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RESEARCH ARTICLE



## The profiles of health care utilization among a non-depressed population and patients with depressive symptoms with and without clinical depression

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### ABSTRACT

**Objective:** To examine health service (HS) utilization profiles among a non-depressive population and patients with depressive symptoms (DS) with and without clinical depression.

**Design, subjects and setting:** The study population was based on primary care patients with DS scoring  $\geq 10$  in the 21-item Beck Depression Inventory (BDI) and who were at least 35 years old and had been referred to depression nurse case managers ( $n = 705$ ). Their psychiatric diagnosis was confirmed with the Mini-International Neuropsychiatric Interview (M.I.N.I.). Of these patients, 447 had clinical depression. The number of patients with DS without clinical depression was 258. The control group consisted of a random sample of 414 residents with a BDI score  $< 10$ . Use of HS (visits and phone calls to a doctor and a nurse) was based on patient records.

**Main outcome measures:** Number of visits and calls to physicians and nurses.

**Results:** Patients with DS regardless of their depression diagnosis used primary health care (PHC) services three times more than the controls ( $p < 0.001$ ). In the secondary care, the differences were smaller but significant. Of the controls, 70% had 0–4 HS contacts per year whereas a majority of the patients having DS had more than 5 contacts per year. The number of contacts correlated with the BDI from a score of 0 to 10 but not as clearly in the higher scores.

**Conclusion:** Depressive symptoms, both with or without clinical depression, are associated with increased HS use, especially in PHC. This study suggests that even mild depressive symptoms are associated with an increased use of HS.

### KEY POINTS

- We analyzed the health service (HS) use among primary health care patients screened for depression and non-depressive population.
- Screen positive patients without clinical depression used as much HS as those having clinical depression.
- Regardless of depression diagnosis, screen positive patients visited a GP and nurse three times more often than the control population.
- In the screen negative control population, milder depressive symptoms were correlated with the use of HS.
- Primary health care was responsible for most of the HS use among patients having depressive symptoms.

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### KEYWORDS

Primary health care; depression; depressive symptoms; health services; public health

## Background

Depression and depressive symptoms (DS) are common in primary health care (PHC) but are not usually recorded as the primary reason for a visit [1]. About 10% of Finnish PHC patients suffer from clinical depression and about 10% display milder depressive

symptoms (DS) than those seen in clinical depression [2]. Depressive disorders were the most common mental disorder (7.4%) in the Finnish general population in Health 2011 Study [3]. From an economical point of view depression is the most significant cause of sick leaves (about 25%) and disability retirement (about

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50%) in Finland [4]. Globally, major depressive disorder (MDD) is the second leading cause of years lived with disability (YLD) worldwide, and MDD together with dysthymia causes 9.4% of YLDs [5].

Depression is often related to other somatic diseases and risk factors [6]. For example, people with metabolic syndrome are more likely to have depression than those without it [7,8]. Depression increases the risk of type 2 diabetes and cardiovascular diseases [6,9,10].

Depression and anxiety disorders increase the use of health services (HS) [11–13]. The use of HS among depressed people may be up to 3 times higher than among non depressed people [13,14]. Depression is linked to an increased use of HS as such [15,16] but also increases the use of HS primarily due to other reasons, e.g. among people with excess weight, diabetes or cardiovascular diseases [6,17,18].

Depression is related to the increased use of HS. However, we do not know the profiles of HS use specifically in the PHC patients screened for depressive symptoms. In the present study our aim was to define health service utilization profiles among primary care patients with elevated level of DS, with patients having clinical depression, and among a population without DS or depression.

## Material/methods

The data of the present study are based on the Finnish Depression and Metabolic Syndrome in Adults (FDMSA) (2009–2011) study and its 5-year follow-up (2012–2016) study [19]. These studies were conducted in municipalities within the Central Finland Hospital District in Finland with a catchment area of 274,000 inhabitants. The study population was based on patients with depressive symptoms (DS) score  $\geq 10$  in the 21-item Beck Depression Inventory (BDI) [20,21] who were at least 35 years old and had been referred to depression nurse case managers ( $n=705$ ) by themselves or by general practitioners. Enrolment was based on written and oral patient information, and written consent was obtained before any study procedures.

At the baseline, all the participants filled out a standard questionnaire containing questions about somatic disorders diagnosed previously and use of long-term medication. Medication were Anatomical Therapeutic Chemical (ATC) classified and grouped by the indication [22]. Data regarding smoking habits were collected by asking smoking years and cigarettes per day/non-smoking. Here we report the proportion of current smoking. Use of alcohol was reported as

number of drinks (12g of alcohol) per week. Physical activity was reported as number of  $>30$  min exercise sessions per week. Information on education, working status and income was based on a structured questionnaire. The participants completed the 21-item BDI to measure the severity of their depressive symptoms and the psychiatric diagnosis was confirmed with a Mini-International Neuropsychiatric Interview, which can be used to diagnose both single and recurrent episodes of depression and other psychiatric disorders according to the DSM-IV criteria (M.I.N.I.; [23]) conducted by a trained study nurse [19]. The M.I.N.I. training included the key elements of the diagnostic interview and rating conventions and instructions. The training was conducted by an experienced psychiatrist simultaneously for all the depression nurse case managers and also included case examples, promoting good interrater reliability.

Random sampling was used to form a control group of 414 middle-aged ( $\geq 35$  years) residents in the participating municipalities with a BDI score of  $< 10$  who participated in the same health evaluation. Contemporaneously with the patient recruitment in 2008–2009, an age, sex, and community-stratified random sample typifying the population in the study region was taken by Statistics Finland [24]. The control group had no psychiatric diagnoses or current depressive symptoms and used no psychoactive medication.

Baseline fasting blood samples including glucose and lipid levels were drawn between 8:00 and 11:00 h after 12 h of fasting. A physical examination included weight, height, waist circumference, and blood pressure taken on the same study visit. Height and weight were measured in light clothing to the nearest 0.5 cm and 0.1 kg, respectively. Waist circumference was measured to the nearest 1.0 cm at the midpoint between the lateral iliac crest and lowest rib. Trained nurses measured blood pressure twice with a mercury sphygmomanometer with the subject in a sitting position after a 15-min rest.

Use of HS in both PHC and secondary care, including visits and phone calls to a general practitioner (GP) in PHC, specialised physician in secondary care, or nurse were collected by two research nurses from the participant's medical records over a 5-year period and calculated as person years. Secondary care denoted hospital-based inpatient or outpatient care.

## Statistical analysis

Statistical comparisons between groups were done using analysis of variance (ANOVA), the Kruskal-Wallis

test and a chi-square test. As the data on visits and calls were highly skewed, bias-corrected and accelerated bootstrap estimation (10,000 replications) were used to derive 95% confidence intervals, and differences between means were tested by bootstrap-type ANOVA. A possible nonlinear relationship between all the contacts and the BDI was assessed by using a 5-knot-restricted cubic spline Poisson regression model [25]. This model was adjusted using two propensity score-based techniques, stratification and weighting (MMWS, marginal mean weighting through stratification) [26]. MMWS is an extension of propensity score matching that combines propensity score stratification and the inverse probability of treatment weighting to reduce selection bias, removing imbalances of characteristics between two or more groups under study. The normality of the variables was tested with the Shapiro–WilkW test. The Stata 15.0 (StataCorp LP; College Station, Texas, USA) statistical package was used for the analysis.

## Results

Clinical depression was confirmed in 447 patients of the 705 participants, scoring more than 9 in the BDI. The number of patients with DS without clinical depression was 258 (36.6%).

The proportion of females varied from 60 to 74% in all three subgroups (Table 1). The subjects with depression were 2 years younger than those with DS without clinical depression and the controls. The patients with depression had fewer years of education. The largest group of unemployed participants was in the clinical depression subgroup; 24%. In the control group the majority (57%) had an income of more than 40,000€ per year, while in the DS without clinical depression group (69%) and the clinical depression group the majority (71%) earned less than that.

The clinical depression people smoked more heavily than those in the other subgroups, but there were no significant differences in alcohol consumption between the subgroups. Compared with patients having clinical depression, leisure time physical activity was higher among the controls and the patients with DS but no clinical depression. Female waist circumference was higher among the clinical depression patients. The clinical depression patients had diabetes more often than the others. There were no differences in the number of cardiovascular diseases and pulmonary diseases between the subgroups. The clinical depression patients used significantly more analgesics, sedatives, cardiovascular and diabetes medication.

All the patients with DS used PHC services (GP visits and GP and nurse calls) three times more than the controls ( $p < 0.001$ , adjusted with a propensity score including age, sex, education, BMI, smoking, alcohol use, physical activity, and use of long-term medication) (Figure 1). There was no difference between patients with or without clinical depression. The corresponding difference in nurse visits was as much as four times higher compared with controls. Respectively, in the use of secondary care there were significant albeit absolutely smaller differences in physician and nurse visits ( $p < 0.001$ ) and physician calls (clinical depression compared with controls,  $p = 0.017$ ; DS without depression compared with controls,  $p < 0.012$ ) and nurse calls (clinical depression compared with controls,  $p = 0.002$ ; DS without depression compared with controls,  $p = 0.003$ ).

Cumulative visits to health care providers during the 5-year period are presented in Figure 2. The majority (70%) of the controls had 0–4 HS contacts per year, whereas the majority of the patients having DS with or without clinical depression contacted HS more than 4 times a year.

Figure 3 shows the number of all contacts per year in the combined data including all the subjects. HS use increased steeply as the BDI score increased from 0 to 10 (among controls) but did not increase markedly with higher scores (regardless of depression diagnosis).

## Discussion

The novel finding in our primary care setting study was that profiles and amount of health service (HS) use were, in general, similar among people with depressive symptoms (DS) without clinical depression and those fulfilling the diagnostic criteria. The novelty of this study is that it takes into account all the patient contacts to primary health care (PHC) and to secondary care calculated from the participant's medical records over a 5-year period for any reason. Especially in PHC, where a GP and nurse often collaborate, both DS groups visited a GP and nurse substantially more often than the controls. In addition, the present results indicated that among people classified as screen-negative for depression (BDI score 0–9) the utilization of HS was correlated with the BDI score. In contrast, among screen-positive patients the utilization was not clearly associated with the BDI score.

Depressed persons very commonly have somatic co-morbidity varying from 47%–84% [1,14]. On one hand, people with different somatic disorders have

**Table 1.** Characteristics of the study population; controls and patients with depressive symptoms without depression and with a depression diagnosis.

	Controls	Depressive symptoms (BDI $\geq$ 10)		<i>p</i> Value
	<i>N</i> = 414	Without depression <i>N</i> = 258	Depression <i>N</i> = 447	
Female, <i>n</i> (%)	247 (60)	191 (74)	312 (70)	<0.001
Age, years, mean (SD)	53 (10)	53 (11)	51 (10)	<0.001
Education years, mean (SD)	12.0 (3.4)	11.0 (3.3)	11.0 (3.0)	<0.001
Working Status, <i>n</i> (%)				<0.001
Working	262 (63)	127 (49)	205 (46)	
Unemployed	31 (7)	44 (17)	108 (24)	
Retired	121 (29)	87 (34)	134 (30)	
Income, <i>n</i> (%)				<0.001
<20,000 €	70 (17)	76 (29)	168 (38)	
20,000–39,000 €	110 (27)	103 (40)	149 (33)	
40,000–59,000 €	120 (29)	57 (22)	92 (21)	
$\geq$ 60,000 €	114 (28)	22 (9)	38 (8)	
Body Mass Index, kg/m <sup>2</sup> , mean (SD)	26.8 (4.6)	27.9 (5.9)	28.0 (5.9)	0.001
Waist, cm, mean (SD)				
Women	88 (13)	91 (15)	93 (15)	<0.001
Men	97 (12)	98 (12)	99 (13)	0.29
Smoking, <i>n</i> (%)	69 (17)	58 (22)	142 (32)	<0.001
Alcohol use dose, <i>n</i> (%)				0.014
0	65 (16)	61 (24)	106 (24)	
1–5	234 (57)	144 (56)	240 (54)	
$\geq$ 6	115 (28)	53 (21)	101 (23)	
Leisure time physical activity, <i>n</i> (%)				<0.001
Low	49 (12)	43 (17)	109 (25)	
Moderate	183 (44)	123 (48)	180 (41)	
High	181 (44)	90 (35)	150 (34)	
BP, mmHg, mean (SD)				
Systolic	129 (16)	130 (16)	131 (16)	0.23
Diastolic	81 (10)	81 (10)	82 (11)	0.35
Blood glucose, mmol/l, mean (SD)	5.68 (1.01)	5.65 (0.87)	5.88 (1.45)	0.026
Total cholesterol, mmol/l, mean (SD)	5.04 (0.88)	5.12 (0.96)	5.09 (1.02)	0.54
LDL, mmol/l, mean (SD)	3.10 (0.82)	3.11 (0.84)	3.05 (0.93)	0.67
HDL, mmol/l, mean (SD)	1.57 (0.42)	1.57 (0.45)	1.57 (0.48)	0.99
Triglyceride, mmol/l, mean (SD)	1.20 (0.65)	1.38 (1.64)	1.38 (0.85)	0.002
Chronic conditions, <i>n</i> (%)				
Hypertension	96 (23)	73 (28)	133 (30)	0.082
Coronary artery disease	12 (3)	16 (6)	21 (5)	0.12
Coronary thrombosis	4 (1)	2 (1)	7 (2)	0.63
Stroke	7 (2)	4 (2)	7 (2)	0.99
Diabetes mellitus	18 (4)	24 (9)	64 (14)	<0.001
Asthma	41 (10)	35 (14)	57 (13)	0.27
Medication, <i>n</i> (%)				
Analgesics	34 (8)	68 (26)	146 (33)	<0.001
Sedative	11 (3)	42 (16)	110 (25)	<0.001
Cardiovascular	102 (25)	88 (34)	165 (37)	<0.001
Lipid lowering	68 (16)	49 (19)	97 (22)	0.14
Diabetes medication	17 (4)	24 (9)	51 (11)	<0.001
Pulmonary	33 (8)	34 (13)	58 (13)	0.034

BDI: Beck Depression Inventory; *n*: number; %: percentage; SD: standard deviation; BP: blood pressure; LDL: low-density lipoprotein; HDL: high-density lipoprotein.

psychiatric disorders more frequently than those without any somatic disorder [6]. Our study is in concordance with these previous findings. In the present study, the depressed patients had less physical activity, they had more diabetes, their blood glucose was higher, and women's waist circumference was larger. They also used more analgesics, sedatives, cardiovascular, and diabetes medication, all of which may contribute to increased HS use.

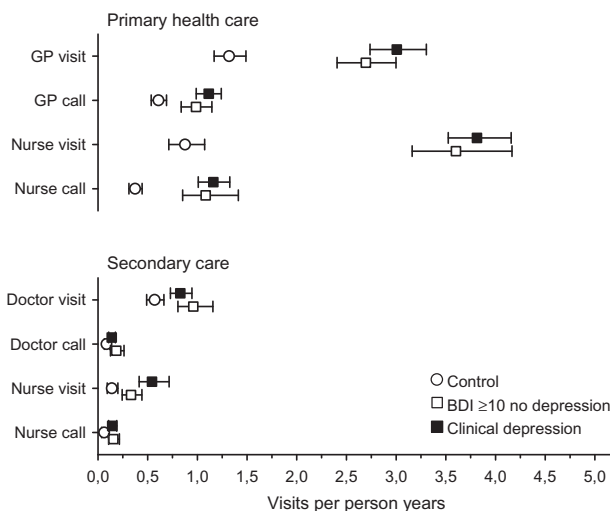
Depression is estimated to be undertreated in one-fourth to one-third of all patients [14]. This may largely be due to failed recognition of depression among

patients and their GPs [12,14]. It is much more common to present somatic symptoms and seek help for them instead of for melancholy or other mental symptoms [1,14,15,27,28]. Depression often presents with somatic symptoms especially in older age [15,16]. In an earlier Finnish primary care-based study including patients with depression and DS without clinical depression, only a few patients presented depression or low mood as the reason for their visit [2]. On one hand, only 12% of MDD patients had no somatic or psychiatric co-morbidity [1]. A differential diagnosis of somatic symptoms is often very challenging in PHC [1]. Furthermore,

depression increases one's worry about somatic problems [15] and may be related to a decreased ability to adapt to chronic diseases and pain [6], which may increase HS contacts for that reason. Respectively, patients with a physical illness have more mental health problems that are often unrecognized [12].

Besides depression, anxiety and distress, too, can lead to increased HS use [11,14]. Although often unrecognized, depression may be a better recognised disorder than anxiety [11]. In general, we assume that in clinical practice even after screening for depression, anxiety and other mental disturbance may remain unrecognized and can explain the increase in HS visits in the DS group. In the present study, the patients with a confirmed diagnosis of depression were provided treatment and follow-up, possibly resulting in more planned use of services. If anxiety or other mental problems besides depression are not identified, the treatment may not be adequately planned, either. This may result in a continued search for help for various reasons and symptoms. Once depression is identified, HS visits may become more systematic and may even result in decreased HS use compared with the time before the diagnosis. This may explain the similar HS use in the patients with clinical depression and those having DS without clinical depression.

More than five visits to HS per year seems to increase the risk of anxiety [28]. In our study the majority of the controls (70%) visited HS 0–4 times per year, while among those having DS the majority visited at least 5 times per year. The Finnish national guideline recommends making a treatment plan for



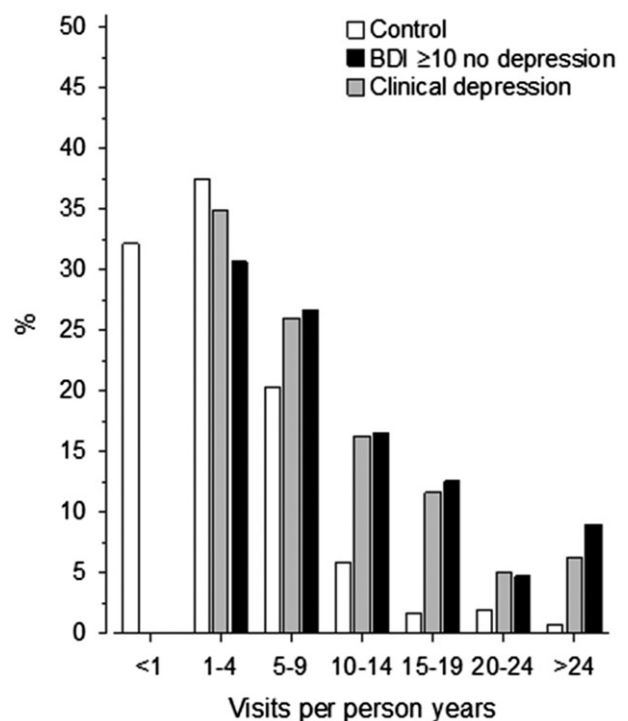
**Figure 1.** Crude numbers of health care contacts to primary health care and secondary care (per person years). GP: general practitioner. BDI: Beck Depression Inventory.

patients visiting HS more than 5 times per year [29]. Based on the present findings, this recommendation seems to be justified.

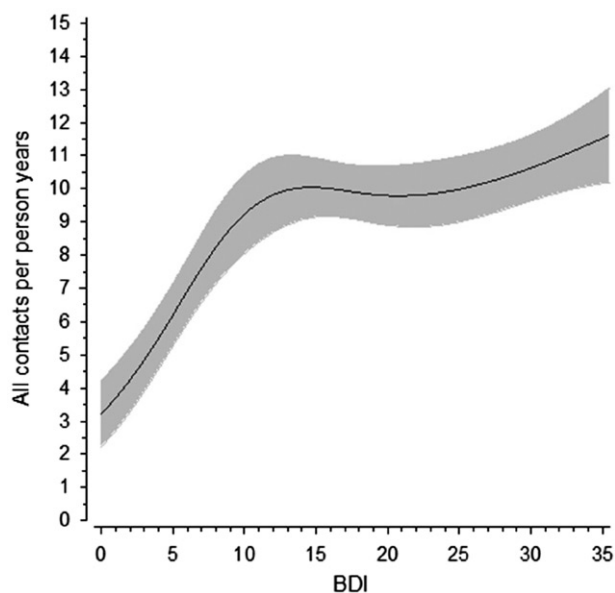
In our study, the use of HS correlated with the BDI score, especially in the controls scoring less than 10 in the BDI. This finding suggests that even less serious depressive symptoms may result in an increased number of HS contacts. In the present study, we were not able to assess the predictive importance of these milder symptoms regarding a new onset of depression or other mental diseases. In patients with DS (with a BDI score of at least 10) the use of health care services did not increase clearly with the BDI score. This finding supports the use of a cut-off point of 9/10 for the BDI, as has been used in several previous studies [19–21].

### Strengths and weaknesses

Our study population was geographically representative. The subjects were adequately screened for depressive symptoms with the BDI-21 and diagnosed with the M.I.N.I. diagnostic interview by trained study nurses. The study population represented PHC patients well. We were able to assess the use of PHC services and secondary care services. In addition to physicians, we were able to calculate visits to nurses. This is important because in Finland nurses play a significant role in carrying out treatment together with



**Figure 2.** All contacts (per person years) among the subjects with depressive symptoms with and without depression and among the controls. BDI: Beck Depression Inventory.



**Figure 3.** Relationships of all contacts per person years as a function of the BDI score. The curves were derived from a 5-knot-restricted cubic splines Poisson regression model. The model was adjusted using a propensity score approach (MMWS, marginal mean weighting through stratification) (gender, age, years of education, BMI, smoking, alcohol use, leisure-time physical activity, and medication). The gray area represents 95% confidence intervals. BDI: Beck Depression Inventory.

doctors. Nurses share a large share of patients' calls and visits with GPs, especially in PHC. Furthermore, the assessment of HS use was based on patient records with a follow-up of several years.

This study also has some limitations. It did not represent the population under 35-years of age. Therefore, these results cannot be generalized to younger people. Another limitation is that we didn't know the duration of symptoms before the study.

### Conclusions and implications

This study revealed similarly higher HS use among patients with DS with and without clinical depression compared with the control subjects. Among screen-negative population-based control subjects the sum of depressive symptoms was positively correlated with the use of HS, suggesting that even milder depressive symptoms may predict HS use. Compared with the number of physician and nurse visits in the secondary care, the large number of GP and nurse visits indicates that PHC plays the most important role in the increased HS use burden related to depression. In PHC, adequate resources and support are needed to screen, diagnose, and manage patients with mental symptoms.

### Ethical approval

The study protocol was approved by the Ethics Committee of Central Finland Hospital District.

### Disclosure statement

No potential conflict of interest was reported by the authors.

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