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Research article

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Occasional and persistent frequent attenders and sickness absences – a longitudinal study

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ABSTRACT

Objectives Frequent attenders create a substantial portion of primary care workload but little is known about frequent attenders' 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.

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

Results Both occasional and persistent FA had more and longer duration of sick-leave than non-FA through the study years. Persistent frequent attenders had consistently high absence rates. Occasional FA had elevated absence rates even two years after their frequent attendance period. Persistent FAs (OR=11 in 2016) and occasional-FAs (OR=2.95 in 2016) were associated with long (15 or more days) sickness absence when compared with non-FA. Both groups of FA's had an increased risk of long term sick-leave indicating a risk of disability pension.

Conclusion Both occasional and persistent frequent attenders 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.

STRENGTHS AND LIMITATIONS OF THIS STUDY

- This is the first study to examine sickness absence differences between occasional and persistent frequent attenders
- 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 study lacks information on occupational status, education and use of other service providers as these are not available from occupational health medical records

INTRODUCTION

Frequent attendance is a costly and burdensome phenomenon for healthcare providers, society and patients. Patients, often referred to as frequent attenders (FA), visit healthcare units repeatedly and constitute a substantial portion of both physician's time and healthcare costs.[1,2] On the other hand, FAs appear to be a vulnerable group of patients that suffer from multimorbidity, medically unexplained symptoms and low quality of life.[3–5] For most patients frequent attendance is transient while a group of persistent FAs continue recurrent visits for extended periods of time.[2,6] Research indicates that persistent FAs often suffer from some combination of somatic, psychological and social problems and are prone to anxiety and worry more than transient FAs are.[3,6,7]

Frequent attenders 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. [8–11] The available research indicates that chronic disease and negative life events are predictive of long term sickness absence among one year FAs.[12] A Swedish study in GP setting showed that 19% of FA's versus 6% of non-FA's received a long term sickness absence or disability pension over 5 years' follow-up.[12] Also being on sick-leave or on disability pension increased the mean number of visits in GP setting and was associated with being a frequent attender.[10,13,14] 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 frequent attenders.

In Finland the proportion of time spent on disability pension is increasingly due to mental disorders, in particular depression.[15] In turn, musculoskeletal and mental disorders are the most common causes for long term sickness absences.[16,17] Both diagnostic groups are also associated with frequent attendance in the Nordic countries in a GP setting and in occupational health (OH) primary care. [18–20] Research shows that chronic illnesses that diminish work ability and symptoms related to work are associated with visiting OH primary care.[21] 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.[22] 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.[23–25] 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 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 programs on individuals at risk of sickness absences indicate both cost effectiveness and reduction in sickness absence days.[26–28] 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

Finnish primary health care is organized into three service sectors that function side by side. Municipal, private and occupational health all provide primary care services. Occupational health services (OHS) are divided into obligatory preventive services and voluntary primary care services which is, however, well in use covering up to 90% of employees [29]. Most professionals in OHS are specialized in occupational health. 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 employee sex and age and employers' industry and size. Pihlajalinna collected the data and the data was sent in pseudonymized 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 collection of data. 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 were excluded. 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 (i.e. the main) ICD-10 diagnosis registered for each visit in this study.

Statistical analysis

We defined FA as the top decile of attenders.[2,14] We used visits to physicians, nurses, physiotherapists and psychologists to define frequent attenders and with our definition FA visited OH units 8 or more times yearly.[20] Previously, we made a secondary analysis of frequent attenders using only visits to the physician, which did not alter the results.[20] Patients being in the top decile in 2014 but not in any other study year were categorized as 1-year-FA (1yFA) representing occasional FA. Patients who were in the top decile during all three study years (2014–2016) were

categorized as persistent-FA (pFA). Patients who were not in the top decile in any of the study years (non-frequent attenders, non-FA) were used as a reference group. Patients who were FA in 2015 or 2016 but not during all three study years were excluded as they were neither occasional nor persistent frequent attenders, and they could not be considered non-FA.

We divided the study population by sex and into four age categories (18–34, 35–44, 45–54, 55–68) for characterization. Employer industries were categorized according to Statistics Finland /Statistical Classification of economic activities in the European Community (TOL2008/Nace Rev.2). We analyzed sickness absences with different categorizations. First we divided sickness absence episodes into groups according to the length: no absence, short (1–3 d), intermediate (4–14 d) and long (15 d or more) absence.[30] In addition, we looked at the total number of sickness absence days per year with two different categorizations (0, 1–15 or more than 15 days per year and short (1–3 d) intermediate (4–14 d) and long (15 d or more)). [31] 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 analyze associations of the dependent variable FA-status (1yFA, pFA and non-FA) with the independent variable (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 existence of cancer diagnosis (C00-C97). Odds ratios (OR) with 95% confidence intervals (CI) were determined. Statistical analyses were conducted in University of Tampere using IBM SPSS Statistics version 23. In all analyses P values less than 0.05 were considered statistically significant.

Ethical considerations

The National Institute of Health and Welfare (THL/556/5.05.OO/2016) and the ethics committee of Pirkanmaa Hospital District (ETL R16041) approved the study. According to Finnish legislation individual consent was not needed due to the size of the study population.

RESULTS

Our study population constituted 59 676 individuals during the study years (2014–2016). The population included 592 pFA and 2468 1yFA in 2014. The latter group diminished due to 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 below shows descriptive statistics of 1yFA, pFA and non-FA during the study years. There were more women than men in both 1yFA and pFA 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, 70% or more received a sick-leave certificate from a physician during the study. In 2016 almost 70% of pFA and 30% of 1yFA had a sick-leave longer than 15 days while only 9% of non-FA had such a long absence.

[Insert Figure 1. Flow of the study population]

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

	2014, n = 24772						2015, n = 27116						2016, n = 41241					
	1yFA n = 2468		pFA n = 592		non-FA n = 21712		1yFA n = 1986		pFA n = 592		non-FA n = 24538		1yFA n = 1391		pFA n = 592		non-FA n = 39258	
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
Sex																		
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)
Age																		
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)
Absences																		
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 Chi square -tests, p<0.001

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

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

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

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 5 to 6 sickness absence episodes yearly whereas the 1yFA group had a median of 4 sickness absence episodes in 2014, after which the frequency of episodes diminished. However, the frequency of sickness episodes remained higher among the 1yFA group than in the non-FA group two 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 1yFA, pFA and non-FA respectively. The median lengths for musculoskeletal disorders (M00–M99) among 1yFA, pFA and non-FA were 7, 5 and 5 days respectively (data not shown).

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 frequent attender 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

Kruskal-Wallis Test, *** = $p < 0.001$, av. = average, md = median

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

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

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.

Throughout the study years long sickness absences (15 or more 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 1yFA and 63% for pFA, while for the non-FA group the proportion was 46%.

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

	1yFA, n = 19 506						pFA, n = 10 117						non-FA, n = 74 176					
	1-3 days, n = 8597		4-14 days, n = 8261		15 or more days, n = 2648		1-3 days, n = 4732		4-14 days, n = 4357		15 or more days, n = 1028		1-3 days, n = 39 566		4-14 days, n = 28 243		15 or more days, n = 6367	
ICD-10	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	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 (frequent attender 10%, FA10)

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

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 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, pFA and 1yFA did not differ significantly in their risk of any length sickness absence. However, in the following years pFA had higher odds (OR 3.73, 95% CI 2.49−5.60 in 2016) of a long sickness absence than 1yFA. These groups did not differ in their risk for intermediate length absences. Throughout the study years both 1yFA (OR 1.44, 95% CI 1.23−1.69 in 2016) and pFA (OR 2.08, 95% CI 1.39−3.10 in 2016) had higher risk for intermediate length absences than non-FA. This association was enhanced when studying long absences. In 2016 1yFA had higher odds (OR 2.95, 95% CI 2.50−3.49) for having a 15 or more days' absence than non-FA, as did pFA (OR 11.0, 95% CI 7.54−16.06).

Table 4. Lengths of sickness absences associated with frequent attender status in multinomial logistic regression (adjusted for sex, age, field of industry, cancer dg (C00-C97) and number of different ICD10-diagnoses given by phycicians), 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 (2014)						
no sickness absence (0 days)	1.0		1.0		1.0	
short (1-3 days)	1.15	0.91 - 1.45	1.06	0.61 - 1.85	0.93	0.52 - 1.67
intermediate length (4-14 days)	2.34	1.96 - 2.80	2.33	1.55 - 3.51	1.00	0.65 - 1.53
long (15 or more days)	13.10	11.07 - 15.50	18.27	12.54 - 26.60	1.39	0.94 - 2.07
Sickness absences (2015)						
no sickness absence (0 days)	1.0		1.0		1.0	
short (1-3 days)	1.20	1.01 - 1.42	1.32	0.72 - 2.40	1.09	0.59 - 2.04
intermediate length (4-14 days)	1.89	1.64 - 2.17	2.92	1.87 - 4.57	1.55	0.97 - 2.46
long (15 or more days)	4.48	3.88 - 5.16	17.96	11.83 - 27.25	4.01	2.60 - 6.18
Sickness absences (2016)						
no sickness absence (0 days)	1.0		1.0		1.0	
short (1-3 days)	1.08	0.89 - 1.29	0.93	0.54 - 1.59	0.86	0.49 - 1.52
intermediate length (4-14 days)	1.44	1.23 - 1.69	2.08	1.39 - 3.10	1.44	0.94 - 2.20
long (15 or more days)	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, p <0.001 in all values

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

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

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.

DISCUSSION

Our results indicate that persistent frequent attenders have more and longer sickness absence episodes than other users of OH primary care. However, occasional frequent attenders also have more and longer sickness absences than non-frequent attenders, not only in their year of frequent attendance, but also in the following two years. Both frequent attender groups are also associated with 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 disability pension in private sector employees. [25,31] In our study approximately 70% of persistent frequent attenders had a sickness absence >15 days yearly while for non-frequent attenders the proportion was a maximum of 10% through the study years. In 2014 almost two thirds of occasional frequent attenders had >15 days sickness absence and after two years follow up one third of occasional FA had >15 days of absence. Our results indicate that both persistent and occasional FA 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 FA than non-FA. The second largest group causing long absences was mental disorders for both occasional and persistent FA. 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. [32,33] 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.[34,35] As our study shows that these diagnostic groups are associated with sickness absences of both occasional and persistent frequent attenders, 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 persistent and occasional frequent attenders 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 frequent attenders should be a target group for interventions at all.[36] However, our results indicate that occasional frequent attenders' sickness absences are higher than 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 frequent attenders' risk of future absences, also persistent frequent attenders need attention. Persistent frequent attenders appear to be a 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 frequent attenders have been those based on in depth analysis of patient's reasons for attendance and accordingly selected actions.[37] 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.[35] Work ability/disability and work relatedness could be also worth considering when discussing frequent attenders. 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.[38,39]

The strengths of this study are the large study population from an OHS provider including 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 generalization outside this particular service provider. As no sampling was done, there should not be selection bias in the frequent attender groups. Also, the use of medical records to define frequency of visits removes inaccuracy related to self-reported utilization.[40] 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.

However, this study is limited by 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 have 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.

CONCLUSIONS

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

In future, a longer follow-up of sickness absences would be useful to see whether sickness absence rate eventually equalizes 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

The Authors declare that there is no conflict of interest.

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AUTHOR'S CONTRIBUTIONS

JU conceptualized the study. TR, SA, NT, MS, MV and JU planned the analysis and NT analyzed the data. TR wrote the first draft, all authors commented on the draft and approved the final version.

AVAILABILITY OF DATA AND MATERIAL

The data that support the findings of this study are available from Pihlajalinna 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 Pihlajalinna Työterveys.

PATIENT AND PUBLIC INVOLVEMENT

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

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FIGURES

Figure 1. Flow of the study population

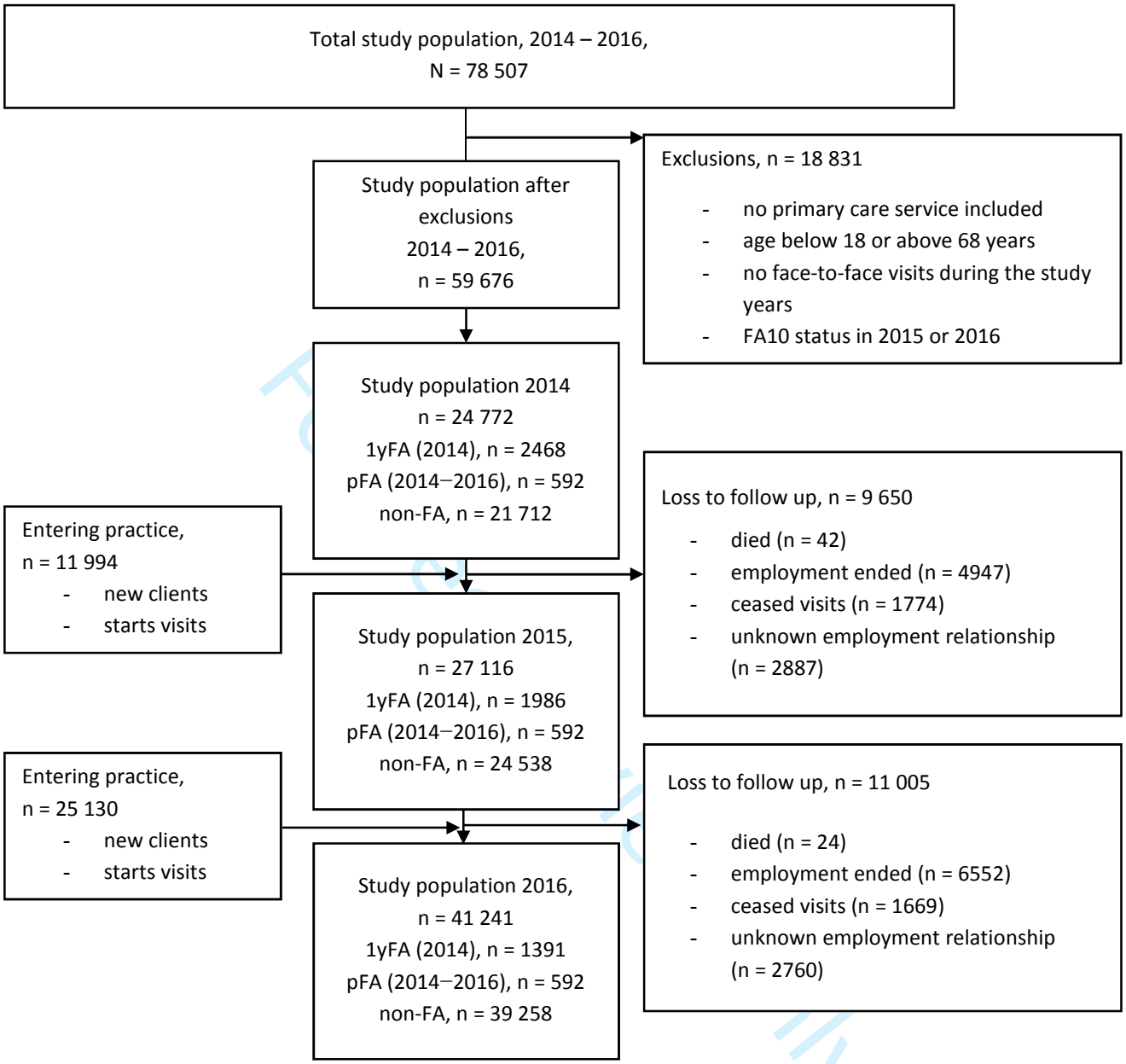

Figure 1. Flow of the study population

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

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

STROBE Statement—checklist of items that should be included in reports of observational studies

	Item No.	Recommendation	Page No.
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	2
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3-4
Objectives	3	State specific objectives, including any prespecified hypotheses	4
Methods			
Study design	4	Present key elements of study design early in the paper	5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5-6
Participants	6	(*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up *Case-control study*—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls *Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants	5-6
		(*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed *Case-control study*—For matched studies, give matching criteria and the number of controls per case	5-6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	6
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	5-6
Bias	9	Describe any efforts to address potential sources of bias	5-6, 16
Study size	10	Explain how the study size was arrived at	5

Continued on next page

Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	5-6
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	6
		(*b*) Describe any methods used to examine subgroups and interactions	6
		(*c*) Explain how missing data were addressed	16-17
		(*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed *Case-control study*—If applicable, explain how matching of cases and controls was addressed *Cross-sectional study*—If applicable, describe analytical methods taking account of sampling strategy	16-17
		(*e*) Describe any sensitivity analyses	5, 16-17
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	5, 7, figure 1
		(b) Give reasons for non-participation at each stage	5, 7, figure 1
		(c) Consider use of a flow diagram	7, figure 1
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	7-8, 12
		(b) Indicate number of participants with missing data for each variable of interest	5
		(c) *Cohort study*—Summarise follow-up time (eg, average and total amount)	7
Outcome data	15*	*Cohort study*—Report numbers of outcome events or summary measures over time	7-9
		Case-control study—Report numbers in each exposure category, or summary measures of exposure	
		Cross-sectional study—Report numbers of outcome events or summary measures	
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	13-14
		(*b*) Report category boundaries when continuous variables were categorized	6
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A

Continued on next page

Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	9-10
Discussion			
Key results	18	Summarise key results with reference to study objectives	15
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	16-17
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	16-17
Generalisability	21	Discuss the generalisability (external validity) of the study results	17
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	17

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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

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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 create a substantial portion of primary care workload but little is known about frequent attenders' 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 categorized into occasional and persistent frequent attenders (FA) or non-frequent attenders (non-FA). Sick-leave episodes and their lengths were collected along with associated diagnostic codes. Logistic regression was used to analyze associations between FA status and sick-leaves of different lengths (1-3, 4-14 and 15 or more days).

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

Conclusion Both occasional and persistent frequent attenders 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.

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 OHS is larger than in the GP setting since patients can be lost due to an employment relationship that ends

INTRODUCTION

Frequent attendance is a costly and burdensome phenomenon for healthcare providers, society and patients. Patients, often referred to as frequent attenders (FA), visit healthcare units repeatedly and constitute a substantial portion of both physician's time and healthcare costs.[1,2] On the other hand, FAs appear to be a vulnerable group of patients that suffer from multimorbidity, medically unexplained symptoms and low quality of life.[3–5] For most patients frequent attendance is transient while a group of persistent FAs continue recurrent visits for extended periods of time.[2,6] Research indicates that persistent FAs often suffer from some combination of somatic, psychological and social problems and are prone to anxiety and worry more than transient FAs are.[3,6,7]

Frequent attenders 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. [8–11] The available research indicates that chronic disease and negative life events are predictive of long term sickness absence among one year FAs.[12] A Swedish study in GP setting showed that 19% of FA's versus 6% of non-FA's received a long term sickness absence or disability pension over 5 years' follow-up.[12] Also being on sick-leave or on disability pension increased the mean number of visits in GP setting and was associated with being a frequent attender.[10,13,14] 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 frequent attenders. There is little research on working age patients alone, and most research concerning working age patients is conducted in GP setting. OH primary care in Finland is an ideal place to study working age patients solely as OHs primary care is available to 90% of the working population and often used as the sole primary care provider. [15,16]

In Finland the proportion of time spent on disability pension is increasingly due to mental disorders, in particular depression.[17] In turn, musculoskeletal and mental disorders are the most common causes for long term sickness absences.[18,19] Both diagnostic groups are also associated with frequent attendance in the Nordic countries in a GP setting and in occupational health (OH) primary care. [20–22] Research shows that chronic illnesses that diminish work ability and symptoms related to work are associated with visiting OH primary care.[23] 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.[24] 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.[25–27] 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 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 programs on individuals at risk of sickness absences indicate both cost effectiveness and reduction in sickness absence days.[28–30] 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. Occupational health 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 [16]. 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. OHS primary care is often used as the sole primary care provider for the working population.[15] Most professionals in OHS are specialized in occupational health. 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 the data was sent in pseudonymized 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 (i.e. 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.[2,14] We used visits to physicians, nurses, physiotherapists and psychologists to define frequent attenders and with our definition FA visited OH units 8 or more times yearly.[22] The general characteristics of FAs in OHS is described previously and we also made a secondary analysis of frequent attenders using only visits to the physician, which did not alter the results.[22] Patients being in the top decile in 2014 but not in any other study year were categorized as 1-year-FA (1yFA) representing occasional FA. Patients who were in the top decile during all three study years (2014–2016) were categorized as persistent-FA (pFA). 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-frequent attenders, non-FA). 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 categorized.

We divided the study population by sex and into four age categories (18–34, 35–44, 45–54, 55–68) for characterization. Employer industries were categorized according to Statistics Finland /Statistical Classification of economic activities in the European Community (TOL2008/Nace Rev.2). We analyzed sickness absences with different categorizations. First we divided sickness absence episodes into groups according to the length: no absence, short (1–3 d), intermediate (4–14 d) and long (15 d or more) absence.[31] In addition, we looked at the total number of sickness absence days per year with two different categorizations (0, 1–15 or more than 15 days per year and short (1–3 d) intermediate (4–14 d) and long (15 d or more)). [32] 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 analyze associations of the dependent variable FA-status (1yFA, pFA and non-FA) with the independent variable (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 existence of cancer diagnosis (C00-C97). Odds ratios (OR)

with 95% confidence intervals (CI) were determined. Statistical analyses were conducted in University of Tampere using IBM SPSS Statistics version 23. In all analyses P values less than 0.05 were considered statistically significant.

Ethical considerations

The National Institute of Health and Welfare (THL/556/5.05.OO/2016) and the ethics committee of Pirkanmaa Hospital District (ETL R16041) approved the study. According to Finnish legislation individual consent was not needed as this is a large-scale register-based study where no single participant can be recognized.

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 pFA and 2468 1yFA in 2014. The latter group diminished due to 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 below shows descriptive statistics of 1yFA, pFA and non-FA during the study years. There were more women than men in both 1yFA and pFA 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, 70% or more received a sick-leave certificate from a physician during the study. In 2016 almost 70% of pFA and 30% of 1yFA had a sick-leave longer than 15 days while only 9% of non-FA had such a long absence.

[Insert Figure 1. Flow of the study population]

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

	2014, n = 24772						2015, n = 27116						2016, n = 41241					
	1yFA n = 2468		pFA n = 592		non-FA n = 21712		1yFA n = 1986		pFA n = 592		non-FA n = 24538		1yFA n = 1391		pFA n = 592		non-FA n = 39258	
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
Sex																		
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)
Age																		
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)
Absences																		
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 Chi square -tests, p<0.001

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

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

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

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 5 to 6 sickness absence episodes yearly whereas the 1yFA group had a median of 4 sickness absence episodes in 2014, after which the frequency of episodes diminished. However, the frequency of sickness episodes remained higher among the 1yFA group than in the non-FA group two 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 1yFA, pFA and non-FA respectively. The median lengths for musculoskeletal disorders (M00–M99) among 1yFA, pFA and non-FA were 7, 5 and 5 days respectively (data not shown).

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 frequent attender 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

Kruskal-Wallis Test, *** = $p < 0.001$, av. = average, md = median

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

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

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

Throughout the study years long sickness absences (15 or more 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 1yFA and 63% for pFA, while for the non-FA group the proportion was 46%.

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

	1yFA, n = 19 506						pFA, n = 10 117						non-FA, n = 74 176					
	1-3 days, n = 8597		4-14 days, n = 8261		15 or more days, n = 2648		1-3 days, n = 4732		4-14 days, n = 4357		15 or more days, n = 1028		1-3 days, n = 39 566		4-14 days, n = 28 243		15 or more days, n = 6367	
ICD-10	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	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 (frequent attender 10%, FA10)

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

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 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, pFA and 1yFA did not differ significantly in their risk of any length sickness absence. However, in the following years pFA had higher odds (OR 3.73, 95% CI 2.49−5.60 in 2016) of a long sickness absence than 1yFA. These groups did not differ in their risk for intermediate length absences. Throughout the study years both 1yFA (OR 1.44, 95% CI 1.23−1.69 in 2016) and pFA (OR 2.08, 95% CI 1.39−3.10 in 2016) had higher risk for intermediate length absences than non-FA. This association was enhanced when studying long absences. In 2016 1yFA had higher odds (OR 2.95, 95% CI 2.50−3.49) for having a 15 or more days' absence than non-FA, as did pFA (OR 11.0, 95% CI 7.54−16.06).

Table 4. Lengths of sickness absences associated with frequent attender status in multinomial logistic regression (adjusted for sex, age, field of industry, cancer dg (C00-C97) and number of different ICD10-diagnoses given by phycicians), 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 (2014)						
no sickness absence (0 days)	1.0		1.0		1.0	
short (1-3 days)	1.15	0.91 - 1.45	1.06	0.61 - 1.85	0.93	0.52 - 1.67
intermediate length (4-14 days)	2.34	1.96 - 2.80	2.33	1.55 - 3.51	1.00	0.65 - 1.53
long (15 or more days)	13.10	11.07 - 15.50	18.27	12.54 - 26.60	1.39	0.94 - 2.07
Sickness absences (2015)						
no sickness absence (0 days)	1.0		1.0		1.0	
short (1-3 days)	1.20	1.01 - 1.42	1.32	0.72 - 2.40	1.09	0.59 - 2.04
intermediate length (4-14 days)	1.89	1.64 - 2.17	2.92	1.87 - 4.57	1.55	0.97 - 2.46
long (15 or more days)	4.48	3.88 - 5.16	17.96	11.83 - 27.25	4.01	2.60 - 6.18
Sickness absences (2016)						
no sickness absence (0 days)	1.0		1.0		1.0	
short (1-3 days)	1.08	0.89 - 1.29	0.93	0.54 - 1.59	0.86	0.49 - 1.52
intermediate length (4-14 days)	1.44	1.23 - 1.69	2.08	1.39 - 3.10	1.44	0.94 - 2.20
long (15 or more days)	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, p <0.001 in all values

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

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

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

DISCUSSION

Our results indicate that persistent frequent attenders have more and longer sickness absence episodes than other users of OH primary care. However, occasional frequent attenders also have more and longer sickness absences than non-frequent attenders, not only in their year of frequent attendance, but also in the following two years. Both frequent attender groups are also associated with 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 disability pension in private sector employees. [27,32] In our study approximately 70% of persistent frequent attenders had a sickness absence >15 days yearly while for non-frequent attenders the proportion was a maximum of 10% through the study years. In 2014 almost two thirds of occasional frequent attenders had >15 days sickness absence and after two years follow up one third of occasional FA had >15 days of absence. Our results indicate that both persistent and occasional FA 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 FA than non-FA. The second largest group causing long absences was mental disorders for both occasional and persistent FA. 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. [33,34] 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.[35,36] As our study shows that these diagnostic groups are associated with sickness absences of both occasional and persistent frequent attenders, 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 persistent and occasional frequent attenders 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 frequent attenders should be a target group for interventions at all.[37] However, our results indicate that occasional frequent attenders' sickness absences are higher than 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 frequent attenders' risk of future absences, also persistent frequent attenders need attention. Persistent frequent attenders appear to be a 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 frequent attenders have been those based on in depth analysis of patient's reasons for attendance and accordingly selected actions.[38] 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.[36] Work ability/disability and work relatedness could be also worth considering when discussing frequent attenders. 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.[39,40]

Strengths and limitations

The strengths of this study are the large study population from an OHS provider including 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 generalization outside this particular service provider. The results can be generalized to OHS sector in Finland where 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 frequent attender groups. Also, the use of medical records to define frequency of visits removes inaccuracy related to self-reported utilization.[41] 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. Although there might be limitations to primary care services in OH, visits to nurses and physicians are not restricted.

However, this study is limited by 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 that 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.[15] Also, we cannot track the service use of the patients lost for follow-up. This might add inaccuracy to categorization of different frequent attender 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 conducted also 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 frequent attenders 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.

CONCLUSIONS

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

In future, a longer follow-up of sickness absences would be useful to see whether sickness absence rate eventually equalizes 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

The Authors declare that there is no conflict of interest.

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AUTHOR'S CONTRIBUTIONS

JU conceptualized the study. TR, SA, NT, MS, MV and JU planned the analysis and NT analyzed the data. TR wrote the first draft, all authors commented on the draft and approved the final version.

AVAILABILITY OF DATA AND MATERIAL

The data that support the findings of this study are available from Pihlajalinna 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 Pihlajalinna Työterveys.

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FIGURES

Figure 1. Flow of the study population

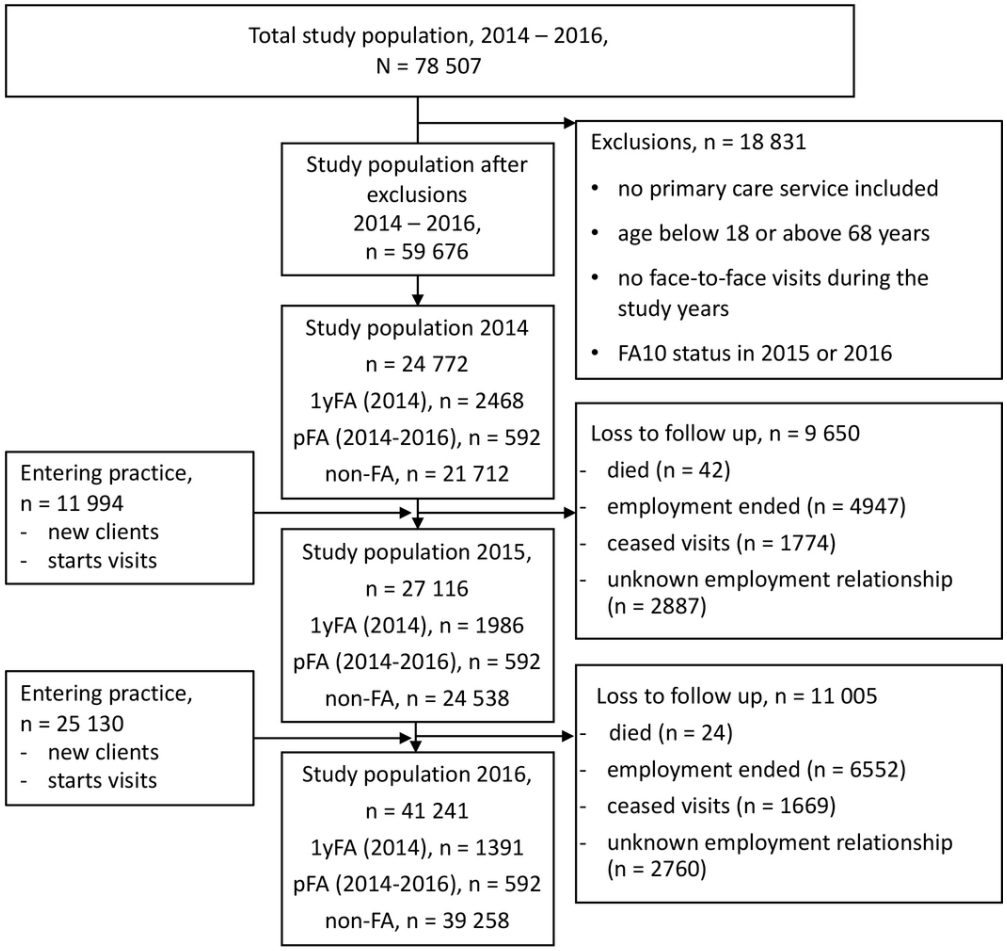

Figure 1. Flow of the study population
1yFA = Patients that were in the top decile of attenders in 2014
pFA = Patients that were in the top decile in all three study years (2014, 2015 and 2016)
non-FA = Patients that were never in the top decile were considered as a reference group, non-frequent attenders

90x90mm (300 x 300 DPI)

STROBE Statement—checklist of items that should be included in reports of observational studies

	Item No.	Recommendation	Page No.
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	2
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3-4
Objectives	3	State specific objectives, including any prespecified hypotheses	4
Methods			
Study design	4	Present key elements of study design early in the paper	5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5-6
Participants	6	(*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up *Case-control study*—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls *Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants	5-6
		(*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed *Case-control study*—For matched studies, give matching criteria and the number of controls per case	5-6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	6
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	5-6
Bias	9	Describe any efforts to address potential sources of bias	5-6, 16
Study size	10	Explain how the study size was arrived at	5

Continued on next page

Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	5-6
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	6
		(*b*) Describe any methods used to examine subgroups and interactions	6
		(*c*) Explain how missing data were addressed	16-17
		(*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed *Case-control study*—If applicable, explain how matching of cases and controls was addressed *Cross-sectional study*—If applicable, describe analytical methods taking account of sampling strategy	16-17
		(*e*) Describe any sensitivity analyses	5, 16-17
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	5, 7, figure 1
		(b) Give reasons for non-participation at each stage	5, 7, figure 1
		(c) Consider use of a flow diagram	7, figure 1
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	7-8, 12
		(b) Indicate number of participants with missing data for each variable of interest	5
		(c) *Cohort study*—Summarise follow-up time (eg, average and total amount)	7
Outcome data	15*	*Cohort study*—Report numbers of outcome events or summary measures over time	7-9
		Case-control study—Report numbers in each exposure category, or summary measures of exposure	
		Cross-sectional study—Report numbers of outcome events or summary measures	
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	13-14
		(*b*) Report category boundaries when continuous variables were categorized	6
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A

Continued on next page

Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	9-10
Discussion			
Key results	18	Summarise key results with reference to study objectives	15
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	16-17
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	16-17
Generalisability	21	Discuss the generalisability (external validity) of the study results	17
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	17

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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

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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 create a substantial portion of primary care workload but little is known about frequent attenders' 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 categorized into occasional and persistent frequent attenders (FA) or non-frequent attenders (non-FA). Sick-leave episodes and their lengths were collected along with associated diagnostic codes. Logistic regression was used to analyze associations between FA status and sick-leaves of different lengths (1-3, 4-14 and 15 or more days).

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

Conclusion Both occasional and persistent frequent attenders 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.

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 OHS is larger than in the GP setting since patients can be lost due to an employment relationship that ends

INTRODUCTION

Frequent attendance is a costly and burdensome phenomenon for healthcare providers, society and patients. Patients, often referred to as frequent attenders (FA), visit healthcare units repeatedly and constitute a substantial portion of both physician's time and healthcare costs.[1,2] On the other hand, FAs appear to be a vulnerable group of patients that suffer from multimorbidity, medically unexplained symptoms and low quality of life.[3–5] For most patients frequent attendance is transient while a group of persistent FAs continue recurrent visits for extended periods of time.[2,6] Research indicates that persistent FAs often suffer from some combination of somatic, psychological and social problems and are prone to anxiety and worry more than transient FAs are.[3,6,7]

Frequent attenders 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. [8–11] The available research indicates that chronic disease and negative life events are predictive of long term sickness absence among one year FAs.[12] A Swedish study in GP setting showed that 19% of FA's versus 6% of non-FA's received a long term sickness absence or disability pension over 5 years' follow-up.[12] Also being on sick-leave or on disability pension increased the mean number of visits in GP setting and was associated with being a frequent attender.[10,13,14] 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 frequent attenders. There is little research on working age patients alone, and most research concerning working age patients is conducted in GP setting. OH primary care in Finland is an ideal place to study working age patients solely as OHs primary care is available to 90% of the working population and often used as the sole primary care provider. [15,16]

In Finland the proportion of time spent on disability pension is increasingly due to mental disorders, in particular depression.[17] In turn, musculoskeletal and mental disorders are the most common causes for long term sickness absences.[18,19] Both diagnostic groups are also associated with frequent attendance in the Nordic countries in a GP setting and in occupational health (OH) primary care. [20–22] Research shows that chronic illnesses that diminish work ability and symptoms related to work are associated with visiting OH primary care.[23] 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.[24] 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.[25–27] 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 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 programs on individuals at risk of sickness absences indicate both cost effectiveness and reduction in sickness absence days.[28–30] 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. Occupational health 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 [16]. 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 four patients having visited OHS named their OHS unit as their main primary care provider [31]. OHS primary care is often used as the sole primary care provider for the working population.[15] The role of the OHS units in primary care has increased in the past years [32] 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 specialized in occupational health. 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 the data was sent in pseudonymized 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 (i.e. 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.[2,14] We used visits to physicians, nurses, physiotherapists and psychologists to define frequent attenders and with our definition FA visited OH units 8 or more times yearly.[22] The general characteristics of FAs in OHS is described previously and we also made a secondary analysis of frequent attenders using only visits to the physician, which did not alter the results.[22] Patients being in the top decile in 2014 but not in any other study year were categorized as 1-year-FA (1yFA) representing occasional FA. Patients who were in the top decile during all three study years (2014−2016) were categorized as persistent-FA (pFA). 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-frequent attenders, non-FA). 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 categorized.

We divided the study population by sex and into four age categories (18−34, 35−44, 45−54, 55−68) for characterization. Employer industries were categorized according to Statistics Finland /Statistical Classification of economic activities in the European Community (TOL2008/Nace Rev.2). We analyzed sickness absences with different categorizations. First we divided sickness absence episodes into groups according to the length: no absence, short (1−3 d), intermediate (4−14 d) and long (15 d or more) absence.[33] In addition, we looked at the total number of sickness absence days per year with two different categorizations (0, 1−15 or more than 15 days per year and short (1−3 d) intermediate (4−14 d) and long (15 d or more)). [34] Additional analysis 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 analyze associations of the dependent variable FA-status (1yFA, pFA and non-FA) with the

independent variable (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 existence of cancer diagnosis (C00-C97). Odds ratios (OR) with 95% confidence intervals (CI) were determined. Statistical analyses were conducted in University of Tampere using IBM SPSS Statistics version 23. In all analyses P values less than 0.05 were considered statistically significant.

Ethical considerations

The National Institute of Health and Welfare (THL/556/5.05.OO/2016) and the ethics committee of Pirkanmaa Hospital District (ETL R16041) approved the study. According to Finnish legislation individual consent was not needed as this is a large-scale register-based study where no single participant can be recognized.

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 pFA and 2468 1yFA in 2014. The latter group diminished due to 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 below shows descriptive statistics of 1yFA, pFA and non-FA during the study years. There were more women than men in both 1yFA and pFA 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, 70% or more received a sick-leave certificate from a physician during the study. In 2016 almost 70% of pFA and 30% of 1yFA had a sick-leave longer than 15 days while only 9% of non-FA had such a long absence.

[Insert Figure 1. Flow of the study population]

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

	2014, n = 24772			2015, n = 27116			2016, n = 41241		
	1yFA n = 2468	pFA n = 592	non-FA n = 21712	1yFA n = 1986	pFA n = 592	non-FA n = 24538	1yFA n = 1391	pFA n = 592	non-FA n = 39258
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Sex									
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)
Age									
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)
Absences									
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 Chi square -tests, p<0.001

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

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

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

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 5 to 6 sickness absence episodes yearly whereas the 1yFA group had a median of 4 sickness absence episodes in 2014, after which the frequency of episodes diminished. However, the frequency of sickness episodes remained higher among the 1yFA group than in the non-FA group two 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 1yFA, pFA and non-FA respectively. The median lengths for musculoskeletal disorders (M00−M99) among 1yFA, pFA and non-FA were 7, 5 and 5 days respectively (data not shown).

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 frequent attender 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

Kruskal-Wallis Test, *** = $p < 0.001$, av. = average, md = median

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

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

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.

Throughout the study years long sickness absences (15 or more 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 1yFA and 63% for pFA, while for the non-FA group the proportion was 46%.

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

	1yFA, n = 19 506						pFA, n = 10 117						non-FA, n = 74 176					
	1-3 days, n = 8597		4-14 days, n = 8261		15 or more days, n = 2648		1-3 days, n = 4732		4-14 days, n = 4357		15 or more days, n = 1028		1-3 days, n = 39 566		4-14 days, n = 28 243		15 or more days, n = 6367	
ICD-10	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	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 (frequent attender 10%, FA10)

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

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 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, pFA and 1yFA did not differ significantly in their risk of any length sickness absence. However, in the following years pFA had higher odds (OR 3.73, 95% CI 2.49−5.60 in 2016) of a long sickness absence than 1yFA. These groups did not differ in their risk for intermediate length absences. Throughout the study years both 1yFA (OR 1.44, 95% CI 1.23−1.69 in 2016) and pFA (OR 2.08, 95% CI 1.39−3.10 in 2016) had higher risk for intermediate length absences than non-FA. This association was enhanced when studying long absences. In 2016 1yFA had higher odds (OR 2.95, 95% CI 2.50−3.49) for having a 15 or more days' absence than non-FA, as did pFA (OR 11.0, 95% CI 7.54−16.06).

One day of sickness absence in any of the study years increases the likelihood of being occasional of persistent FA only slightly and the results are insignificant when comparing 1yFA with pFA (table 5). In table 6 can be seen characteristics associated with frequent attender status in sickness absences over 15 days. Female sex and morbidity (measured by number of different diagnoses given by a physician) were associated with frequent attender status in sickness absences over 15 days.

Table 4. Lengths of sickness absences associated with frequent attender status in multinomial logistic regression (adjusted for sex, age, field of industry, cancer dg (C00-C97) and number of different ICD10-diagnoses given by phycicians), 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 (2014)						
no sickness absence (0 days)	1.0		1.0		1.0	
short (1-3 days)	1.15	0.91 - 1.45	1.06	0.61 - 1.85	0.93	0.52 - 1.67
intermediate length (4-14 days)	2.34	1.96 - 2.80	2.33	1.55 - 3.51	1.00	0.65 - 1.53
long (15 or more days)	13.10	11.07 - 15.50	18.27	12.54 - 26.60	1.39	0.94 - 2.07
Sickness absences (2015)						
no sickness absence (0 days)	1.0		1.0		1.0	
short (1-3 days)	1.20	1.01 - 1.42	1.32	0.72 - 2.40	1.09	0.59 - 2.04
intermediate length (4-14 days)	1.89	1.64 - 2.17	2.92	1.87 - 4.57	1.55	0.97 - 2.46
long (15 or more days)	4.48	3.88 - 5.16	17.96	11.83 - 27.25	4.01	2.60 - 6.18
Sickness absences (2016)						
no sickness absence (0 days)	1.0		1.0		1.0	
short (1-3 days)	1.08	0.89 - 1.29	0.93	0.54 - 1.59	0.86	0.49 - 1.52
intermediate length (4-14 days)	1.44	1.23 - 1.69	2.08	1.39 - 3.10	1.44	0.94 - 2.20
long (15 or more days)	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%, FA10)

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

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.

Table 5. Sickness absence associated with frequent attender status in multinomial logistic regression (adjusted for sex, age, field of industry, cancer dg (C00-C97) and number of different ICD10-diagnoses given by phycicians), n = 24 772−41241

	1yFA vs. non-FA		pFA vs. non-FA		pFA vs. 1yFA	
	OR	95 % CI	OR	95 % CI	OR	95 % CI
Sickness absences (2014)						
A single sickness absence day in 2014	1.02	1.02 - 1.02	1.02	1.02 - 1.02	1.00	0.99 - 1.00
Sickness absences (2015)						
A single sickness absence day in 2015	1.01	1.01 - 1.01	1.01	1.01 - 1.02	1.00	1.00 - 1.00
Sickness absences (2016)						
A single sickness absence day in 2016	1.01	1.01 - 1.01	1.02	1.02 - 1.02	1.01	1.01 - 1.01

OR = Odds ratio, CI = Confidence interval

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

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

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.

Table 6. Sickness absences >15 days associated with frequent attender status in multinomial logistic regression model (adjusted for age, field of industry and cancer dg (C00-C97) and number of different ICD10- diagnoses given by phycicians), 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 (2014)						
Sex						
Male	1.0		1.0		1.0	
Female	1.52	1.28 - 1.82	1.76	1.33 - 2.31	1.15	0.88 - 1.50
Number of different ICD10-diagnoses given by phycicians	2.22	2.08 - 2.36	2.84	2.60 - 3.10	1.28	1.19 - 1.38
Sickness absences (2015)						
Sex						
Male	1.0		1.0		1.0	
Female	1.48	1.21 - 1.81	1.47	1.12 - 1.93	0.99	0.74 - 1.33
Number of different ICD10-diagnoses given by phycicians	1.71	1.58 - 1.84	2.93	2.67 - 3.22	1.71	1.57 - 1.88
Sickness absences (2016)						
Sex						
Male	1.0		1.0		1.0	
Female	1.18	0.91 - 1.53	1.59	1.19 - 2.12	1.34	0.95 - 1.91
Number of different ICD10-diagnoses given by phycicians	1.76	1.63 - 1.91	2.82	2.58 - 3.09	1.60	1.45 - 1.77

OR = Odds ratio, CI = Confidence interval, 1.0 = reference group

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

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

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.

DISCUSSION

Our results indicate that persistent frequent attenders have more and longer sickness absence episodes than other users of OH primary care. However, occasional frequent attenders also have more and longer sickness absences than non-frequent attenders, not only in their year of frequent attendance, but also in the following two years. Both frequent attender groups are also associated with 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 disability pension in private sector employees. [27,34] In our study approximately 70% of persistent frequent attenders had a sickness absence >15 days yearly while for non-frequent attenders the proportion was a maximum of 10% through the study years. In 2014 almost two thirds of occasional frequent attenders had >15 days sickness absence and after two years follow up one third of occasional FA had >15 days of absence. Our results indicate that both persistent and occasional FA 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 FA than non-FA. The second largest group causing long absences was mental disorders for both occasional and persistent FA. 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. [35,36] 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.[37,38] As our study shows that these diagnostic groups are associated with sickness absences of both occasional and persistent frequent attenders, 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 persistent and occasional frequent attenders 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 frequent attenders should be a target group for interventions at all.[39] However, our results indicate that occasional frequent attenders' sickness absences are higher than 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 frequent attenders' risk of future absences, also persistent frequent attenders need attention. Persistent frequent attenders appear to be a 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 frequent attenders have been those based on in depth analysis of patient's reasons for attendance and accordingly selected actions.[40] 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.[38] Work ability/disability and work relatedness could be also worth considering when discussing frequent attenders. 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.[41,42]

Strengths and limitations

The strengths of this study are the large study population from an OHS provider including 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 generalization outside this particular service provider. The results can be generalized to OHS sector in Finland where 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 frequent attender groups. Also, the use of medical records to define frequency of visits removes inaccuracy related to self-reported utilization.[43] 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 persistent FAs. 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 to use of OHS primary care. [15,31,32] Thus, we assume that these results received from the OHS primary care in Finland can be to some extent generalized to the working population using GP services in other countries.

However, this study is limited by 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 that 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.[15] Also, we cannot track the service use of the patients lost for follow-up. This might add inaccuracy to categorization of different frequent attender 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 conducted also 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 frequent attenders 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 [22] we analyzed 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 categorize FA's. 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 frequent attenders have higher odds for long and intermediate length absences, which suggests an elevated risk of future retirement due to disability. Frequent attenders should be identified in the working age population and sickness absences should be taken into account when planning frequent attender rehabilitation and interventions.

In future, a longer follow-up of sickness absences would be useful to see whether sickness absence rate eventually equalizes 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

The Authors declare that there is no conflict of interest.

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AUTHOR'S CONTRIBUTIONS

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

AVAILABILITY OF DATA AND MATERIAL

The data that support the findings of this study are available from Pihlajalinna 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 Pihlajalinna Työterveys.

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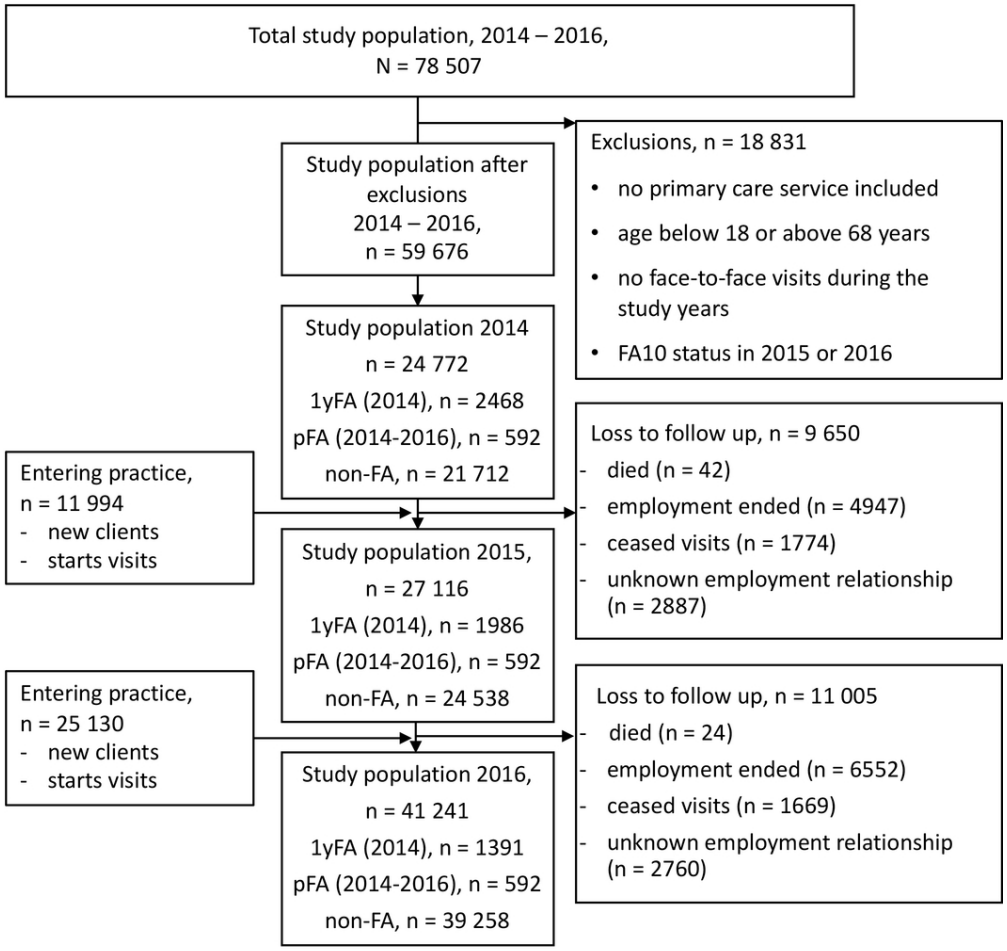
FIGURES

Figure 1. Flow of the study population



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1yFA = Patients that were in the top decile of attenders in 2014
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non-FA = Patients that were never in the top decile were considered as a reference group, non-frequent attenders

90x90mm (300 x 300 DPI)

STROBE Statement—checklist of items that should be included in reports of observational studies

	Item No.	Recommendation	Page No.
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	2
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3-4
Objectives	3	State specific objectives, including any prespecified hypotheses	4
Methods			
Study design	4	Present key elements of study design early in the paper	5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5-6
Participants	6	(*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up *Case-control study*—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls *Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants	5-6
		(*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed *Case-control study*—For matched studies, give matching criteria and the number of controls per case	5-6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	6
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	5-6
Bias	9	Describe any efforts to address potential sources of bias	5-6, 16
Study size	10	Explain how the study size was arrived at	5

Continued on next page

Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	5-6
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	6
		(*b*) Describe any methods used to examine subgroups and interactions	6
		(*c*) Explain how missing data were addressed	16-17
		(*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed *Case-control study*—If applicable, explain how matching of cases and controls was addressed *Cross-sectional study*—If applicable, describe analytical methods taking account of sampling strategy	16-17
		(*e*) Describe any sensitivity analyses	5, 16-17
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	5, 7, figure 1
		(b) Give reasons for non-participation at each stage	5, 7, figure 1
		(c) Consider use of a flow diagram	7, figure 1
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	7-8, 12
		(b) Indicate number of participants with missing data for each variable of interest	5
		(c) *Cohort study*—Summarise follow-up time (eg, average and total amount)	7
Outcome data	15*	*Cohort study*—Report numbers of outcome events or summary measures over time	7-9
		Case-control study—Report numbers in each exposure category, or summary measures of exposure	
		Cross-sectional study—Report numbers of outcome events or summary measures	
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	13-14
		(*b*) Report category boundaries when continuous variables were categorized	6
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A

Continued on next page

Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	9-10
Discussion			
Key results	18	Summarise key results with reference to study objectives	15
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	16-17
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	16-17
Generalisability	21	Discuss the generalisability (external validity) of the study results	17
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	17

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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

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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 create a substantial portion of primary care workload but little is known about frequent attenders' 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 categorized into occasional and persistent frequent attenders (FA) or non-frequent attenders (non-FA). Sick-leave episodes and their lengths were collected along with associated diagnostic codes. Logistic regression was used to analyze associations between FA status and sick-leaves of different lengths (1-3, 4-14 and 15 or more days).

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

Conclusion Both occasional and persistent frequent attenders 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.

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 OHS is larger than in the GP setting since patients can be lost due to an employment relationship that ends

INTRODUCTION

Frequent attendance is a costly and burdensome phenomenon for healthcare providers, society and patients. Patients, often referred to as frequent attenders (FA), visit healthcare units repeatedly and constitute a substantial portion of both physician's time and healthcare costs.[1,2] On the other hand, FAs appear to be a vulnerable group of patients that suffer from multimorbidity, medically unexplained symptoms and low quality of life.[3–5] For most patients frequent attendance is transient while a group of persistent FAs continue recurrent visits for extended periods of time.[2,6] Research indicates that persistent FAs often suffer from some combination of somatic, psychological and social problems and are prone to anxiety and worry more than transient FAs are.[3,6,7]

Frequent attenders 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. [8–11] The available research indicates that chronic disease and negative life events are predictive of long term sickness absence among one year FAs.[12] A Swedish study in GP setting showed that 19% of FA's versus 6% of non-FA's received a long term sickness absence or disability pension over 5 years' follow-up.[12] Also being on sick-leave or on disability pension increased the mean number of visits in GP setting and was associated with being a frequent attender.[10,13,14] 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 frequent attenders. There is little research on working age patients alone, and most research concerning working age patients is conducted in GP setting. OH primary care in Finland is an ideal place to study working age patients solely as OHs primary care is available to 90% of the working population and often used as the sole primary care provider. [15,16]

In Finland the proportion of time spent on disability pension is increasingly due to mental disorders, in particular depression.[17] In turn, musculoskeletal and mental disorders are the most common causes for long term sickness absences.[18,19] Both diagnostic groups are also associated with frequent attendance in the Nordic countries in a GP setting and in occupational health (OH) primary care. [20–22] Research shows that chronic illnesses that diminish work ability and symptoms related to work are associated with visiting OH primary care.[23] 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.[24] 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.[25–27] 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 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 programs on individuals at risk of sickness absences indicate both cost effectiveness and reduction in sickness absence days.[28–30] 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. Occupational health 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 [16]. 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 four patients having visited OHS named their OHS unit as their main primary care provider [31]. OHS primary care is often used as the sole primary care provider for the working population.[15] The role of the OHS units in primary care has increased in the past years [32] 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 specialized in occupational health. 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 the data was sent in pseudonymized 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 (i.e. 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.[2,14] We used visits to physicians, nurses, physiotherapists and psychologists to define frequent attenders and with our definition FA visited OH units 8 or more times yearly.[22] The general characteristics of FAs in OHS is described previously and we also made a secondary analysis of frequent attenders using only visits to the physician, which did not alter the results.[22] Patients being in the top decile in 2014 but not in any other study year were categorized as 1-year-FA (1yFA) representing occasional FA. Patients who were in the top decile during all three study years (2014−2016) were categorized as persistent-FA (pFA). 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-frequent attenders, non-FA). 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 categorized.

We divided the study population by sex and into four age categories (18−34, 35−44, 45−54, 55−68) for characterization. Employer industries were categorized according to Statistics Finland /Statistical Classification of economic activities in the European Community (TOL2008/Nace Rev.2). We analyzed sickness absences with different categorizations. First we divided sickness absence episodes into groups according to the length: no absence, short (1−3 d), intermediate (4−14 d) and long (15 d or more) absence.[33] In addition, we looked at the total number of sickness absence days per year with two different categorizations (0, 1−15 or more than 15 days per year and short (1−3 d) intermediate (4−14 d) and long (15 d or more)). [34] Additional analysis 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 analyze associations of the dependent variable FA-status (1yFA, pFA and non-FA) with the

independent variable (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 existence of cancer diagnosis (C00-C97). Odds ratios (OR) with 95% confidence intervals (CI) were determined. Statistical analyses were conducted in University of Tampere using IBM SPSS Statistics version 23. In all analyses P values less than 0.05 were considered statistically significant.

Ethical considerations

The National Institute of Health and Welfare (THL/556/5.05.OO/2016) and the ethics committee of Pirkanmaa Hospital District (ETL R16041) approved the study. According to Finnish legislation (Personal Data Act, Finland, 22.4.1999) individual consent was not needed as this is a large-scale register-based study where no single participant can be recognized.

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 pFA and 2468 1yFA in 2014. The latter group diminished due to 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 below shows descriptive statistics of 1yFA, pFA and non-FA during the study years. There were more women than men in both 1yFA and pFA 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, 70% or more received a sick-leave certificate from a physician during the study. In 2016 almost 70% of pFA and 30% of 1yFA had a sick-leave longer than 15 days while only 9% of non-FA had such a long absence.

[Insert Figure 1. Flow of the study population]

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

	2014, n = 24772			2015, n = 27116			2016, n = 41241		
	1yFA n = 2468	pFA n = 592	non-FA n = 21712	1yFA n = 1986	pFA n = 592	non-FA n = 24538	1yFA n = 1391	pFA n = 592	non-FA n = 39258
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Sex									
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)
Age									
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)
Absences									
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 Chi square -tests, p<0.001

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

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

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

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 5 to 6 sickness absence episodes yearly whereas the 1yFA group had a median of 4 sickness absence episodes in 2014, after which the frequency of episodes diminished. However, the frequency of sickness episodes remained higher among the 1yFA group than in the non-FA group two 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 1yFA, pFA and non-FA respectively. The median lengths for musculoskeletal disorders (M00−M99) among 1yFA, pFA and non-FA were 7, 5 and 5 days respectively (data not shown).

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 frequent attender 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

Kruskal-Wallis Test, *** = $p < 0.001$

av. = average, md = median

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

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

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.

Throughout the study years long sickness absences (15 or more 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 1yFA and 63% for pFA, while for the non-FA group the proportion was 46%.

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

	1yFA, n = 19 506						pFA, n = 10 117						non-FA, n = 74 176					
	1-3 days, n = 8597		4-14 days, n = 8261		15 or more days, n = 2648		1-3 days, n = 4732		4-14 days, n = 4357		15 or more days, n = 1028		1-3 days, n = 39 566		4-14 days, n = 28 243		15 or more days, n = 6367	
ICD-10	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	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)

ICD-10 = International Classification of Diseases, 10th edition

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

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

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 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, pFA and 1yFA did not differ significantly in their risk of any length sickness absence. However, in the following years pFA had higher odds (OR 3.73, 95% CI 2.49−5.60 in 2016) of a long sickness absence than 1yFA. These groups did not differ in their risk for intermediate length absences. Throughout the study years both 1yFA (OR 1.44, 95% CI 1.23−1.69 in 2016) and pFA (OR 2.08, 95% CI 1.39−3.10 in 2016) had higher risk for intermediate length absences than non-FA. This association was enhanced when studying long absences. In 2016 1yFA had higher odds (OR 2.95, 95% CI 2.50−3.49) for having a 15 or more days' absence than non-FA, as did pFA (OR 11.0, 95% CI 7.54−16.06).

One day of sickness absence in any of the study years increases the likelihood of being occasional of persistent FA only slightly and the results are insignificant when comparing 1yFA with pFA (table 5). As the number of sickness absence days increases, the association with FA status grows stronger. In table 6 can be seen characteristics associated with frequent attender status in sickness absences over 15 days. Female sex and morbidity (measured by number of different diagnoses given by a physician) were associated with frequent attender status in sickness absences over 15 days.

Table 4. Lengths of sickness absences associated with frequent attender status in multinomial logistic regression (adjusted for sex, age, field of industry, cancer dg (C00-C97) and number of different ICD10-diagnoses given by phycicians), 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 (2014)						
no sickness absence (0 days)	1.0		1.0		1.0	
short (1-3 days)	1.15	0.91 - 1.45	1.06	0.61 - 1.85	0.93	0.52 - 1.67
intermediate length (4-14 days)	2.34	1.96 - 2.80	2.33	1.55 - 3.51	1.00	0.65 - 1.53
long (15 or more days)	13.10	11.07 - 15.50	18.27	12.54 - 26.60	1.39	0.94 - 2.07
Sickness absences (2015)						
no sickness absence (0 days)	1.0		1.0		1.0	
short (1-3 days)	1.20	1.01 - 1.42	1.32	0.72 - 2.40	1.09	0.59 - 2.04
intermediate length (4-14 days)	1.89	1.64 - 2.17	2.92	1.87 - 4.57	1.55	0.97 - 2.46
long (15 or more days)	4.48	3.88 - 5.16	17.96	11.83 - 27.25	4.01	2.60 - 6.18
Sickness absences (2016)						
no sickness absence (0 days)	1.0		1.0		1.0	
short (1-3 days)	1.08	0.89 - 1.29	0.93	0.54 - 1.59	0.86	0.49 - 1.52
intermediate length (4-14 days)	1.44	1.23 - 1.69	2.08	1.39 - 3.10	1.44	0.94 - 2.20
long (15 or more days)	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

ICD-10 = International Classification of Diseases, 10th edition

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

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

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.

Table 5. Sickness absence associated with frequent attender status in multinomial logistic regression (adjusted for sex, age, field of industry, cancer dg (C00-C97) and number of different ICD10-diagnoses given by phycicians), n = 24 772−41241

	1yFA vs. non-FA		pFA vs. non-FA		pFA vs. 1yFA	
	OR	95 % CI	OR	95 % CI	OR	95 % CI
Sickness absences (2014)						
A single sickness absence day in 2014	1.02	1.02 - 1.02	1.02	1.02 - 1.02	1.00	0.99 - 1.00
Sickness absences (2015)						
A single sickness absence day in 2015	1.01	1.01 - 1.01	1.01	1.01 - 1.02	1.00	1.00 - 1.00
Sickness absences (2016)						
A single sickness absence day in 2016	1.01	1.01 - 1.01	1.02	1.02 - 1.02	1.01	1.01 - 1.01

OR = Odds ratio, CI = Confidence interval

ICD-10 = International Classification of Diseases, 10th edition

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

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

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.

Table 6. Sickness absences >15 days associated with frequent attender status in multinomial logistic regression model (adjusted for age, field of industry and cancer dg (C00-C97) and number of different ICD10- diagnoses given by phycicians), 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 (2014)						
Sex						
Male	1.0		1.0		1.0	
Female	1.52	1.28 - 1.82	1.76	1.33 - 2.31	1.15	0.88 - 1.50
Number of different ICD10-diagnoses given by phycicians	2.22	2.08 - 2.36	2.84	2.60 - 3.10	1.28	1.19 - 1.38
Sickness absences (2015)						
Sex						
Male	1.0		1.0		1.0	
Female	1.48	1.21 - 1.81	1.47	1.12 - 1.93	0.99	0.74 - 1.33
Number of different ICD10-diagnoses given by phycicians	1.71	1.58 - 1.84	2.93	2.67 - 3.22	1.71	1.57 - 1.88
Sickness absences (2016)						
Sex						
Male	1.0		1.0		1.0	
Female	1.18	0.91 - 1.53	1.59	1.19 - 2.12	1.34	0.95 - 1.91
Number of different ICD10-diagnoses given by phycicians	1.76	1.63 - 1.91	2.82	2.58 - 3.09	1.60	1.45 - 1.77

OR = Odds ratio, CI = Confidence interval, 1.0 = reference group

ICD-10 = International Classification of Diseases, 10th edition

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

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

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.

DISCUSSION

Our results indicate that persistent frequent attenders have more and longer sickness absence episodes than other users of OH primary care. However, occasional frequent attenders also have more and longer sickness absences than non-frequent attenders, not only in their year of frequent attendance, but also in the following two years. Both frequent attender groups are also associated with 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 disability pension in private sector employees. [27,34] In our study approximately 70% of persistent frequent attenders had a sickness absence >15 days yearly while for non-frequent attenders the proportion was a maximum of 10% through the study years. In 2014 almost two thirds of occasional frequent attenders had >15 days sickness absence and after two years follow up one third of occasional FA had >15 days of absence. Our results indicate that both persistent and occasional FA 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 FA than non-FA. The second largest group causing long absences was mental disorders for both occasional and persistent FA. 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. [35,36] 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.[37,38] As our study shows that these diagnostic groups are associated with sickness absences of both occasional and persistent frequent attenders, 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 persistent and occasional frequent attenders 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 frequent attenders should be a target group for interventions at all.[39] However, our results indicate that occasional frequent attenders' sickness absences are higher than 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 frequent attenders' risk of future absences, also persistent frequent attenders need attention. Persistent frequent attenders appear to be a 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 frequent attenders have been those based on in depth analysis of patient's reasons for attendance and accordingly selected actions.[40] 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.[38] Work ability/disability and work relatedness could be also worth considering when discussing frequent attenders. 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.[41,42]

Strengths and limitations

The strengths of this study are the large study population from an OHS provider including 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 generalization outside this particular service provider. The results can be generalized to OHS sector in Finland where 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 frequent attender groups. Also, the use of medical records to define frequency of visits removes inaccuracy related to self-reported utilization.[43] 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 persistent FAs. 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 to use of OHS primary care. [15,31,32] Thus, we assume that these results received from the OHS primary care in Finland can be to some extent generalized to the working population using GP services in other countries.

However, this study is limited by 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 that 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.[15] Also, we cannot track the service use of the patients lost for follow-up. This might add inaccuracy to categorization of different frequent attender 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 conducted also 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 frequent attenders 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 [22] we analyzed 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 categorize FA's. 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 frequent attenders have higher odds for long and intermediate length absences, which suggests an elevated risk of future retirement due to disability. Frequent attenders should be identified in the working age population and sickness absences should be taken into account when planning frequent attender rehabilitation and interventions.

In future, a longer follow-up of sickness absences would be useful to see whether sickness absence rate eventually equalizes 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

The Authors declare that there is no conflict of interest.

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AUTHOR'S CONTRIBUTIONS

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

AVAILABILITY OF DATA AND MATERIAL

The data that support the findings of this study are available from Pihlajalinna 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 Pihlajalinna Työterveys.

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FIGURES

Figure 1. Flow of the study population

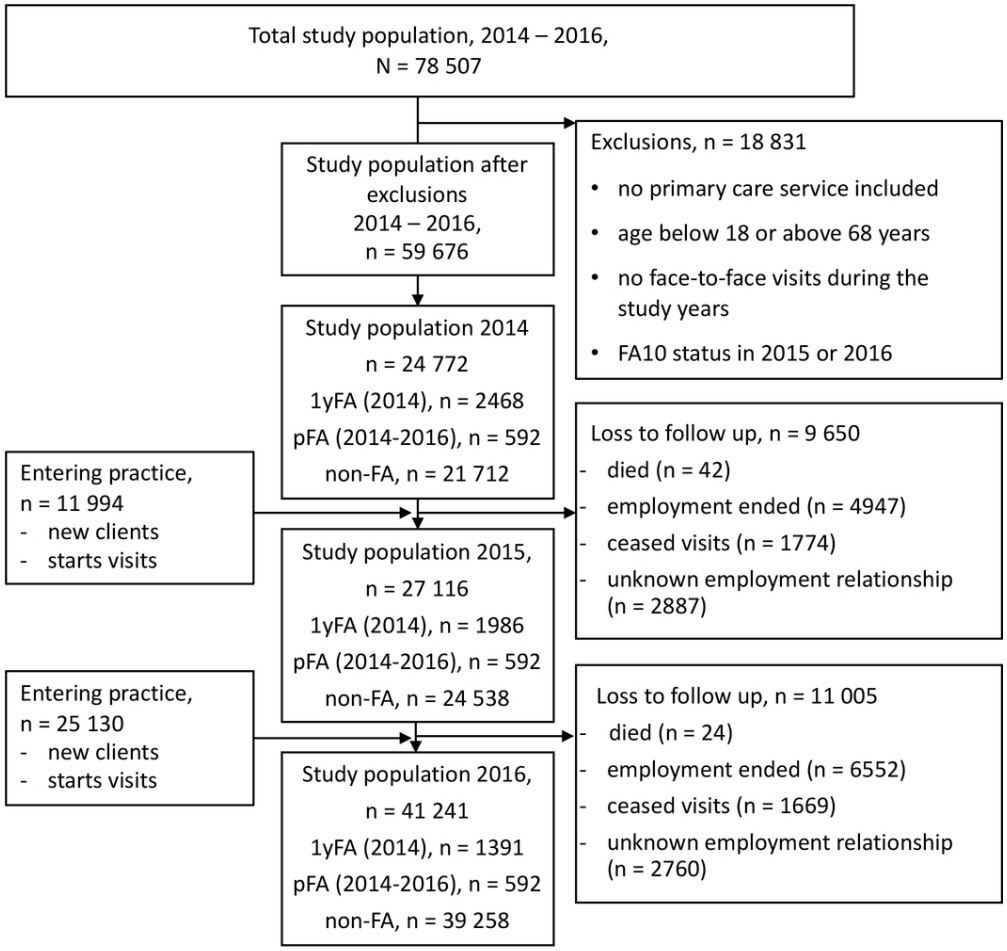

Figure 1. Flow of the study population
1yFA = Patients that were in the top decile of attenders in 2014
pFA = Patients that were in the top decile in all three study years (2014, 2015 and 2016)
non-FA = Patients that were never in the top decile were considered as a reference group, non-frequent attenders

90x90mm (300 x 300 DPI)

STROBE Statement—checklist of items that should be included in reports of observational studies

	Item No.	Recommendation	Page No.
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	2
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3-4
Objectives	3	State specific objectives, including any prespecified hypotheses	4
Methods			
Study design	4	Present key elements of study design early in the paper	5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5-6
Participants	6	(*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up *Case-control study*—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls *Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants	5-6
		(*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed *Case-control study*—For matched studies, give matching criteria and the number of controls per case	5-6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	6
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	5-6
Bias	9	Describe any efforts to address potential sources of bias	5-6, 16
Study size	10	Explain how the study size was arrived at	5

Continued on next page

Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	5-6
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	6
		(*b*) Describe any methods used to examine subgroups and interactions	6
		(*c*) Explain how missing data were addressed	16-17
		(*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed *Case-control study*—If applicable, explain how matching of cases and controls was addressed *Cross-sectional study*—If applicable, describe analytical methods taking account of sampling strategy	16-17
		(*e*) Describe any sensitivity analyses	5, 16-17
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	5, 7, figure 1
		(b) Give reasons for non-participation at each stage	5, 7, figure 1
		(c) Consider use of a flow diagram	7, figure 1
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	7-8, 12
		(b) Indicate number of participants with missing data for each variable of interest	5
		(c) *Cohort study*—Summarise follow-up time (eg, average and total amount)	7
Outcome data	15*	*Cohort study*—Report numbers of outcome events or summary measures over time	7-9
		Case-control study—Report numbers in each exposure category, or summary measures of exposure	
		Cross-sectional study—Report numbers of outcome events or summary measures	
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	13-14
		(*b*) Report category boundaries when continuous variables were categorized	6
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N/A

Continued on next page

Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	9-10
Discussion			
Key results	18	Summarise key results with reference to study objectives	15
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	16-17
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	16-17
Generalisability	21	Discuss the generalisability (external validity) of the study results	17
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	17

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.