
10%, FA10)

1-year-FA = Patients that were in the top decile of attenders in one of the  
study years (2014, 2015 or 2016)

2-year-FA = Patients that were in the top decile in any two study years (2014,  
2015 or 2016)

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

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

OH primary care. This result suggests that among the working age population diseases of the musculoskeletal system can be a more important factor driving frequent attendance than in the general practice setting. This is an observation that should be taken into account when planning identification and intervention strategies for frequent attenders in this context.

Our findings suggest that in particular those frequent attenders diagnosed with musculoskeletal disorders should be identified early. A follow up plan should be prepared, where a multiprofessional approach could be used in the spirit of Good Occupational Health Practice and the Occupational Health Care Act [28]. The accumulating pressure and weight on the system from frequent attendance is

significant and cost-savings might be obtained if utilization could be increasingly planned and managed. Deeper analysis behind reasons for attendance [29] could be acquired through collaboration with other health care professionals.

OHS has close contact with the employers allowing, with the consent of the employee, also workplace interventions if seen necessary [30]. Although the likelihood of OH collaborative negotiation increases as the frequent use of services continues, these negotiations have been held for only 23% of pFA. Further studies should investigate if having attended an OH collaborative negotiation affects future frequent attendance. Interventions aimed at frequent attendance have shown encouraging results when subgroups such as depressed patients are targeted or a detailed analysis of reasons for attendance are carried out [29, 31]. If work related symptoms and performance difficulties cause visits to OH unit, workplace interventions, including OH collaborative negotiations, might be an effective way to address medically unsolvable reasons for attendance.

The association with mental and behavioural disorders also grows as frequent attendance persists, but diseases of the respiratory and nervous system show higher odds in association with pFA. An Estonian study found that depressed patients did not consult a physician significantly more than others when the follow up period was three years [32]. Effective recovery could explain this also in our study. However as mental disorders are one of the most common reasons for disability pensions, this issue should be studied further. It is not known if frequent attenders receive more disability pensions for mental disorders than others, which could also cause mental health diagnoses being less significant in the pFA group. Also in Finland, mental and behavioural disorders can also be treated in mental health services and units of secondary care. If a mental disorder persists, patients are often referred to these units. This might be one factor explaining why mental disorders appear less significant with pFA group. Similarly to Australian and Dutch primary care studies we found that persistent frequent attendance was associated with depression, but on the other hand we did not find an association with diabetes or heart problems [3, 5]. This might be due to our study material comprising of solely a working age population, some of whom may consult public practitioners for chronic diseases [26, 33]. The OH primary care setting most likely emphasizes the problems and illnesses affecting working ability [14].

The findings also indicate that respiratory diseases and diseases of the nervous system are closely associated with persistent high use of services in the working age population. An association of persistent high use of services with respiratory diseases has previously been reported in a primary care setting [3] and diseases of the nervous system have been associated with frequent attendance, but this confirms the connection also in persistent frequent attendance



**Table 3** Patients diagnosed with a disease according to ICD-10 (registered for physician consultations in the study years 2014–2016,  $n = 66,831$ )

Characteristics	1-year-FA 2014–2016		2-year-FA 2014–2016		pFA 2014–2016		non-FA 2014–2016	
	<i>n</i>	(%)	<i>n</i>	(%)	<i>n</i>	(%)	<i>n</i>	(%)
ICD-10	6528	(10)	1603	(2)	592	(1)	58,108	(87)
J00-J99 Diseases of the respiratory system	4254	(65.2)	1321	(82.4)	536	(90.5)	23,678	(40.7)
M00-M99 Diseases of the musculoskeletal system and connective tissue	4796	(73.5)	1422	(88.7)	559	(94.4)	21,303	(36.7)
R00-R99 Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	2309	(35.4)	857	(53.5)	401	(67.7)	9147	(15.7)
S00-T98 Injury, poisoning and certain other consequences of external causes	2198	(33.7)	792	(49.4)	349	(59.0)	9228	(15.9)
L00-L99 Diseases of the skin and subcutaneous tissue	1335	(20.5)	510	(31.8)	220	(37.2)	5717	(9.8)
F00-F99 Mental and behavioural disorders	1595	(24.4)	609	(38.0)	270	(45.6)	4663	(8.0)
I00-I99 Diseases of the circulatory system	1129	(17.3)	403	(25.1)	168	(28.4)	4902	(8.4)
A00-B99 Certain infectious and parasitic diseases	1102	(16.9)	425	(26.5)	228	(38.5)	4827	(8.3)
H00-H59 Diseases of the eye and adnexa	868	(13.3)	326	(20.3)	163	(27.5)	4056	(7.0)
H60-H95 Diseases of the ear and mastoid process	909	(13.9)	315	(19.7)	153	(25.8)	3687	(6.3)

ICD-10 = International Classification of Diseases

FA status was defined as the top decile of attenders (frequent attender 10%, FA10),  $p < 0.001$  in all values

1-year-FA = Patients that were in the top decile of attenders in one of the study years (2014, 2015 or 2016)

2-year-FA = Patients that were in the top decile in any two study years (2014, 2015 or 2016)

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

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

In the table are presented the 10 largest ICD-10 groups

[25]. In turn, the high OR for the ICD R-group can be seen as indicative of medically unexplained physical symptoms (MUPS). The association of MUPS with persistent frequent attendance has been seen also in general practice setting [3] and is of importance as also medically unexplained symptoms increase the risk of long-term sickness absence [34]. The finding that injuries have higher odds for persistent FA is interesting, and might reinforce the perception that persistent frequent attenders are more vulnerable as also indicated in a previous study [35]. Multimorbidity is associated with frequent attendance and appears to increase as frequent attendance persists, as also seen previously [3]. As a whole, no single factor differentiates these groups from each other but rather, these factors seem to exist on a continuum.

Our study has certain limitations. Our study population differs from the general practice setting to some extent in terms of patient age and working status, and we assume that these demographic differences possibly accentuate different factors than what would rise in general practice setting. The lack of occupational status and education are limitations to the study as these are not available in medical records. Human error may be present when using medical record data, but the large sample likely dilutes the effect. Retrospective study sets limitations to variables used, which are also limited by what is and can be registered in the electronic patient registers.

On the other hand our data allow a unique perspective to this particular group given our nationwide material covering largely different service sectors and both rural and urban areas with employees with variety of employment lengths and industries. The distribution of employers' size and industry resembles the general distribution of employers according to Statistics Finland [36]. The equal age distribution within the working age population and equal gender distribution, allows generalization outside this particular context. Strengths of the study are large sample and longitudinal study design allowing for interpretation of predictive factors of persistent frequent attendance. The health care records in Finland are accurate and comprehensive allowing for good quality data. For example, the ICD-10 classified diagnostic code was missing in only 1% of the visits. In this study we did not have access to use of other health care services, but a previous study indicates that when OHS primary care is available it is often used as sole primary care provider [26].

## Conclusions

Diseases of the musculoskeletal system are emphasized among persistent frequent attenders of occupational health primary care. This could be explained by the demands of working life or that the conditions are work-related. As it seems that persistent frequent attenders create the most demand for their primary care unit, it is necessary

**Table 4** Factors associated with frequent attendance in multinomial logistic regression (n = 66,831)

Factor	1-year-FA (2014–2016)			2-year-FA (2014–2016)			pFA (2014–2016)		
	n	OR	95% CI	n	OR	95% CI	n	OR	95% CI
Professionals visited									
Physician	6513			1603			592		
Nurse	4119	3.43	3.25–3.63	1192	5.39	4.80–6.06	460	6.19	5.07–7.56
Physiotherapist	2932	4.73	4.48–5.00	1023	9.59	8.62–10.7	425	13.15	10.95–15.79
Psychologist	1174	6.19	5.71–6.70	467	11.92	10.6–13.5	196	14.44	11.99–17.40
Specialist consultation	1851	3.40	3.20–3.62	709	7.61	6.84–8.47	348	14.64	12.31–17.40
ICD-10									
M00-M99 Diseases of the musculoskeletal system and connective tissue	4796	4.59	4.33–4.86	1422	12.58	10.8–14.7	559	26.85	18.9–38.2
J00-J99 Diseases of the respiratory system	4254	2.88	2.73–3.05	1321	7.50	6.57–8.55	536	15.55	11.79–20.52
R00-R99 Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	2309	2.91	2.75–3.08	857	6.13	5.55–6.79	401	11.15	9.36–13.29
S00-T98 Injury, poisoning and certain other consequences of external causes	2198	2.87	2.71–3.03	792	5.68	5.13–6.30	349	8.58	7.25–10.15
F00-F99 Mental and behavioural disorders	1595	3.67	3.44–3.92	609	7.05	6.33–7.85	270	9.68	8.19–11.44
L00-L99 Diseases of the skin and subcutaneous tissue	1335	2.32	2.17–2.48	510	4.15	3.72–4.63	220	5.21	4.39–6.18
A00-B99 Certain infectious and parasitic diseases	1102	2.37	2.21–2.55	425	4.34	3.86–4.88	228	7.70	6.49–9.13
I00-I99 Diseases of the circulatory system	1129	2.13	1.98–2.29	403	3.38	2.99–3.81	168	4.00	3.32–4.83
G00-G99 Diseases of the nervous system	976	3.03	2.80–3.27	403	5.69	5.05–6.42	220	10.00	8.41–11.89
K00-K93 Diseases of the digestive system	934	2.60	2.40–2.81	379	4.75	4.20–5.36	202	7.93	6.65–9.44

ICD-10 = International Classification of Diseases

OR = Odds ratio (adjusted by sex, age, company size and field of industry), CI = Confidence interval

1.0 = reference group (non-FA = non-frequent attenders, patients that were never in the top decile were considered as a reference group)

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

1-year-FA = Patients that were in the top decile of attenders in one of the study years (2014, 2015 or 2016)

2-year-FA = Patients that were in the top decile in any two study years (2014, 2015 or 2016)

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

In the table are presented the 10 largest ICD-10 groups

to further examine whether they are also at risk of disability and sickness absences. When planning future interventions aimed at frequent attenders, the subgroup suffering from musculoskeletal disorders should be considered. Among the working age patients, identified disorders' work-relatedness should be considered.

#### Abbreviations

CI: Confidence interval; FA10: Frequent attender 10% (patients in the top decile of annual visits to healthcare professionals); GP: General practice; MUPS: Medically unexplained physical symptoms; OH: Occupational health; OHS: Occupational health services; OR: Odds ratios

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#### Availability of data and materials

The data that support the findings of this study are available from Pihlajalinnna Työterveys but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly

available. Data are however available from the authors upon reasonable request and with permission of Pihlajalinnna Työterveys.

#### Authors' contributions

The study was conceptualized by JU and the study design was planned by all the authors. Planning of data collection and analysis was done by all authors. NT analyzed the data. TR wrote the first draft and all authors contributed to the final version by revising and commenting on the draft. All authors approved the final version.

#### Ethics approval and consent to participate

The ethics committee of Pirkanmaa Hospital District (ETL R16041) and the National Institute of Health and Welfare (THL/556/5.05.OO/2016) approved the study. Based on Finnish legislation (Personal Data Act, Finland, 22.4.1999) individual consent is unnecessary since no individual could be identified due to the size of the study population.

#### Consent for publication

Not applicable.

#### Competing interests

The authors' declare that they have no competing interests.

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# PUBLICATION III

## **Occasional and persistent frequent attenders and sickness absences in occupational health primary care: a longitudinal study in Finland**

Reho T, Atkins S, Talola N, Viljamaa M, Sumanen M, Uitti J

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# BMJ Open Occasional and persistent frequent attenders and sickness absences in occupational health primary care: a longitudinal study in Finland

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## ABSTRACT

**Objectives** Frequent attenders (FAs) create a substantial portion of primary care workload but little is known about FAs' sickness absences. The aim of the study is to investigate how occasional and persistent frequent attendance is associated with sickness absences among the working population in occupational health (OH) primary care.

**Setting and participants** This is a longitudinal study using medical record data (2014–2016) from an OH care provider in Finland. In total, 59 676 patients were included and categorised into occasional and persistent FAs or non-FAs. Sick-leave episodes and their lengths were collected along with associated diagnostic codes. Logistic regression was used to analyse associations between FA status and sick leaves of different lengths (1–3, 4–14 and ≥15 days).

**Results** Both occasional and persistent FA had more and longer duration of sick leave than non-FA through the study years. Persistent FAs had consistently high absence rates. Occasional FAs had elevated absence rates even 2 years after their frequent attendance period. Persistent FAs (OR=11 95% CI 7.54 to 16.06 in 2016) and occasional FAs (OR=2.95 95% CI 2.50 to 3.49 in 2016) were associated with long (≥15 days) sickness absence when compared with non-FAs. Both groups of FAs had an increased risk of long-term sick leaves indicating a risk of disability pension.

**Conclusion** Both occasional and persistent FAs should be identified in primary care units caring for working-age patients. As frequent attendance is associated with long sickness absences and possibly disability pensions, rehabilitation should be directed at this group to prevent work disability.

## INTRODUCTION

Frequent attendance is a costly and burdensome phenomenon for healthcare providers, society and patients. Patients, often referred to as frequent attenders (FAs), visit healthcare units repeatedly and constitute a substantial portion of both physician's time and healthcare costs.<sup>1,2</sup> On the other hand, FAs appear to be a vulnerable group of patients who suffer

## Strengths and limitations of this study

- The study relies on large nationwide data including employees from rural and urban areas and public and private employers.
- The longitudinal study design allows for examining sickness absences also after consultation rates reduce.
- The use of medical records to define frequency of visits and sickness absences removes inaccuracy related to self-reporting.
- The study lacks information on occupational status, education and use of other service providers as these are not available from occupational health medical records.
- Loss to follow-up in occupational health services is larger than in the general practice setting since patients can be lost due to an employment relationship that ends.

from multimorbidity, medically unexplained symptoms and low quality of life.<sup>3–5</sup> For most patients, frequent attendance is transient while a group of persistent FAs (pFAs) continue recurrent visits for extended periods of time.<sup>2,6</sup> Research indicates that pFAs often suffer from some combination of somatic, psychological and social problems and are prone to anxiety and worry more than transient FAs are.<sup>3,6,7</sup>

FAs in general practice (GP) are often unemployed or (disability)pensioners but to date, there is little known about the relationship between frequent attendance and sickness absences among the working population.<sup>8–11</sup> The available research indicates that chronic disease and negative life events are predictive of long-term sickness absence among 1-year FAs (1yFAs).<sup>12</sup> A Swedish study in GP setting showed that 19% of FAs versus 6% of non-FAs received a long-term sickness absence or disability pension over 5 years' follow-up.<sup>12</sup> Also, being on sick leave or on

disability pension increased the mean number of visits in GP setting and was associated with being a FA.<sup>10 13 14</sup> However, there are no data available on how occasional and persistent FAs differ in terms of sick leave and if frequent attendance is predictive of future sickness absences. Little is also known about the diagnostic groups associated with FAs' sickness absences and whether these patterns are similar for occasional and persistent FAs. There is little research on working-age patients alone, and most research concerning working-age patients is conducted in GP setting. Occupational health (OH) primary care in Finland is an ideal place to study working-age patients solely as occupational health services (OHS) primary care is available to 90% of the working population and often used as the sole primary care provider.<sup>15 16</sup>

In Finland, the proportion of time spent on disability pension is increasingly due to mental disorders, in particular, depression.<sup>17</sup> In turn, musculoskeletal and mental disorders are the most common causes for long-term sickness absences.<sup>18 19</sup> Both diagnostic groups are also associated with frequent attendance in the Nordic countries in a GP setting and in OH primary care.<sup>20–22</sup> Research shows that chronic illnesses that diminish work ability and symptoms related to work are associated with visiting OH primary care.<sup>23</sup> In the same setting, in almost half of the visits caused by mental reasons and in one-third of visits due to musculoskeletal reasons, a sickness absence certificate was given.<sup>24</sup> These associations suggest that FAs could be a potential risk group for sickness absences and work disability. To grasp the full picture of frequent attendance and the impact on society and individuals, we need to know if and how sickness absenteeism is associated with high use of services.

Understanding the association of frequent attendance with sickness absenteeism is vital to enable healthcare providers to use frequent attendance as an early marker for necessary rehabilitation. It has been shown that short-term sick leaves are associated with long sickness absences and long sick leaves in turn predict disability.<sup>25–27</sup> If frequent attendance is predictive of future absences, this could be used to trigger early supportive measures possibly even before the next occurrence of sickness absence. We need to define whether both occasional and persistent FAs are at an equal risk of sickness absences to define appropriate groups for OH interventions where the aim is to prevent sickness absences and disability. Workplace interventions and OH intervention programmes on individuals at risk of sickness absences indicate both cost-effectiveness and reduction in sickness absence days.<sup>28–30</sup> However, current interventions are often designed around sickness absences and do not take into account patterns of frequent use. Interventions should be aimed at the group of FAs who are also at risk of long-term sickness absences to ensure both resource management and disability prevention.

We aim to determine how sickness absences of different lengths are associated with occasional and persistent frequent attendance.

## MATERIAL AND METHODS

### Study setting and design

In Finland, OH is an important primary care provider for the working population that functions in parallel with municipal and private primary care services. OHS are divided into obligatory preventive services and voluntary primary care services of which the latter is, however, well used and covers up to 90% of employees.<sup>16</sup> OHS primary care is paid by the employers for the most part and is free of charge for the employees. In the Finnish OH primary care, in addition to work-related issues and issues related to work ability, acute and chronic illnesses and typical primary care issues are treated. In primary care issues, a patient can choose where to attend but three out of four patients having visited OHS named their OHS unit as their main primary care provider.<sup>31</sup> OHS primary care is often used as the sole primary care provider for the working population.<sup>15</sup> The role of the OHS units in primary care has increased in the past years<sup>32</sup> and primary care is used to support the preventive functions of the OHS by identifying individuals at risk of lowered work ability from the primary care appointments. Most professionals in OHS are specialised in OH. Physiotherapists and psychologists can be consulted after a referral from a nurse or a physician.

This study is conducted using data from Pihlajalinna Työterveys—a large nationwide private OHS provider. The clientele of Pihlajalinna includes employees from both municipal and private employers, with representation from different company sizes and industries. The study is a longitudinal register study using electronic medical record data of Pihlajalinna covering years 2014–2016.

### Data collection

Data used for the study included all visits to healthcare professionals and diagnostic codes (International Classification of Diseases, 10th edition (ICD-10)) registered for the visit through the study years 2014–2016. The data also included sickness absences, employee sex and age and employers' industry and size. Pihlajalinna collected the data and these were sent in pseudonymised format to the University of Tampere for analysis. There were no missing data.

The data initially comprised 78 507 patients. No sampling was done during data collection. The study population was limited to employees who had visited the OH unit during the study years and were aged 18–68 years. Only face-to-face contacts were included and occupational safety check-ups and other mandatory check-ups not initiated by the patient were excluded based on invoice codes. Patients who had no employer-provided primary care service plan were also excluded from the study. After these exclusions, the study population comprised 59 676 patients. Diagnostic codes, using ICD-10, are mandatory for visits to a physician. We used the first (ie, the main) ICD-10 diagnosis registered for each visit in this study. Most employers had all employees' sickness absence certificates are entered into the medical



records through a portal, even though they were certified outside the OHS.

### Statistical analysis

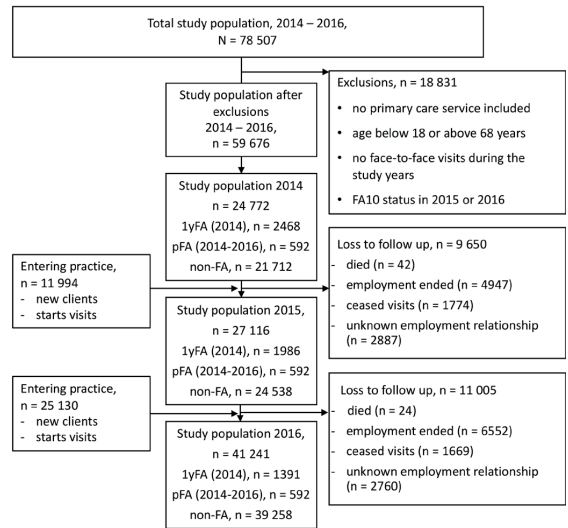
We defined FA as the top decile of attenders.<sup>2 14</sup> We used visits to physicians, nurses, physiotherapists and psychologists to define FAs and with our definition, FA visited OH units eight or more times yearly.<sup>22</sup> The general characteristics of FAs in OHS are described previously, and we also made a secondary analysis of FAs using only visits to the physician, which did not alter the results.<sup>22</sup> Patients being in the top decile in 2014 but not in any other study year were categorised as 1-year FAs (1yFAs) representing occasional FAs. Patients who were in the top decile during all three study years (2014–2016) were categorised as pFAs. Patients who were not in the top decile in any of the study years but who had at least once contact with the OHS during the study years were used as a reference group (non-FAs). To avoid confounding, patients who were FA in 2015 or 2016 but not during all three study years were excluded as they might have entered the practice during the study period, and without knowledge of their previous service use, they might have been wrongly categorised.

We divided the study population by sex and into four age categories (18–34, 35–44, 45–54, 55–68) for characterisation. Employer industries were categorised according to Statistics Finland/Statistical Classification of economic activities in the European Community (TOL2008/Nace Rev.2). We analysed sickness absences with different categorisations. First, we divided sickness absence episodes into groups according to the length: no absence, short (1–3 days), intermediate (4–14 days) and long ( $\geq 15$  days) absence.<sup>33</sup> In addition, we looked at the total number of sickness absence days per year with two different categorisations (0, 1–15 or  $>15$  days per year and short (1–3 days) intermediate (4–14 days) and long ( $\geq 15$  days)).<sup>34</sup> Additional analyses using sickness absences as a continuous variable were conducted. When examining sickness absences yearly, we included self-certified and nurse-certified sick leaves. In the analysis of diagnostic codes associated with sickness absenteeism, only physician-certified sick leaves were used.

Chi-square and Kruskal-Wallis tests were used to test for significant differences between groups. Multinomial logistic regression was used to analyse associations of the dependent variable FA status (1yFA, pFA and non-FA) with the independent variables (occurrence of a sick-leave episode and number of sickness absence days yearly). The results were adjusted for sex, age, industry, number of ICD-10 diagnoses and the existence of cancer diagnosis (C00–C97). ORs with 95% CIs were determined. Statistical analyses were conducted in University of Tampere using IBM SPSS Statistics V.23. In all analyses,  $p$  values  $<0.05$  were considered statistically significant.

### Ethical considerations

According to Finnish legislation (Personal Data Act, Finland, 22.4.1999), individual consent was not needed



**Figure 1** Flow of the study population. 1yFA, 1-year frequent attender; pFA, persistent frequent attender.

as this is a large-scale register-based study where no single participant can be recognised.

### Patient and public involvement

As it is a study of medical records, patients were not involved.

## RESULTS

Our study population constituted 59 676 individuals during the study years (2014–2016). The population included 592 pFAs and 2468 1yFAs in 2014. The latter group diminished due to the loss for follow-up as time went on so that in 2015, there were 1986 individuals and in 2016, 1391 individuals in 1yFA group. **Figure 1** shows the flow of the study population. **Table 1** shows descriptive statistics of 1yFAs, pFAs and non-FAs during the study years. There were more women than men in both 1yFA and pFA groups throughout the study years. Over 90% of the pFA group received a sick-leave certificate from a physician every year and 90% of the 1yFA group received one in the first year. Thereafter of the 1yFA group,  $\geq 70\%$  received a sick-leave certificate from a physician during the study. In 2016, almost 70% of pFAs and 30% of 1yFAs had a sick leave longer than 15 days while only 9% of non-FAs had such a long absence.

As a whole, the pFA group had a median of 16 absence episodes during the three study years, the 1yFA group had 7 episodes and the non-FA group had a median of 2 episodes, all certified by a physician (**table 2**). The pFA group had a constant median five to six sickness absence episodes yearly, whereas the 1yFA group had a median of four sickness absence episodes in 2014, after which the frequency of episodes diminished. However, the

**Table 1** Characteristics by status (1yFA, pFA and non-FA) yearly (2014–2016), n=59 676

	2014, n=24 772			2015, n=27 116			2016, n=41 241		
	1yFA n=2468 n (%)	pFA n=592 n (%)	Non-FA n=21 712 n (%)	1yFA n=1986 n (%)	pFA n=592 n (%)	Non-FA n=24 538 n (%)	1yFA n=1391 n (%)	pFA n=592 n (%)	Non-FA n=39 258 n (%)
<b>Sex</b>									
Male	1 134 (46)	262 (44)	12 783 (59)	924 (46)	262 (44)	14 628 (60)	679 (49)	262 (44)	22 277 (57)
Female	1 334 (54)	330 (56)	8 929 (41)	1 062 (54)	330 (56)	9 910 (40)	712 (51)	330 (56)	16 981 (43)
<b>Age, years</b>									
18–34	704 (29)	130 (22)	6 751 (31)	501 (25)	121 (20)	7 434 (30)	264 (19)	108 (18)	12 106 (31)
35–44	552 (22)	145 (25)	5 135 (24)	465 (24)	137 (23)	5 841 (24)	319 (23)	132 (22)	9 467 (24)
45–54	638 (26)	186 (31)	5 673 (26)	521 (26)	190 (32)	6 532 (27)	413 (30)	188 (32)	10 139 (26)
55–68	574 (23)	131 (22)	4 153 (19)	499 (25)	144 (25)	4 731 (19)	395 (28)	164 (28)	7 546 (19)
<b>Absences</b>									
Sickness absence certified by physician	2 219 (90)	551 (93)	10 309 (47)	1 511 (76)	556 (94)	11 642 (47)	978 (70)	547 (92)	18 350 (47)
0 days / year	207 (8)	33 (6)	9 554 (44)	377 (19)	26 (4)	10 374 (42)	315 (23)	34 (6)	16 873 (43)
1–15 days /year	768 (31)	147 (25)	10 026 (46)	873 (44)	127 (22)	11 722 (48)	653 (47)	150 (25)	18 906 (48)
>15 days / year	1493 (61)	412 (69)	2 132 (10)	739 (37)	439 (74)	2 442 (10)	423 (30)	408 (69)	3 479 (9)

Statistically significant results with the  $\chi^2$  tests,  $p < 0.001$ .

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

1yFA, patients who were in the top decile of attenders in 2014; non-FA, non-frequent attender patients who were never in the top decile were considered as a reference group; pFA, persistent frequent attender patients who were in the top decile in all three study years (2014, 2015 and 2016).

frequency of sickness episodes remained higher among the 1yFA group than in the non-FA group 2 years after the 1yFA group's frequent attendance ended.

The lengths of sickness absence episodes are shown in table 2. The average length of a sickness absence episode is consistently high for the pFA group. It is equally high for 1yFA in the first study year, their year of frequent attendance, but the mean and median length of sickness absence reduces slowly, while remaining higher through the study years compared with the non-FA group. The median lengths of single absence episodes are equal between the groups. The median length of single sickness absence episode due to mental and behavioural disorders (F00-F99) was 9, 7 and 7 days for 1yFAs, pFAs and non-FAs, respectively. The median lengths for musculoskeletal disorders (M00-M99) among 1yFAs, pFAs and non-FAs were 7, 5 and 5 days, respectively (data not shown).

Throughout the study years, long sickness absences ( $\geq 15$  days yearly) were mostly due to musculoskeletal disorders (table 3). Injuries were the second largest diagnostic group for non-FA causing long absences, while for 1yFA and pFA, long absences were caused by mental and behavioural disorders. Musculoskeletal and mental disorders caused 64% of long sick-leave episodes for 1yFAs and

63% for pFAs, while for the non-FA group, the proportion was 46%.

In the table are presented the five largest diagnostic groups that had the most sickness absence certificates written through the study years, arranged according to the number of certificates in each category.

In the fully adjusted multinomial logistic regression model, there was no significant difference between short absences between the groups (table 4). In the first year, pFAs and 1yFAs did not differ significantly in their risk of any length sickness absence. However, in the following years, pFAs had higher odds (OR 3.73, 95% CI 2.49 to 5.60 in 2016) of long sickness absence than 1yFA. These groups did not differ in their risk for intermediate length absences. Throughout the study years, both 1yFAs (OR 1.44, 95% CI 1.23 to 1.69 in 2016) and pFAs (OR 2.08, 95% CI 1.39 to 3.10 in 2016) had a higher risk for intermediate length absences than non-FA. This association was enhanced when studying long absences. In 2016, 1yFAs had higher odds (OR 2.95, 95% CI 2.50 to 3.49) for having  $\geq 15$  days' absence than non-FAs, as did pFAs (OR 11.0, 95% CI 7.54 to 16.06).

One day of sickness absence in any of the study years increases the likelihood of being occasional or

**Table 2** Median and average lengths of sickness absence episodes, median and average number of absence days yearly and median and average number of written sickness absence certificates yearly (2014–2016) by FA status, n=33 592 (patients with a sickness absence certified by a physician)

	Total length of sickness absences per year		Average length of a single sickness absence episode		Number of written sickness absence certificates	
	av	md	av	md	av	md
2014 (n=23 232)	***		***		***	
1yFA	46.1	23	9.2	4	5.0	4
pFA	42.6	25	7.1	4	6.0	5
Non-FA	14.4	6	7.7	3	1.9	1
2015 (n=25 151)	***		***		***	
1yFA	41.2	14	11.7	4	3.5	3
pFA	51.4	29	8.0	4	6.4	6
Non-FA	14.0	5	7.5	3	1.9	1
2016 (n=38 054)	***		***		***	
1yFA	28.0	10	9.1	4	3.1	2
pFA	51.6	24	8.8	4	5.9	5
Non-FA	12.5	5	6.9	3	1.8	1
2014–2016 (n=56 042)	***		***		***	
1yFA	82.5	41	9.8	4	8.4	7
pFA	138.4	96	7.9	4	17.4	16
Non-FA	17.7	7	7.3	3	2.4	2

\*\*\*P<0.001 (Kruskal-Wallis test).

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

av, average; 1yFA, patients who were in the top decile of attenders in 2014; md, median; non-FA, non-frequent attender patients who were never in the top decile were considered as a reference group; pFA, persistent frequent attender patients who were in the top decile in all three study years (2014, 2015 and 2016).

persistent FAs only slightly and the results are insignificant when comparing 1yFAs with pFAs (table 5). As the number of sickness absence days increases, the association with FA status grows stronger. Table 6 shows characteristics associated with FA status in sickness absences over 15 days. Female sex and morbidity (measured by the number of different diagnoses given by a physician) were associated with FA status in sickness absences over 15 days.

## DISCUSSION

Our results indicate that pFAs have more and longer sickness absence episodes than other users of OH primary care. However, occasional FAs also have more and longer sickness absences than non-FAs, not only in their year of frequent attendance, but also in the following 2 years. Both FA groups are also associated with an increased risk of long sickness absences. These findings are novel and allow for better understanding of the risk for work disability associated with frequent attendance.

In a Finnish study on municipal employees' sickness absence longer than 15 days was highly predictive of future disability pension, and a Danish study showed that the longer the absence the higher the risk for a disability pension for private sector employees.<sup>27 34</sup> In our study,

approximately 70% of pFAs had a sickness absence >15 days yearly, whereas for non-FAs, the proportion was a maximum of 10% through the study years. In 2014, almost two-thirds of occasional FAs had >15 days sickness absence and after 2 years follow-up, one-third of occasional FA had >15 days of absence. Our results indicate that both pFAs and occasional FAs have more and longer sickness absences than an average user and thus might be at an increased risk of retirement due to disability.

Most long sickness absences were caused by diseases of the musculoskeletal system in all groups, but the proportions were higher for occasional and persistent FAs than non-FAs. The second largest group causing long absences was mental disorders for both occasional and persistent FAs. Previous research indicates that musculoskeletal and mental disorders in particular cause recurrent sickness absences and that consultations for a specific illness tend to predict future consultations for the same illness group.<sup>35 36</sup> Detection of these individuals for follow-up and necessary rehabilitative measures is important to maintain work ability. Additionally, in particular, sick leaves based on psychiatric and musculoskeletal reasons show increased risk in future for illness-based retirement.<sup>37 38</sup> As our study shows that these diagnostic groups are associated with sickness absences of both occasional and

**Table 3** Diagnostic codes associated with sickness absences of different lengths (for sickness absence certificates given by a physician), 2014–2016, n=number of sickness absence certificates

ICD-10	1yFA, n=19 506			pFA, n=10 117			Non-FA, n=74 176		
	1–3 days, n=8597	4–14 days, n=8261	≥15 days, n=2648	1–3 days, n=4732	4–14 days, n=4357	≥15 days, n=1028	1–3 days, n=39 566	4–14 days, n=28 243	≥15 days, n=6367
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
J00–J99 Diseases of the respiratory system	4020 (47)	1367 (17)	48 (2)	2150 (45)	810 (17)	19 (2)	20 856 (53)	6570 (23)	118 (2)
M00–M99 Diseases of the musculoskeletal system and connective tissue	1545 (18)	3678 (45)	1248 (47)	1028 (22)	2042 (47)	483 (47)	5585 (14)	9820 (35)	1982 (31)
S00–T98 Injury, poisoning and certain other consequences of external causes	463 (5)	1045 (13)	366 (14)	221 (5)	461 (11)	136 (13)	2100 (5)	4640 (16)	1471 (23)
F00–F99 Mental and behavioural disorders	281 (3)	809 (10)	439 (17)	165 (4)	353 (8)	164 (16)	829 (2)	2171 (8)	948 (15)
A00–B99 Certain infectious and parasitic diseases	603 (7)	145 (2)	4 (0)	255 (5)	52 (1)	4 (0)	2749 (7)	792 (3)	35 (1)
Others	1685 (20)	1217 (15)	543 (21)	913 (19)	639 (15)	222 (22)	7447 (19)	42 500 (15)	1813 (28)

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

1yFA, patients who were in the top decile of attenders in 2014; ICD-10, International Classification of Diseases, 10th edition; non-FA, patients who were never in the top decile were considered as a reference group, non-FAs; pFA, patients who were in the top decile in all three study years (2014, 2015 and 2016).

**Table 4** Lengths of sickness absences associated with FA status in multinomial logistic regression (adjusted for sex, age, field of industry, cancer dg (C00–C97) and number of different ICD-10 diagnoses given by physicians), n=24 772–41 241

Sickness absences	1yFA vs Non-FA		pFA vs Non-FA		pFA vs 1yFA	
	OR	95% CI	OR	95% CI	OR	95% CI
Sickness absences (2014)						
No sickness absence (0 days)	1.0		1.0		1.0	
Short (1–3 days)	1.15	0.91 to 1.45	1.06	0.61 to 1.85	0.93	0.52 to 1.67
Intermediate length (4–14 days)	2.34	1.96 to 2.80	2.33	1.55 to 3.51	1.00	0.65 to 1.53
Long (≥15 days)	13.10	11.07 to 15.50	18.27	12.54 to 26.60	1.39	0.94 to 2.07
Sickness absences (2015)						
No sickness absence (0 days)	1.0		1.0		1.0	
Short (1–3 days)	1.20	1.01 to 1.42	1.32	0.72 to 2.40	1.09	0.59 to 2.04
Intermediate length (4–14 days)	1.89	1.64 to 2.17	2.92	1.87 to 4.57	1.55	0.97 to 2.46
Long (≥15 days)	4.48	3.88 to 5.16	17.96	11.83 to 27.25	4.01	2.60 to 6.18
Sickness absences (2016)						
No of sickness absence (0 days)	1.0		1.0		1.0	
Short (1–3 days)	1.08	0.89 to 1.29	0.93	0.54 to 1.59	0.86	0.49 to 1.52
Intermediate length (4–14 days)	1.44	1.23 to 1.69	2.08	1.39 to 3.10	1.44	0.94 to 2.20
Long (≥15 days)	2.95	2.50 to 3.49	11.00	7.54 to 16.06	3.73	2.49 to 5.60

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

1yFA, patients who were in the top decile of attenders in 2014; 1.0, reference group; ICD-10, International Classification of Diseases, 10th edition; non-FA, non-frequent attendee patients who were never in the top decile were considered as a reference group; pFA, persistent frequent attendee patients who were in the top decile in all three study years (2014, 2015 and 2016).

**Table 5** Sickness absence associated with FA status in multinomial logistic regression (adjusted for sex, age, field of industry, cancer dg (C00-C97) and number of different ICD-10 diagnoses given by physicians), n=24 772–41 241

	1yFA vs Non-FA		pFA vs Non-FA		pFA vs 1yFA	
	OR	95% CI	OR	95% CI	OR	95% CI
<b>Sickness absences (2014)</b>						
A single sickness absence day in 2014	1.02	1.02 to 1.02	1.02	1.02 to 1.02	1.00	0.99 to 1.00
<b>Sickness absences (2015)</b>						
A single sickness absence day in 2015	1.01	1.01 to 1.01	1.01	1.01 to 1.02	1.00	1.00 to 1.00
<b>Sickness absences (2016)</b>						
A single sickness absence day in 2016	1.01	1.01 to 1.01	1.02	1.02 to 1.02	1.01	1.01 to 1.01

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

\*1yFA, patients who were in the top decile of attenders in 2014; ICD-10, International Classification of Diseases, 10th edition; non-FA, non-frequent attender patients who were never in the top decile were considered as a reference group; pFA, persistent frequent attender patients who were in the top decile in all three study years (2014, 2015 and 2016).

persistent FAs, both groups should be of special interest in OHS and GP setting treating working-age patients.

Sickness absences predict future disability and retirement due to ill health and these individuals should be identified for rehabilitation. This study indicates that both pFAs and occasional FAs are at risk of long sickness absences that in turn are associated with risk of disability pension. Vast use of services could be used as an early indicator for interventions to protect work ability. Also,

as frequent attendance is mostly a self-limiting condition, it has been argued whether occasional FAs should be a target group for interventions at all.<sup>39</sup> However, our results indicate that occasional FAs' sickness absences are higher than those of average users even after the consultation rates have reduced indicating that they are also in need of rehabilitative evaluation bearing in mind work ability. In addition to occasional FAs' risk of future absences, pFAs also need attention. PFAs appear to be a

**Table 6** Sickness absences >15 days associated with FA status in a multinomial logistic regression model (adjusted for age, field of industry and cancer dg (C00-C97) and number of different ICD-10 diagnoses given by physicians), n=24 772–41 241

	1yFA vs non-FA		pFA vs non-FA		pFA vs 1yFA	
	OR	95% CI	OR	95% CI	OR	95% CI
<b>Sickness absences (2014)</b>						
Sex						
Male	1.0		1.0		1.0	
Female	1.52	1.28 to 1.82	1.76	1.33 to 2.31	1.15	0.88 to 1.50
Number of different ICD-10 diagnoses given by physicians	2.22	2.08 to 2.36	2.84	2.60 to 3.10	1.28	1.19 to 1.38
<b>Sickness absences (2015)</b>						
Sex						
Male	1.0		1.0		1.0	
Female	1.48	1.21 to 1.81	1.47	1.12 to 1.93	0.99	0.74 to 1.33
Number of different ICD-10 diagnoses given by physicians	1.71	1.58 to 1.84	2.93	2.67 to 3.22	1.71	1.57 to 1.88
<b>Sickness absences (2016)</b>						
Sex						
Male	1.0		1.0		1.0	
Female	1.18	0.91 to 1.53	1.59	1.19 to 2.12	1.34	0.95 to 1.91
Number of different ICD-10 diagnoses given by physicians	1.76	1.63 to 1.91	2.82	2.58 to 3.09	1.60	1.45 to 1.77

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

1yFA, patients who were in the top decile of attenders in 2014; 1.0, reference group; ICD-10, International Classification of Diseases, 10th edition; non-FA, non-frequent attender patients who were never in the top decile were considered as a reference group; pFA, persistent frequent attender patients who were in the top decile in all three study years (2014, 2015 and 2016).



group of patients whose needs have not been met. Both these patient groups should be identified and careful diagnostic evaluation should be conducted to enable meeting their needs and reducing absences.

So far, effective interventions on FAs have been those based on in-depth analysis of patient's reasons for attendance and accordingly selected actions.<sup>40</sup> The measured outcomes have been mostly consultation frequency or morbidity, but in the future, sickness absences and change in their frequency or length could be measured as well. Early detection of individuals at risk of work disability based on readily available markers is crucial for the implementation of timely interventions and rehabilitative measures to sustain patient's work ability.<sup>38</sup> Work ability/disability and work-relatedness could be also worth considering when discussing FAs. Determining how sickness absences are associated with frequent attendance is important due to the cost of absenteeism on employers and society, but also because of the effects on the individual, medically certified sickness absences are also associated with mortality.<sup>41 42</sup>

### Strengths and limitations

The strengths of this study are the large study population from an OHS provider including a wide range of industries and company sizes from both rural and urban areas. The employees are representative of the working population in Finland including all ages, employment lengths and status, which allows generalisation outside this particular service provider. The results can be generalised to OHS sector in Finland where a variety of industries are present, and cautious interpretations can be made concerning the working population in general. As no sampling was done, there should not be selection bias in the FA groups. Also, the use of medical records to define the frequency of visits removes inaccuracy related to self-reported utilisation.<sup>43</sup> The novel longitudinal study design employed in this study allows for examining sickness absences also after frequent attendance, which gives unique information on risks associated with frequent attendance. To support this aim, we chose to use FAs in 2014 only to represent occasional FA allowing to examine sickness absences after consultation rates have diminished and to allow equal follow-up time with the pFAs. Although there might be limitations to primary care services in OH, visits to nurses and physicians are not restricted. In Finland, the use of GPs in primary care by the working population appears to be scarce compared with use of OHS primary care.<sup>15 31 32</sup> Thus, we assume that these results received from the OHS primary care in Finland can be to some extent generalised to the working population using GP services in other countries.

However, this study is limited by the lack of information on occupational status and education since they are not available from medical records. In addition, loss to follow-up in OHS may be larger than in the GP setting since patients can be lost due to an employment relationship that ends. We did not have access to medical

record data of other service providers, thus, the sample might include individuals who use other service sectors widely and this could not be accounted for. However, there is evidence that when OH primary care is available, it is often used as the sole primary care provider.<sup>15</sup> Also, we cannot track the service use of the patients lost for follow-up. This might add inaccuracy to the categorisation of different FA groups. However, we conducted confirmatory analyses on the subgroup of 1391 occasional FAs whose service use was known for the entire study time, and the results did not differ substantially. We have also conducted confirmatory analyses to ensure that we have sufficient data also on 1–3 days' length sick leaves. All sick-leave certificates of one of the largest employers on the Pihlajalinna client lists are entered onto the Pihlajalinna sick-leave register. When comparing the proportions of different length absence episodes between this employer and all the data, the results did not differ to a great degree. We defined FAs according to attendance rates across the study population since we wanted to study the working population as a whole. Our study population includes only the working, which narrows the differences between different age groups. In our previous study,<sup>22</sup> we analysed the risk of being FA in different age groups and we found no significant association of age with FA status in our study population when adjusted for confounding. We used visits to all healthcare professional in the OHS to categorise FAs. This should be taken into consideration when comparing internationally although we made secondary analysis including only physician visits and the results did not alter.

### CONCLUSIONS

Both occasional and persistent FAs have higher odds for long and intermediate length absences, which suggests an elevated risk of future retirement due to disability. FAs should be identified in the working-age population and sickness absences should be taken into account when planning FA rehabilitation and interventions.

In future, a longer follow-up of sickness absences would be useful to see whether sickness absence rate eventually equalises with the non-FA group. More understanding is needed of how frequent attendance is associated with disability and retirement due to ill health.

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**Competing interests** None declared.

**Ethics approval** The National Institute of Health and Welfare (THL/556/5.05.00/2016) and the ethics committee of Pirkanmaa Hospital District (ETL R16041) approved the study.



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**Data sharing statement** The data that support the findings of this study are available from Pihlajalinnat Työterveys but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available. Data are however available from the authors upon reasonable request and with permission of Pihlajalinnat Työterveys.

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# PUBLICATION IV

## **Frequent attenders at risk of disability pension: a longitudinal study combining routine and register data**

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## ORIGINAL ARTICLE

## Frequent attenders at risk of disability pension: a longitudinal study combining routine and register data

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### Abstract

**Aims:** Frequent attendance in healthcare services is associated with ill-health and chronic illnesses. More information is needed about the phenomenon's connection with disability pensions (DPs). **Methods:** The study group comprised 59,676 patients divided into occasional- (1yFAs) and persistent frequent attenders (pFAs) and non-frequent attenders (non-FAs). Odds ratios for DP were analysed for these groups taking into account preceding sickness absence days. The awarded DPs were obtained from the Finnish Centre for Pensions and data on primary care visits were obtained from Pihlajalinna, a nationwide occupational healthcare provider. **Results:** 1yFAs and pFAs have more DPs than non-FAs. During follow-up, 14.9% of pFAs, 9.6% of 1yFAs and 1.6% of non-FAs had a DP decision of any kind. pFAs receive more partial and fixed-term decisions than the other groups and most permanent DPs are granted to 1yFAs. Musculoskeletal disorders are the most common reason for illness-based retirement in all groups but 1yFAs and pFAs have proportionally more mental disorders leading to DP. The group of non-FAs, on the other hand, has more DPs granted based on neoplasms. Both 1yFAs and pFAs have an increased risk of DP but the effect is diluted after taking into account preceding sick-leave. **Conclusions:** Frequent attendance of healthcare services, both occasional and persistent, is associated with increased risk of future DP. The association is linked to increased sickness absences. Frequent attenders should be identified and their rehabilitative needs evaluated. Frequency of consultation could be used in selecting candidates for early rehabilitation before sickness absences develop.

**Keywords:** Primary healthcare, patient acceptance of healthcare, occupational health services, rehabilitation, disability evaluation

### Introduction

Illness-based retirement represents a personal loss and a social and economic challenge. In 2015 Finland's disability pension (DP) expenditure was 2057 million euros, of which two-thirds were due to musculoskeletal (27% in 2015) and mental (41% in 2015) disorders [1]. Similarly, in the Nordic countries most long sickness absences are due to the same illness categories [1,2]. Supporting people to stay at work is perceived as important by governments [3,4]. Occupational health (OH) services play an important role in supporting individuals with lowered work ability in Finland [4]. Part-time solutions and

changes in work descriptions are only part of the current solutions for supporting employees to remain in the workforce [5]. Sickness absences are known to predict DP [6,7] but other and earlier predictors of DP would be useful to steer individuals towards rehabilitation or new working careers before DPs are imminent.

Frequent attendance in healthcare is associated with the same illness categories in both general practice (GP) and OH primary care settings and with DP [8–10]. Frequent attenders in healthcare constitute a vulnerable group of patients that consume substantial healthcare resources. The organisational burden is

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well established – the top decile of attendees constitute up to 40% of physicians' workload in primary care settings [10–12]. Frequent attendance is associated with chronic illnesses, unemployment and retirement [12,13] and often some combination of somatic, psychological and social problems [9,12,13]. Frequent attenders are sometimes subcategorised to differentiate between occasional-1-year-FAs (1yFA) and persistent frequent attenders (pFAs), as pFAs can have more complex problems and consume proportionally more resources [14]. Frequent attenders also have more and longer sickness absences than average primary care users [15,16]. Associations with future disability are however as yet unestablished although their characteristics indicate elevated risk of future DP.

In Finland, visiting OH primary care is associated with illnesses related to diminishing work ability [17]. In addition, employees with long-term illnesses and contact with a physician for work-related issues are at an increased risk of future sick-leave of over one month in duration [18]. These findings suggest that frequent attenders in OH primary care could be a risk group for work disability. Although frequent attendance in GP settings has been established as being associated with being on (disability) pension [19], research is sparse on how frequent attendance is linked to future disability in the working population. A Swedish study in a GP setting showed increased risk of long-term sick-leave in 1yFAs<sup>16</sup> compared with non-FAs. On the other hand, a Scottish study demonstrated an increased consultation frequency three years prior to a disability allowance claim [20]. Despite these findings, it remains unclear whether the causes of frequent attenders' early retirement are similar to other DP recipients, and whether 1yFAs and pFAs differ in this aspect. High attendance rates could also be used to detect those individuals that need rehabilitative interventions to prevent disability, even before long absences occur. Understanding the association between frequent attendance and future disability would allow for purposefully designed and timely activities and follow-up plans for working age patients in both GP and OH primary care settings.

The aim of this study is to determine whether frequent attendance is associated with risk of future disability grants and whether 1yFAs and pFAs differ in their risk of DP.

## Material and methods

### *Study setting and design*

In Finland, OH is an important primary care provider for the working population, functioning side by

side with municipal and private primary care services. Approximately 90% is entitled to OH primary care, with most costs covered by the employer [21]. Most staff in OH primary care have OH specialisation, supporting the preventive functions of OH services [22]. An example of such work is OH collaborative negotiation, a confidential negotiation between the patient, employer and OH physician to discuss work ability and possible solutions [23].

DP may be granted in Finland for individuals whose work ability has been reduced due to an illness for at least a period of one year. Partial fixed-term and fixed-term DPs are granted when rehabilitation is expected and for the duration of the rehabilitation. For a full DP (fixed-term or permanent) work ability must be reduced by at least 3/5 and for partial disability benefit (fixed-term or permanent) by 2/5 based on a physician's assessment [1]. In addition, vocational rehabilitation allowance may be used to change occupations, when an employee cannot continue in their previous work. Permanent full DP leads to withdrawal from the workforce. DPs are funded by a mandatory insurance paid by employees and employers.

This is a longitudinal retrospective study combining routine medical record data with register data. This study was conducted using Pihlajalinna Työterveys' data from the years 2014–2016. Pihlajalinna operates nationwide in rural and urban areas providing OH services for private and municipal employers. The clientele is fairly representative of the working population in Finland. Several corporate acquisitions were conducted during the study years, which increased the study population. We obtained the decisions on DP benefits (2015–2017) from the Finnish Centre for Pensions (FCP).

### *Data collection*

Pihlajalinna's data were collected and pseudonymised by Pihlajalinna and sent to Tampere University. Medical record data included visits to physicians, nurses, physiotherapists and psychologists, the mandatory first diagnostic code (ICD-10) recorded for each physician visit, sickness absence certificates given on a visit, OH negotiations held and background data including patient age and sex, and employer size and industry. Data obtained from the FCP included decisions on disability benefits and the diagnostic codes associated with the decision [1]. The data from the FCP were combined using a pseudonymised ID-number, and the pseudonymised data were sent to Tampere University.

Our data initially comprised 78,507 patients. We limited the study population to employees aged 18–68

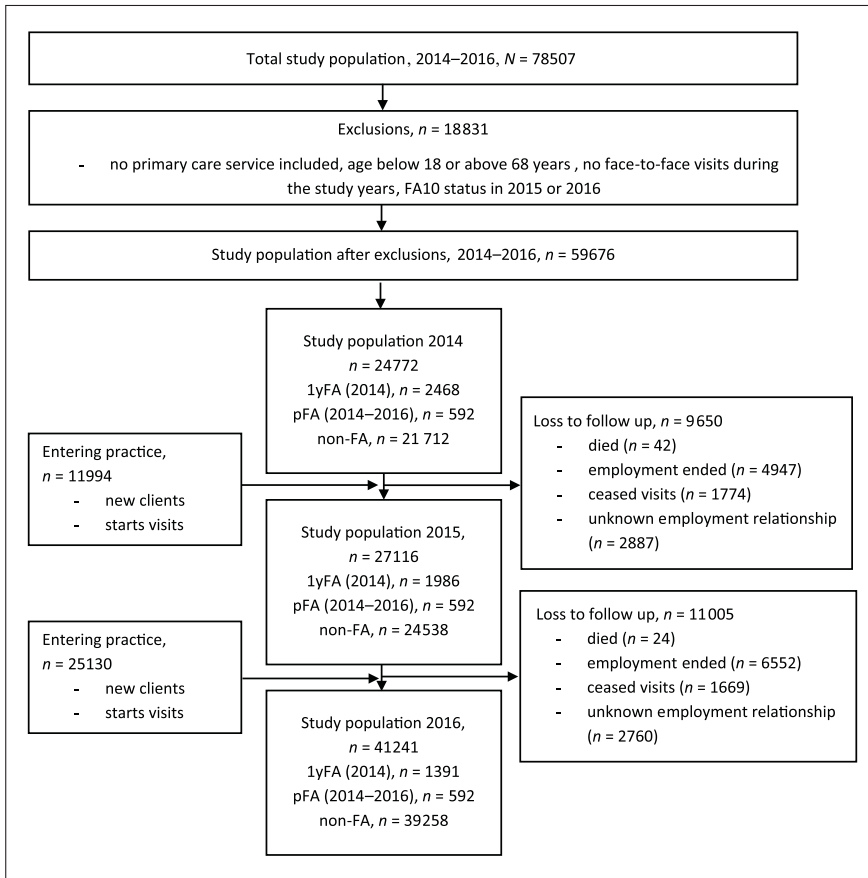


Figure 1. Flow chart of the study population.

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

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

years with at least one face-to-face visit to the OH unit. Any general and mandatory health check-ups and contacts not conducted face-to-face (prescription renewals, telephone calls, etc.) were excluded. After exclusions the study population comprised 59,676 patients (Figure 1). There were no missing data.

### Statistical analysis

Frequent attenders were defined as the top decile of attendees per year [11,24]. This meant eight or more visits in a year [10]. The remaining 90% were categorised as non-frequent attenders (non-FAs). Visits to physicians, nurses, physiotherapists and psychologists were used to define frequent attenders. Patients being frequent attenders in 2014 but not after this

were categorised as 1yFAs. Patients being frequent attenders during 2014–2016 were categorised as pFAs. Patients that were never frequent attenders were used as a reference group (non-FAs). To account for confounding, patients being frequent attenders in 2015 or 2016 but not during all study years were excluded as they neither represented 1yFAs nor pFAs, nor could they be considered non-FAs.

The study population was divided by sex and into four age categories. Employer industries were categorised according to Statistics Finland (TOL2008/Nace Rev2). We used chi square to test for significant differences between the studied groups. Kaplan–Meier survival curves with stratification of FA status and the log-rank test were used to analyse durations of sickness absence before DP for the different FA groups.

Table I. Characteristics by frequent attender status: 1yFAs, pFAs and non-FAs yearly (2014–2016).

	Patients 2014–2016, <i>n</i> = 59,676						<i>p</i> -value
	1yFA <i>n</i> = 2468		pFA <i>n</i> = 592		non-FA <i>n</i> = 56,616		
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	
Sex							<0.001
Male	1134	46	262	44	32,566	57	
Female	1334	54	330	56	24,050	43	
Age							<0.001
18–34	631	26	108	18	18,494	33	
35–44	546	22	132	22	13,218	23	
45–54	628	25	188	32	13,996	25	
55–68	663	27	164	28	10,908	19	
Disability grants (2015–2017)							<0.001
Permanent disability pension	67	2.7	13	2.2	214	0.4	
Partial disability pension	34	1.4	24	4.1	140	0.2	
Fixed-term disability pension	37	1.5	13	2.2	197	0.3	
Partial fixed-term disability pension	8	0.3	6	1.0	49	0.1	
Vocational rehabilitation	91	3.7	32	5.4	298	0.5	
OH collaborative negotiation	382	15.5	163	27.5	588	1.0	

OH = occupational health.

FA status was defined as the top decile of attenders (frequent attender 10%, FA10); 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 = patients that were never in the top decile were considered as a reference group, non-frequent attenders.

We used the total number of sickness absence days (2014–2016) as the follow-up time.

The main outcome was permanent DP as registered on FCP registry. Secondary outcome measures included partial fixed-term DP, partial DP, fixed-term DP and vocational rehabilitation allowance. Odds ratios (ORs) with 95% confidence interval (CI) were calculated for all outcome measures for the FA groups. The results were adjusted for patient age and sex, employer industry, number of different ICD-10 diagnoses, a cancer dummy variable and number of preceding sickness absence days. Statistical analyses were conducted at Tampere University using R and IBM's SPSS. Alpha was set at 0.05.

#### *Ethical considerations*

The study was approved by the Pirkanmaa Hospital District Ethics Committee (ETL R16041) and the National Institute of Health and Welfare (THL/556/5.05.OO/2016). Based on Finnish legislation, individual consent is unnecessary since no individual could be identified due to the size of the study population.

#### **Results**

The study population comprised 59,676 patients during 2014–2016. There were 592 pFAs and 2468 1yFAs in 2014 (Figure 1). Due to loss to follow-up,

the latter group of 1yFAs diminished so that in 2015 there were 1986 individuals and in 2016 1391 individuals in the 1yFA group. Men constituted 46%, 44% and 57% of patients for 1yFA, pFA and non-FA respectively (Table I).

Proportionally 1yFAs received the greatest number of permanent DP decisions and non-FAs the least (2.7% of 1yFAs, 2.2% of pFAs and 0.4% of non-FAs) as seen in Table I. The pFA group received, proportionally, the most vocational rehabilitation allowances and partial or fixed-term disability resolutions. During the follow-up period 14.9% of pFAs, 9.6% of 1yFAs and 1.6% of non-FAs had any disability pension decision ( $p < 0.001$ ).

Almost half of permanent DP decisions awarded to pFAs and 1yFAs were given based on musculoskeletal diseases (55% and 46% respectively) and for 31% of non-FAs (Table II). For pFAs, 23% of decisions were made based on mental disorders (16% for 1yFAs and 12% for non-FAs). In the group of non-FAs the second largest group was C00–D48 neoplasms (17%). The proportion of neoplasms leading to permanent DP was 8% for pFAs and 9% for 1yFAs. For any DP decision, diseases of the musculoskeletal system constituted 59% of decisions for 1yFAs and pFAs and 39% for non-FAs. The second largest group leading to any DP was mental and behavioural disorders with a 16%, 14% and 21% share for 1yFAs, pFAs and non-FAs respectively.

Table II. Distribution of diagnostic codes leading to disability pension decisions (2015–2017),  $n = 1223$ .

ICD-10	Any DP by FA status						$p$ -value	Permanent DP by FA status						$p$ -value
	1yFA $n = 237$		pFA $n = 88$		non-FA $n = 898$			1yFA $n = 67$		pFA $n = 13$		non-FA $n = 214$		
	$n$	%	$n$	%	$n$	%		$n$	%	$n$	%	$n$	%	
C00–D48 Neoplasms	13	5	3	3	79	9	***	6	9	1	8	36	17	***
F00–F99 Mental and behavioural disorders	37	16	12	14	185	21	***	11	16	3	23	26	12	***
G00–G99 Diseases of the nervous system	18	8	4	5	73	8	***	5	8	0	0	26	12	***
I00–I99 Diseases of the circulatory system	4	2	8	9	76	8	***	1	2	1	8	30	14	***
M00–M99 Diseases of the musculoskeletal system and connective tissue	141	59	52	59	350	39	***	37	55	6	46	66	31	***
Others	23	10	9	10	135	15	***	7	10	2	15	30	14	***
All	237	100	88	100	898	100	***	67	100	13	100	214	100	***

\*\*\*= < 0.001.

ICD-10 = International Classification of Diseases 10<sup>th</sup> edition.

DP = disability pension.

FA status was defined as the top decile of attenders (frequent attender 10%, FA10); 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 = patients that were never in the top decile were considered as a reference group, non-frequent attenders.

Table III shows the OR for different DPs. Crude ratios indicate that pFAs and 1yFAs have increased risk of any disability grant when compared with non-FAs. These associations appear to be accentuated when adjusting for sex, age, field of industry, number of different ICD-10 diagnoses and the cancer dummy. When the ratios are also adjusted for the total number of preceding sickness absence days, the group of 1yFAs have an increased risk of partial DP (OR 2.26, 95% CI 1.36–3.76) and vocational rehabilitation allowance (OR 1.89, 95% CI 1.29–2.78) compared with non-FAs. In the adjusted analyses the pFA group also has increased risk of partial DP (OR 6.02, 95% CI 3.02–12.00) compared with non-FAs, while the risk of permanent DP is smaller (OR 0.12, 95% CI 0.05–0.29). When comparing groups of pFAs and 1yFAs, pFAs have a lower risk of permanent DP (0.21, 95% CI 0.10–0.45).

Although there are more DP grants for 1yFAs and pFAs as a whole, the time delay before the DP grant is significantly longer for pFAs and 1yFAs compared with non-FAs (Figure 2). Each drop on the curve indicates an individual receiving a DP. Half had received a DP at 546 days (non-FAs), 750 days (1yFAs) and 886 days (pFAs). The group of pFAs had significantly more sickness absence days (median 490) prior to disability grant than the other two groups (1yFAs median 309 and non-FAs median 61 days,  $p < 0.001$ ).

## Discussion

Our results show that frequent attenders, both 1yFAs and pFAs, have proportionally more DPs in the near future than average user of OH primary care. Most permanent DP grants leading to withdrawal from the workforce are granted for 1yFAs, followed by pFAs. On the other hand, permanent pFAs have proportionally more partial and fixed-term DPs and vocational rehabilitation decisions than 1yFAs and non-FAs, allowing for return to the workforce. However, the elevated risk of DP of both the frequent attender groups is mostly due to the preceding sickness absence days.

To our knowledge this study is the first to examine the differences between 1yFAs and pFAs and the distribution of diagnoses leading to DP among these groups. Our results show that high consultation frequency in the OHS, even occasional, is associated with DP in the following years. Proportionally, 1yFAs received the most permanent DP decisions and non-FAs the least. The increased risk of DP among the FA groups is for the most part explained by elevated sickness absence days, which has been shown to be a strong indicator of DP risk [6,7]. In previous work, frequent attendance was associated with long sickness absences in GP [16] and OH settings [15]; frequency of consultation could therefore potentially be used as an early marker for rehabilitative needs before sickness absences develop.

Table III. Different pensions associated with frequent attendance in multinomial logistic regression,  $n = 59,676$ .

	Crude ratios						Adjusted ratios: Model 1						Adjusted ratios: Model 2					
	1yFA vs. non-FA		pFA vs. non-FA		pFA vs. 1yFA		1yFA vs. non-FA		pFA vs. non-FA		pFA vs. 1yFA		1yFA vs. non-FA		pFA vs. non-FA		pFA vs. 1yFA	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Partial fixed-term disability pension	3.75	1.78 - 7.94	11.82	5.04 - 27.70	3.15	1.09 - 9.11	4.68	2.03 - 10.79	28.73	9.06 - 91.11	6.14	1.86 - 20.28	0.71	0.28 - 1.84	2.38	0.64 - 8.86	3.34	0.97 - 11.55
Fixed-term disability pension	4.36	3.06 - 6.21	6.43	3.65 - 11.34	1.48	0.78 - 2.79	5.11	3.36 - 7.75	10.59	5.18 - 21.64	2.07	1.03 - 4.16	0.73	0.42 - 1.28	0.57	0.24 - 1.39	0.78	0.37 - 1.68
Partial disability pension	5.64	3.87 - 8.22	17.05	10.97 - 26.49	3.03	1.78 - 5.14	4.45	2.85 - 6.94	15.44	8.44 - 28.26	3.47	1.93 - 6.24	2.26	1.36 - 3.76	6.02	3.02 - 12.00	2.66	1.46 - 4.87
Permanent disability pension	7.36	5.57 - 9.71	5.92	3.36 - 10.42	0.81	0.44 - 1.47	7.83	5.54 - 11.06	7.64	3.84 - 15.21	0.98	0.51 - 1.89	0.56	0.34 - 0.92	0.12	0.05 - 0.29	0.21	0.10 - 0.45
Vocational rehabilitation allowance	7.24	5.70 - 9.18	10.80	7.43 - 15.70	1.49	0.99 - 2.26	9.31	6.96 - 12.45	17.76	10.76 - 29.33	1.91	1.19 - 3.05	1.89	1.29 - 2.78	1.63	0.89 - 2.96	0.86	0.52 - 1.43

Model 1 adjusted for sex, age, field of industry, number of different ICD 10-diagnoses and cancer dummy.

Model 2 adjusted for the same as above (sex, age, field of industry, number of different ICD 10 -diagnoses and cancer dummy) and total number of sickness absence days.

OR = odds ratio; CI = confidence interval.

FA status was defined as the top decile of attenders (frequent attender 10%, FA10); 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 = patients that were never in the top decile were considered as a reference group, non-frequent attenders.



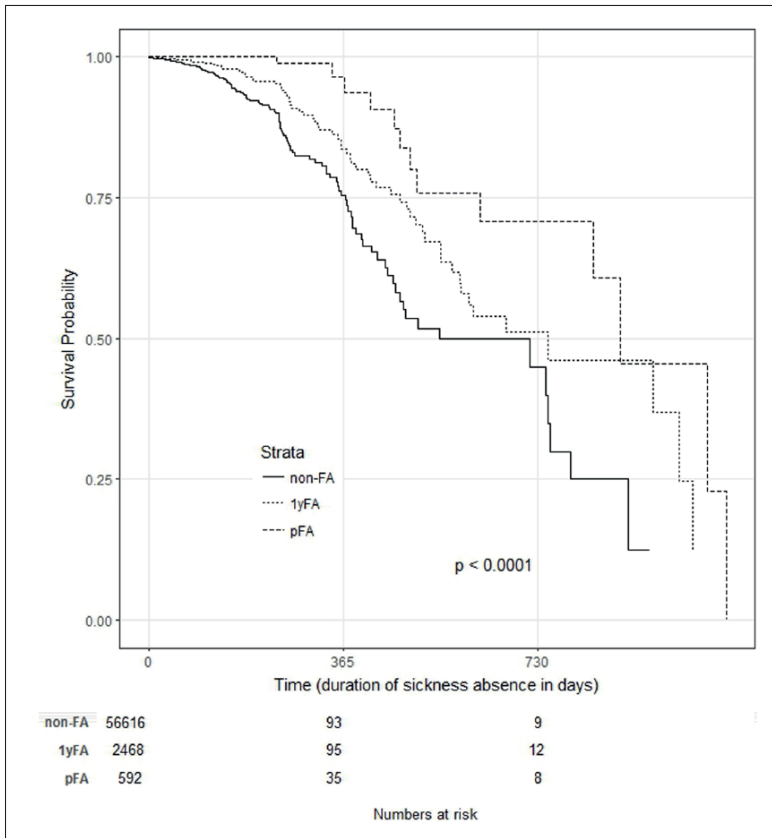


Figure 2. Kaplan–Meier survival curves with stratification of clients’ status (1yFA, pFA and non-FA) starting from the first sickness absence day of each individual (only patients with a sickness absence) and ending in permanent DP. Each drop on the curve indicates an individual receiving a DP. Half of each group (50%) had received a DP decision at 546 days (non-FA), 750 days (1yFA) and 886 days (pFA).  
 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 = Patients that were never in the top decile were considered as a reference group, non-frequent attenders  
 DP = disability pension

This study also showed that pFAs have more vocational rehabilitation resolutions and partial and fixed-term DPs than other users, indicating that temporary resolutions are sought for them more frequently than for non-FAs and 1yFAs. Thus, although there are more DPs given as a whole, pFAs and 1yFAs may take more advantage of possibilities that allow for remaining in and returning to the workforce. DPs shorten working careers in Finland by approximately 11 years [25]. Fixed-term DPs are used increasingly to enable a return to employment [26] and only approximately half of these lead to permanent disability in 4 years [26]. As an alternative for permanent resolutions, fixed-term resolutions facilitate a return to work after recovery. There are several possible explanations for

the distribution of DP types between the frequent attender groups, including diagnosis-related reasons and the positive effects of OH measures, however further research is needed to establish the reasons. Almost one-third of pFAs had attended OH collaborative negotiation, while only 16% of 1yFAs and 1% non-FAs had done so. As OH collaborative negotiation is the place to discuss work modifications [23], it is possible that workplace interventions and other measures prior to disability application are used more often for clients who attend them. This might also postpone applying for DPs, possibly explaining pFAs’ longer sickness absences before DP.

The distribution of diagnoses leading to permanent DP in our study differs slightly from the general

distribution reported by the FCP [27]. Over half of the DPs awarded for 1yFAs and pFAs are based on musculoskeletal disorders, while in 2017 FCP statistics covering all decisions in Finland, the proportion was less than a third [27]. This is similar to the proportion of non-FAs. This suggests that 1yFAs and pFAs leave the workforce due to musculoskeletal disorders more often than the average user of OH services. On the other hand, only 16% of 1yFAs and 12% of non-FAs retired due to mental disorders, while FCP statistics show that on average 30% of permanent DPs are awarded based on mental disorders [27]. In this study, mental disorders led to permanent withdrawal from the workforce less than in the FCP statistics, which might be due to the study population solely consisting of the working population, excluding the unemployed. It is also possible that the patients suffering from the more severe mental disorders mental disorders that finally lead to DP attended other services besides OH. Further research is needed on the use of other healthcare sectors to grasp the entire picture of disability caused by these illnesses that can be managed in multiple service sectors. Neoplasms leading to DP usually cannot be solved by the OHS nor partial DP solutions and are more common with the non-FA group as their care is usually coordinated in secondary care.

Measures that help to lengthen working careers and postpone DPs are welcome in the current economic situation and age-structure of Western and Asian countries such as Japan. Including frequency of consultation in the selection criteria of rehabilitation programmes could allow for earlier interventions for those at risk of DP, rather than relying solely on sickness absence rates. Authors have previously argued that 1-year frequent attenders should be excluded from interventions aimed at frequent attenders, as their frequency of visits diminishes on its own [28]. However, our results indicate that 1yFAs have proportionally more permanent DPs than permanent pFAs do, which indicates a decline in work ability. To date, interventions aimed at frequent attendance have focused mainly on morbidity and reduction of consultations rates [29]. Our results indicate, however, that frequent attenders' work ability, and interventions aimed at improvement of working ability should also be considered. Careful evaluation of rehabilitative needs and multi-professional interventions, including care coordination, should be made. Frequency of consultation should be considered as an early indicator of DP risk when choosing groups for OH interventions aimed at reducing sickness absences or future disability, especially in subgroups of musculoskeletal and mental disorders.

Our study also has some limitations. We could not control for income, occupational status or level of education as they are not available through medical

records. We did not have access to data on the use of other healthcare services such as the public sector or secondary care, or different OH providers. However, previous research indicates that when OH primary care services are available they are often used as the sole primary care provider [30]. In OH services loss to follow-up is possibly larger than in GP settings due to the ending of occupational relationships. Furthermore, we could not track the service use of patients lost to follow-up. This might have increased inaccuracy of the categorisation of different frequent attender groups. In a previous study, we conducted confirmatory analyses on the subgroup of 1391 1yFAs whose service use was known for the entire study period. The results did not differ substantially. The strengths of this study include the longitudinal study design that allowed for examining risks associated with both occasional and persistent frequent attendance. Moreover, the large study population from a nationwide OH service provider covers a wide range of industries and company sizes allowing for careful generalisation outside this particular context. The distribution of company sizes and industries resembles that of Statistics Finland. The health registers in Finland are comprehensive and accurate allowing for quality data.

## Conclusions

Frequent attenders of OH primary care receive proportionally more DPs than other users of OH primary care. Their increased risk of DP is explained by their sickness absences. High consultation frequency appears to indicate potential disability risk and careful rehabilitative assessment and care-planning should be conducted. Frequency of consultation could be considered when choosing candidates for early rehabilitation aimed at reducing DPs, especially in musculoskeletal and mental disorders, where the supportive measures of employers and OH services can be used. Further research is needed on working age frequent attenders using all parallel service providers. A longer follow-up period to evaluate risk of DP in the long term would be useful. Rehabilitative interventions aimed at working age frequent attenders of the OH services should be examined keeping in mind disability evaluation.

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## Conflict of interest

The authors declare that there is no conflict of interest.


## Data availability

The datasets collected and analysed during the current study are available from the corresponding author after the completion of the study on reasonable request.

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