SCANDINAVIAN JOURNAL OF PRIMARY HEALTH CARE, 2016
VOL. 34, NO. 3, 240–249
http://dx.doi.org/10.1080/02813432.2016.1207141

Taylor & Francis
Taylor & Francis Group

RESEARCH ARTICLE

OPEN ACCESS

Determinants related to gender differences in general practice utilization: Danish Diet, Cancer and Health Cohort

Jeanette Therming Jørgensen[a], John Sahl Andersen[b], Anne Tjønneland[c] and Zorana Jovanovic Andersen[a]

[a]Centre for Epidemiology and Screening, Department of Public Health, University of Copenhagen, Copenhagen, Denmark; [b]Section of General Practice, Department of Public Health, University of Copenhagen, Copenhagen, Denmark; [c]Danish Centre for Cancer Research, Danish Cancer Society, Copenhagen, Denmark

ABSTRACT

Objective: This study aims to describe the determinants related to gender differences in the GP utilization in Danish population aged 50–65 years.
Design: Cohort-based cross-sectional study.
Setting: Danish general practice.
Subjects: Totally, 54,849 participants of the Danish Diet, Cancer and Health cohort (50–65 years).
Main outcome measures: The sum of cohort members' face-to-face consultations with general practitioner (GP) at the cohort baseline year (1993–1997). We obtained data on GP visits from the Danish National Health Service Register at the cohort baseline (1993–1997), when information on lifestyle (smoking, body mass index (BMI), alcohol use, physical activity), medical conditions (somatic and mental), employment, education, gravidity, and hormone therapy (HT) use was collected by questionnaire.
Results: Women had on average 4.1 and men 2.8 consultations per year. In a crude model, women had 47% higher rate of GP visits than men (incidence rate ratio: 1.47; 95% Confidence Interval: 1.45–1.50), which remained unchanged after adjustment for lifestyle, socio-demographic and medical factors, but attenuated to 18% (1.18; 1.13–1.24) after adjustment for female factors (gravidity and post-menopausal HT. In a fully adjusted model, subjects with hypertension (1.63; 1.59–1.67), mental illness (1.63; 1.61–1.66), diabetes (1.56; 1.47–1.65), angina pectoris (1.28; 1.21–1.34), and unemployed persons (1.19; 1.18–1.21) had highest rates of GP visits.
Conclusions: Gravidity and HT use explain a large proportion, but not all of the gender difference in GP utilization. Medical conditions (somatic and mental) and unemployment are the main determinants of GP utilization in men and women, while lifestyle has minor effect.

KEY POINTS

- Female gender remained a dominant determinant of GP utilization, after adjustment for lifestyle, socio-demography, medical and gender specific factors, with females consulting their GP 18% more often than males.
- Female reproductive factors (use of postmenopausal hormone therapy and gravidity) explained a large proportion of the gender variation in use of GP.
- Strongest determinants for GP use among Danish adults aged 50–65 years were the presence of medical conditions (somatic and mental) and unemployment, while lifestyle factors (e.g., body mass index, alcohol consumption and smoking) had minor effect.

ARTICLE HISTORY
Received 2 October 2015
Accepted 4 April 2016

KEYWORDS
Cohort; Denmark; gender; general practice; health service use; lifestyle; unemployment

Introduction

Knowledge about determinants of health care utilization is essential in the daily clinical work and planning of a health care system, in order to efficiently meet the needs of the population. General practice is characterized by free access and nonselected patients, resulting in a broad spectrum of services provided and a variety of reasons for encounters. The background for the utilization of services in the primary health care system is of interest to the general practitioners (GPs) and for public health in general. Existing studies on utilization of Danish GPs focused primarily on equity in access to health care or frequent attenders.[1,2] Although it is well documented that women contact GP more often

CONTACT Jeanette Therming Jørgensen jethe@sund.ku.dk Centre for Epidemiology and Screening, Department of Public Health, University of Copenhagen, Copenhagen, Nørregade 10, 1165 København, Denmark

Supplemental data for this article can be accessed here.

than men, little is known about the determinants of this difference. Vedsted et al. reported that women utilized GPs 47% more often than men,[3] but did not have data to examine whether lifestyle and gender-specific factors (reproductive-related contacts, gravidity and use of post-menopausal hormone therapy (HT)) explained difference. Krasnik et al. found that gender and health characteristics, especially functional status and chronic diseases, are most important determinants of GP use in Denmark, whereas social factors had very little impact, but lacked data on gender-specific factors.[1]

Musculoskeletal, psychological, and respiratory problems have been identified by Moth et al. as the most common reasons for encounter in Danish primary care during the period of 1993–2009, but also lacked information on gender-specific factors.[4]

Green et al. investigated gender differences in medical care utilization in the United States (all health services contacts) and found that the gender differences persisted but were reduced when controlling for gender-specific utilization,[5] however the effect on GP contacts alone has not yet been quantified. Furthermore, Green et al. identified attitudinal and behavioral factors as important predictors of medical care utilization, whereas health knowledge did not affect health care utilization.[5] Evidence on the effect of lifestyle factors on GP utilization is conflicting. Body mass index (BMI) has previously been linked to increased GP use, whereas other lifestyle factors such as diet, physical activity, smoking and alcohol consumption did not influence attendance rates in the Dutch population.[6] This contradicts results from another Dutch study examining risk behaviors and use of GP services related to gender,[7] where no association between BMI and GP use was found. Finally, Vos et al. reported lower GP attendance rate among smoking men compared to nonsmoking men, and the reverse association in women.[7]

A large body of literature examined determinants of frequent attendance to GP, defined typically as the age- and gender-stratified top 10th percentile of GP attenders,[2,8–10] and identified social factors (unemployment, divorce, low education, and social support), psychological distress, and physical diseases as main determinants.[7] Results from a Dutch study showed that age, chronic illness, psychosocial problems, and analgesics prescriptions, moderately predicted persistent frequent attendance, whereas gender, medically unexplained symptoms, use of psychoactive drugs and prescription of antibiotics did not affect frequent attendance.[11]

Additionally, Koskela et al. identified female gender, obesity (BMI $>30\,kg/m^2$), former frequent attendance, fear of death, alcohol abstinence, low patient satisfaction and irritable bowel syndrome as determinants of persistent frequent attendance.[12] Gupta and Greve found that overweight and obesity's effect on GP use in Denmark affected GP use among frequent users only,[13] suggesting variation in characteristics and underlying the mechanism between use of GP among frequent attenders and the general population.

The aim of this study was to examine the determinants related to gender differences in use of GP in Danish population aged 50–65 years. Furthermore, we specifically examined whether gender differences in GP utilization persisted when adjusting for lifestyle, marital, occupational and educational status, urbanization, pre-existing diseases (somatic and mental), and female-specific factors (gravidity and HT use).

Materials and Methods

Study population

We have linked data on 57,053 participants of the Danish Diet, Cancer, and Health (DCH) cohort to the Danish National Health Service Register (NHSR) to obtain data on GP visits. The study was conducted as a cohort-based cross-sectional study, where information on GP contacts and confounder information were collected within the same year, at cohort baseline in 1993–1997.

Danish National Health Service Register

NHSR is a nationwide register containing information on all contacts within primary health care in Denmark.[14] The register was established for administrative purposes in 1984, and data has been available for research purposes since 1990.[14,15] In addition to citizen-related data, records in NHSR contain information on the health care provider and the type of service provided (e.g., telephone consultation, home-visit, face-to-face visit, preventive consultation). Reasons for encounter or information on specific health problems is only available through NHSR to a limited extent, in terms of services codes (e.g., prescription renewal, additional services codes), and no diagnoses are available. GP visits in this study were defined as sum of all face-to-face contacts at the year of cohort baseline (1993–1997) including consultations at GPs office and home-visits during opening hours, while telephone consultations and prescription renewals were excluded. Furthermore, information on cohort members visits to psychologist and psychiatrists within primary health sector before cohort baseline and at baseline year

(since 1990) was obtained from NHSR and used as an indicator of pre-existing mental disorders.

Danish Diet, Cancer, and Health Cohort

The DCH cohort, described in detail elsewhere,[16] is part of the European Prospective Investigation into Cancer and Nutrition study (EPIC) and used widely for the research into lifestyle factors, with focus on diet, and the risk of cancer and other chronic diseases. Briefly, in 1993–1997 a total of 160,725 individuals, aged between 50 and 64, born in Denmark, living in Copenhagen or Aarhus, and with no previous records in the Danish Cancer Registry,[17] were invited to participate in the DCH cohort study, and 57,053 individuals responded and participated in the study. Cohort participation involved answering comprehensive questionnaires and interviews concerning dietary intake and lifestyle factors that are known and potential risk factors in the development of cancer. Additionally, anthropometric measurements were taken during a physical examination and various biological materials were collected. Due to large cohort sample size and extensive data collection (e.g., biological material, anthropometric measurements, etc.) participants' baseline information was collected over several years (1993–1997). The following potential determinants of GP contact were obtained from the DCH cohort: gender, age, weight, height, alcohol consumption, smoking status, leisure time physical activity, marital status, occupational status, educational status, urbanization, pre-existing somatic diseases, history of cancer in the family, previous or current use of HT, number of pregnancies. Information on pre-existing mental disease was obtained from the NHSR as described above. Age refers to the participants' age at the date of the physical examination, and a part from age, gender, weight, height and urbanization, all other variables collected from DCH cohort are self-reported. Urbanization was dichotomized into urban (Copenhagen, Frederiksberg or Aarhus municipality) and suburban (remaining suburban municipalities around Copenhagen and Aarhus). The self-reported daily alcohol intake in grams was dichotomized (below the recommended limit and above the recommended limit), according to Danish Health and Medicines Authority's recommendation on weekly alcohol consumption (females: 168 g, male: 252 g) at the time of cohort baseline. Prevalence of pre-existing diseases was estimated based on participants reporting either being diagnosed with heart attack, high cholesterol, angina pectoris, stroke, hypertension, diabetes, gallstones and intestinal polyps or self-reported use of medication to treat before-mentioned diseases. Information on occupational status was constructed based on self-reported levels of physical activity at work. Participants classified themselves according to four different work categories or as "have not been working the past year", representing unemployed and individuals outside labor force. Thus, in this study definition "unemployed" implies both unemployed and individuals not in labor force.

Statistical analysis

We used negative binomial regression model to examine association between total number of GP visits at the year of cohort baseline and abovementioned covariates, in five separate models: (1) Model 1, a crude model; (2) Model 2, a model adjusted for age, gender and lifestyle factors (BMI, alcohol consumption, smoking, physical activity); (3) Model 3, a model adjusted for age, gender, lifestyle and social factors (marital and occupational status, education, and urbanization); (4) Model 4, a model adjusted for age, gender, lifestyle, social and medical factors (pre-existing diseases and history of cancer in the family); (5) Model 5, a fully adjusted model, adjusted for age, gender, lifestyle factors, social factors, medical factors and female-specific factors (gravidity, previous or current use of HT). Additionally, separate Models 1 and 5 were fit for men and women separately. Interaction terms between gender and all other covariates were introduced in fully adjusted model one at a time, to test potential effect modification. All analyses were performed as complete-subjects-analysis. As sensitivity analyses, two additional models were fitted using alternative outcome including GP visits in "near" future: participants' number of visits 1 year after baseline (1994–1998) and in 5 years post-baseline (1998–2002). Results are available in online supplement (Table A). Results are presented as incidence rate ratio (IRR) with 95% confidence intervals (95%CI). Negative binomial regression procedures (GENMOD) in SAS 3.9 (Copenhagen, Denmark) were used to conduct the analyses.

Results

Of the 57,053 DCH cohort participants, 571 were excluded due to cancer diagnosis prior to cohort baseline. This was inclusion criteria for the DCH cohort, as the original aim of the cohort was to study association between diet and incidence of cancer. Furthermore, 1633 were excluded due to missing values on one or more covariates of interest, leaving 54,849 cohort members for analyses in this paper. Of these 54,849

cohort members, 28,643 (52.2%) were women (Table 1). A total of 188,709 GP contacts were registered in NHSR at the cohort baseline year, giving 3.44 mean contacts per DCH participant. A total of 11,192 (20.4%) cohort participants had no registered GP contacts in NHSR at the baseline year, of whom, majority were men (65.2%).

The average number of visits to GP at cohort baseline in 1993–1997 was 4.06 (standard deviation 4.54) for women and 2.76 (4.00) for men (Table 1). Number of GP visits increased with age, and was higher in underweight and obese participants, smokers, physically inactive participants, those who drank alcohol below recommended limit, unemployed, participants with lower education, and those with pre-existing disease (Table 1). GP utilization did not differ by history of cancer in the family, while married and unmarried participants had less GP contacts than divorced or widowed participants (Table 1). The GP contacts in women increased with number of pregnancies and HT use (Table 1). There was no variation in GP use by urbanicity level. However, women had consistently, statistically significantly more GP visits than men (Table 1), even those with pre-existing diseases, e.g., diabetic women contacted GP on average 7.41, while diabetic men contacted GP 5.71 times per year ($p < 0.001$).

In a crude model, women had 47% higher rate of GP visits than men (IRR: 1.47; 95% confidence interval 1.45–1.50) (Table 2). This gender variation persisted when lifestyle, socio-demographic and medical factors were added to the model, but attenuated to 18% when female-specific factors were included in a fully adjusted model (1.18; 1.13–1.24). In a fully adjusted model, we found no association between age and GP visits. Alcohol consumption was weakly, but significantly inversely associated with GP visits and individuals drinking above the weekly recommended limit had 8% fewer annual visits (0.92; 0.91–0.94) than those adhering recommendations. Current and previous smoking was weakly positively associated with GP visits (1.09; 1.07–1.12 and 1.10; 1.07–1.12, respectively), while there was weak or no effect of BMI, physical activity, or marital status. Employment was associated with lower use of GP (0.81; 0.79–0.82). Similarly, subjects with more than four years of higher education had fewer GP visits than those with no vocational training (0.70; 0.68–0.72). Pre-existing diseases were the strongest determinants of GP visits, hypertension (1.63; 1.59–1.67), mental disorders (1.63; 1.61–1.66), diabetes (1.56; 1.47–1.65), angina pectoris (1.28; 1.21–1.34) and stroke (1.25; 1.16–1.34), as leading determinants of GP use. Having a history of cancer in the family, however had no effect on visits to GP. No association was found between GP visits and living in urban area. For women, number of pregnancies (1.09; 1.04–1.14) were weakly positively associated with GP visits while previous and current users of HT had 27% higher rate of GP visits (1.27; 1.24–1.30) than nonusers. Further adjustment for removal of lump in the breast, hysterectomy, and removal of one or both ovaries did not change the estimated gender difference, and these were removed from the final model as they did not have any effect on the number of GP visits. Significant effect modification by gender was identified for a number of factors: age, alcohol consumption, smoking, physical activity, occupational status, heart attack, high cholesterol, angina pectoris, hypertension, diabetes intestinal polyps and mental disorders (Table 3). Lifestyle seemed to have more pronounced effect on GP use in men than women in this age group, as increasing age and smoking lead to higher increase in use of GP in men than women. High cholesterol, hypertension, diabetes, intestinal polyps and mental illness led to higher increase in GP visits in men than women.

Discussion

Statement of principal findings

This study yielded three major findings: (1) female gender is a dominant determinant of GP utilization in the age group 50–65 years, even after controlling for lifestyle, socio-demographic, medical (somatic and mental), and female reproductive factors, with women consulting GP 18% more than men; (2) female-reproductive factors (gravidity and postmenopausal HT use) explained a large amount of the variation in the GP use; (3) pre-existing medical conditions (somatic and mental), unemployment, and HT use in women were major determinants of GP utilization.

Strengths and weaknesses of the study

This study benefited from an internationally unique possibility to link a large Danish cohort with 57,053 participants recruited from general population to the national registry of primary health care utilization, with objective assessment of GP utilization. DCH cohort has high quality data on lifestyle, education, diseases, and measured height and weight. DCH has been utilized in a number of epidemiological studies on aetiology of cancer and other chronic diseases, related to lifestyle, socio-economic and reproductive factors. However, this is the first study linking the DCH cohort to the Danish NHSR, and obtaining cohort participants' information on GP use. NHSR is considered to be of high validity

Table 1. Distribution of baseline characteristics among men and women in the DCH cohort ($n = 54{,}849$).

	Number of GP visits[a]				
	Female		Male		
	N (%)	Mean (std)	*N* (%)	Mean (std)	*p* Value[b]
Gender	28,643 (52.2)	4.06 (4.54)	26,206 (47.8)	2.76 (4.00)	<0.0001
Age	–	–	–	–	–
50–54	11,917 (21.7)	3.84 (4.32)	11,243 (20.5)	2.39 (3.67)	<0.0001
55–59	8899 (16.2)	4.18 (4.82)	8129 (14.8)	2.85 (4.28)	<0.0001
60–65	7827 (14.3)	4.27 (4.51)	6834 (12.5)	3.27 (4.12)	<0.0001
BMI	–	–	–	–	–
Underweight (>18.5 kg/m^2)	355 (0.65)	4.43 (7.55)	66 (0.12)	3.59 (4.91)	<.2485
Normal weight (18.5–24.9 kg/m^2)	14,481 (26.4)	3.63 (4.14)	9110 (16.6)	2.38 (3.83)	<0.0001
Overweight (25–29.9 kg/m^2)	9805 (17.9)	4.24 (4.45)	13,078 (23.8)	2.73 (3.79)	<0.0001
Obese (≥30 kg/m^2)	4002 (7.30)	5.14 (5.45)	3952 (7.21)	3.73 (4.80)	<0.0001
Alcohol consumption	–	–	–	–	–
Below the recommended weekly limit	17,456 (31.8)	4.32 (4.96)	15,114 (27.6)	2.81 (4.30)	<0.0001
Above the recommended weekly limit	11,187 (20.4)	3.66 (3.74)	11,092 (20.2)	2.70 (3.55)	<0.0001
Smoking status	–	–	–	–	–
Never	12,600 (23.0)	3.84 (4.36)	6738 (12.3)	2.39 (3.41)	<0.0001
Previous	6731 (12.3)	4.20 (4.40)	9095 (16.6)	2.94 (3.82)	<0.0001
Current	9312 (17.0)	4.26 (4.84)	10,373 (18.9)	2.85 (4.47)	<0.0001
Physical activity	–	–	–	–	–
No leisure time physical activity	11,799 (21.5)	4.34 (4.94)	13,425 (24.5)	3.01 (4.37)	<0.0001
Physical active in leisure time	16,844 (30.7)	3.87 (4.22)	12,781 (23.3)	2.50 (3.56)	<0.0001
Marital status	–	–	–	–	–
Unmarried	1775 (3.24)	3.81 (4.92)	1498 (2.73)	2.93 (4.24)	<0.0001
Divorced	5538 (10.1)	4.44 (4.97)	3706 (6.76)	3.18 (4.99)	<0.0001
Widow/widower	2422 (4.42)	4.37 (5.25)	595 (1.08)	3.19 (4.11)	<0.0001
Married	18,908 (34.5)	3.94 (4.25)	20,407 (37.2)	2.66 (3.77)	<0.0001
Occupational status	–	–	–	–	–
Unemployed	8018 (14.6)	4.99 (5.69)	4051 (7.4)	4.15 (5.31)	<0.0001
Employed	20,625 (37.6)	3.70 (3.94)	22,155 (40.4)	2.51 (3.66)	<0.0001
Educational status	–	–	–	–	–
No vocational training	5498 (10.0)	4.95 (5.45)	2606 (4.75)	3.49(4.39)	<0.0001
Higher education, <3 years	8943 (16.3)	4.03 (4.19)	3504 (6.39)	2.88(3.61)	<0.0001
Higher education, 3–4 years	10,992 (20.0)	3.84 (4.48)	11,131 (20.29)	2.80(4.27)	<0.0001
Higher education, >4 years	3210 (5.85)	3.38 (3.65)	8965 (16.34)	2.45(3.63)	<0.0001
Municipal	–	–	–	–	–
Suburban	12,712 (23.2)	4.02 (4.44)	11,736 (21.40)	2.74(4.03)	<0.0001
Urban	15,931 (29.1)	4.10 (4.61)	14,470 (26.38)	2.78(3.98)	<0.0001
Medical conditions	–	–	–	–	–
Heart attack	241 (0.44)	6.87 (8.92)	880 (1.60)	5.00 (5.75)	<0.0023
High cholesterol	1797 (3.28)	5.56 (5.14)	2288 (4.17)	4.18 (4.46)	<0.0001
Angina pectoris	639 (1.17)	6.52 (6.70)	1010 (1.84)	5.11 (5.52)	<0.0001
Stroke	283 (0.52)	6.29 (5.10)	427 (0.78)	5.09 (5.26)	<0.0027
Hypertension	4957 (9.04)	5.88 (5.47)	3953 (7.21)	5.06 (5.80)	<0.0001
Diabetes	428 (0.78)	7.41 (9.51)	705 (1.29)	5.71 (6.20)	<0.0010
Gallstones	2049 (3.74)	5.33 (5.56)	575 (1.05)	3.66 (4.32)	<0.0001
Intestinal polyps	876 (1.60)	5.11 (5.35)	1043 (1.90)	3.46 (4.06)	<0.0001
Mental illness	2082 (3.80)	6.07 (6.30)	915 (1.67)	5.37 (9.25)	<0.0001
History of cancer in the family	14,348 (26.2)	4.14 (4.48)	11,926 (21.7)	2.77 (3.85)	<0.0001
Hormone therapy use	–	–	–	–	–
Never	16,057 (29.3)	3.57 (4.03)	–	–	–
Previous or current user	12,586 (23.0)	4.69 (5.04)	–	–	–
Number of pregnancies	–	–	–	–	–
0	2479 (4.52)	3.68 (4.22)	–	–	–
1 or more	26,164 (47.7)	4.13 (4.59)	–	–	–

[a]Consultations and home-visits.
[b]*t* statistics for univariate associations.

due to its administrative purpose, as GPs financial reimbursement depends on the accurate registration of GP services in the register.[15]

This study has several limitations. Information on pre-existing somatic diseases was self-reported, and information on the severity of disease and mental diseases was unavailable. Therefore, we defined a proxy of mental disorders based on the NHSR registered contacts with psychologist in primary care or referral to psychiatrist. Information on employment status was obtained from question on physical activity at work, where cohort participants could report being unemployed or not in labor force during the last year. Thus, it was not possible to distinguish between unemployed, early retired or individuals on disability pension. We also lacked information on

Table 2. General practice utilization determinants among men and women in the DCH cohort ($n = 54,849$).

	Number of GP visits[a]				
	Model 1[b] IRR (95% CI)	Model 2[c] IRR (95% CI)	Model 3[d] IRR (95% CI)	Model 4[e] IRR (95% CI)	Model 5[f] IRR (95% CI)
Gender	–	–	–	–	–
Male (n = 26,206)	1.00	1.00	1.00	1.00	1.00
Female (n = 28,643)	1.47 (1.45–1.50)	1.56 (1.53–1.59)	1.44 (1.41–1.47)	1.44 (1.41–1.46)	1.18 (1.13–1.24)
Age	–	–	–	–	–
50–54	1.00	1.00	1.00	1.00	1.00
55–59	1.13 (1.11–1.16)	1.12 (1.10–1.14)	1.08 (1.06–1.10)	1.06 (1.03–1.08)	1.04 (1.02–1.06)
60–65	1.22 (1.19–1.25)	1.19 (1.16–1.22)	1.06 (1.04–1.09)	1.03 (1.00–1.05)	1.02 (1.00–1.04)
BMI	–	–	–	–	–
Underweight (>18.5 kg/m^2)	1.00	1.00	1.00	1.00	1.00
Normal weight (18.5–24.9 kg/m^2)	0.79 (0.72–0.88)	0.85 (0.77–0.93)	0.88 (0.79–0.97)	0.88 (0.80–0.97)	0.87 (0.79–0.96)
Overweight (25–29.9 kg/m^2)	0.91 (0.82–1.01)	0.97 (0.87–1.07)	0.98 (0.89–1.08)	0.95 (0.86–1.05)	0.94 (0.86–1.04)
Obese (≥30 kg/m^2)	1.17 (1.06–1.30)	1.23 (1.11–1.36)	1.20 (1.09–1.33)	1.08 (0.98–1.19)	1.09 (0.99–1.20)
Alcohol consumption	–	–	–	–	–
Below the recommended weekly limit	1.00	1.00	1.00	1.00	1.00
Above the recommended weekly limit	0.90 (0.89–0.92)	0.91 (0.89–0.93)	0.94 (0.92–0.96)	0.92 (0.91–0.94)	0.92 (0.91–0.94)
Smoking status	–	–	–	–	–
Never	1.00	1.00	1.00	1.00	1.00
Previous	1.13 (1.11–1.16)	1.13 (1.11–1.16)	1.12 (1.09–1.15)	1.11 (1.08–1.13)	1.10 (1.07–1.12)
Current	1.13 (1.11–1.16)	1.15 (1.13–1.18)	1.09 (1.07–1.12)	1.10 (1.08–1.13)	1.09 (1.07–1.12)
Physical activity	–	–	–	–	–
No leisure time physical activity	1.00	1.00	1.00	1.00	1.00
Physical active in leisure time	0.87 (0.85–0.88)	0.90 (0.89–0.92)	0.93 (0.92–0.95)	0.95 (0.93–0.97)	0.95 (0.93–0.97)
Marital status	–	–	–	–	–
Unmarried	1.00	–	1.00	1.00	1.00
Divorced	1.12 (1.07–1.17)		1.10 (1.06–1.15)	1.09 (1.05–1.14)	1.06 (1.01–1.10)
Widow/widower	1.04 (0.99–1.10)		1.03 (0.97–1.08)	1.03 (0.98–1.08)	1.00 (0.95–1.05)
Married	0.96 (0.92–1.00)		0.97 (0.94–1.01)	1.00 (0.96–1.04)	0.97 (0.94–1.01)
Occupational status	–	–	–	–	–
Unemployed	1.00	–	1.00	1.00	1.00
Employed	0.70 (0.68–0.72)		0.75 (0.73–0.77)	0.80 (0.78–0.82)	0.81 (0.79–0.82)
Educational status	–	–	–	–	–
No vocational training	1.00	–	1.00	1.00	1.00
Higher education, <3 years	0.82 (0.80–0.85)		0.93 (0.90–0.96)	0.91 (0.88–0.93)	0.91 (0.88–0.93)
Higher education, 3–4 years	0.80 (0.78–0.82)		0.92 (0.89–0.95)	0.89 (0.87–0.91)	0.89 (0.87–0.91)
Higher education, >4 years	0.70 (0.68–0.72)		0.88 (0.85–0.91)	0.81 (0.78–0.83)	0.80 (0.78–0.83)
Municipal	–	–	–	–	–
Suburban	1.00	–	1.00	1.00	1.00
Urban	1.02 (1.01–1.04)		0.98 (0.96–1.00)	1.00 (0.98–1.01)	1.00 (0.99–1.02)
Medical conditions	–	–	–	–	–
Heart attack	1.77 (1.66–1.88)	–	–	1.19 (1.12–1.27)	1.19 (1.12–1.27)
High cholesterol	1.48 (1.43–1.53)	–	–	1.20 (1.16–1.24)	1.20 (1.17–1.24)
Angina pectoris	1.74 (1.66–1.83)	–	–	1.28 (1.21–1.34)	1.28 (1.21–1.34)
Stroke	1.68 (1.56–1.82)	–	–	1.24 (1.15–1.33)	1.25 (1.16–1.34)
Hypertension	1.81 (1.77–1.85)	–	–	1.63 (1.60–1.67)	1.63 (1.59–1.67)
Diabetes	1.99 (1.87–2.11)	–	–	1.54 (1.46–1.63)	1.56 (1.47–1.65)
Gallstones	1.31 (1.26–1.37)	–	–	1.18 (1.14–1.23)	1.16 (1.12–1.21)
Intestinal polyps	1.25 (1.19–1.31)	–	–	1.17 (1.12–1.22)	1.16 (1.11–1.21)
Mental illness	1.71 (1.64–1.77)	–	–	1.61 (1.55–1.67)	1.63 (1.61–1.66)
History of cancer in the family	1.02 (1.00–1.04)	–	–	1.03 (1.01–1.04)	1.02 (1.01–1.04)
Hormone therapy use	–	–	–	–	–
Never	1.00	–	–	–	1.00
Previous or current user	1.30 (1.27–1.33)				1.27 (1.24–1.30)
Number of pregnancies	–	–	–	–	–
0	1.00	–	–	–	1.00
1 or more	1.13 (1.08–1.18)	–	–	–	1.09 (1.05–1.14)

[a]Consultations and home-visits.
[b]Adjusted for gender and age.
[c]Adjusted for gender, age and lifestyle factors (BMI, smoking, alcohol consumption, physical activity).
[d]Adjusted for model 2 and socio-demographic factors (marital, occupational, educational status, and urbanization).
[e]Adjusted for model 3 and medical factors (heart attack, high cholesterol, angina pectoris, stroke, hypertension, diabetes, intestinal polyps, gallstones, and history of cancer in the family).
[f]Adjusted for model 4 and female reproductive factors (use of HT, and number of pregnancies).

vulnerability or life-events (death in family, divorce, loss of job, etc.), that may have affected GP use.[1] Another weakness is that participants in DCH had higher education and income than nonparticipants,[16] as well as the study is based on data from 1993–1997 and on the specific age group 50–65, limiting generalizability of the results to general population and other age groups.

Table 3. General practice utilization determinants in the DCH cohort ($n = 54{,}849$) by gender.

	Number of GP visits[a]				
	Female ($n = 28643$)		Male ($n = 26206$)		
	Crude[b] model IRR (95% CI)	Adjusted[c] model IRR (95% CI)	Crude[b] model IRR (95% CI)	Adjusted[c] model IRR (95% CI)	p Value[d]
Age	–	–	–	–	–
50–54	1.00	1.00	1.00	1.00	
55–59	1.09 (1.06–1.12)	0.98(0.96–1.01)	1.19 (1.15–1.23)	1.12(1.08–1.15)	<0.0001
60–65	1.11 (1.08–1.14)	0.92(0.90–0.95)	1.36 (1.32–1.42)	1.14(1.10–1.19)	<0.0001
BMI	–	–	–	–	–
Underweight (>18.5 kg/m^2)	1.00	1.00	1.00	1.00	
Normal weight (18.5–24.9 kg/m^2)	0.82 (0.74–0.91)	0.88(0.80–0.97)	0.65 (0.49–0.87)	0.81(0.62–1.06)	0.3728
Overweight (25–29.9 kg/m^2)	0.95 (0.86–1.06)	0.96(0.87–1.06)	0.74 (0.56–0.99)	0.87(0.66–1.13)	0.3654
Obese (≥30 kg/m^2)	1.16 (1.04–1.28)	1.07(0.97–1.18)	1.02 (0.76–1.35)	1.03(0.78–1.35)	0.7656
Alcohol consumption	–	–	–	–	–
Below the recommended weekly limit	1.00	1.00	1.00	1.00	
Above the recommended weekly limit	0.85 (0.83–0.87)	0.89(0.87–0.91)	0.97 (0.94–1.00)	0.96(0.93–0.98)	0.0002
Smoking status	–	–	–	–	–
Never	1.00	1.00	1.00	1.00	
Previous	1.09 (1.06–1.12)	1.07(1.04–1.10)	1.20 (1.15–1.24)	1.14(1.10–1.18)	<0.0001
Current	1.11 (1.08–1.14)	1.07(1.04–1.10)	1.18 (1.14–1.23)	1.13(1.09–1.17)	0.0006
Physical activity	–	–	–	–	–
No leisure time physical activity	1.00	1.00	1.00	1.00	
Physical active in leisure time	0.89 (0.87–0.91)	0.96(0.94–0.99)	0.84 (0.82–0.87)	0.95(0.93–0.98)	0.0534
Marital status	–	–	–	–	–
Unmarried	1.00	1.00	1.00	1.00	
Divorced	1.16 (1.10–1.22)	1.05 (1.00–1.11)	1.07 (1.00–1.16)	1.06(0.99–1.14)	0.6682
Widow/widower	1.11 (1.05–1.18)	1.02 (0.96–1.09)	1.00 (0.89–1.12)	1.02(0.92–1.14)	0.3401
Married	1.03 (0.98–1.08)	0.99(0.94–1.04)	0.88 (0.83–0.94)	0.96(0.90–1.02)	0.3962
Occupational status	–	–	–	–	–
Unemployed	1.00	1.00	1.00	1.00	–
Employed	0.74 (0.72–0.76)	0.83 (0.81–0.86)	0.63 (0.61–0.66)	0.75(0.72–0.78)	<0.0001
Educational status	–	–	–	–	–
No vocational training	1.00	1.00	1.00	1.00	–
Higher education, <3 years	0.82 (0.79–0.85)	0.89(0.86–0.92)	0.82 (0.77–0.87)	0.92(0.87–0.98)	0.5876
Higher education, 3–4 years	0.78 (0.76–0.81)	0.87(0.84–0.90)	0.81 (0.77–0.85)	0.91(0.86–0.95)	0.6859
Higher education, >4 years	0.69 (0.66–0.72)	0.80(0.77–0.84)	0.71 (0.67–0.75)	0.81(0.77–0.85)	0.3323
Municipal	–	–	–	–	–
Suburban	1.00	1.00	1.00	1.00	–
Urban	1.02 (1.01–1.05)	1.01(0.99–1.03)	1.03 (1.00–1.06)	0.99(0.96–1.02)	0.1236
Medical conditions	–	–	–	–	–
Heart attack	1.67 (1.48–1.87)	1.14(1.01–1.27)	1.77 (1.64–1.92)	1.15(1.07–1.25)	0.0147
High cholesterol	1.39 (1.32–1.45)	1.19(1.14–1.24)	1.57 (1.49–1.65)	1.22(1.16–1.28)	0.0006
Angina pectoris	1.60 (1.49–1.72)	1.21(1.13–1.30)	1.83 (1.70–1.96)	1.30(1.21–1.40)	0.0003
Stroke	1.54 (1.38–1.71)	1.24(1.12–1.37)	1.76 (1.58–1.97)	1.19(1.07–1.32)	0.1519
Hypertension	1.59 (1.54–1.63)	1.46(1.42–1.50)	2.12 (2.04–2.20)	1.86(1.80–1.94)	<0.0001
Diabetes	1.83 (1.68–2.00)	1.48(1.36–1.60)	2.09 (1.92–2.27)	1.57(1.45–1.70)	0.0096
Gallstones	1.33 (1.28–1.39)	1.18(1.13–1.23)	1.30 (1.18–1.43)	1.13(1.03–1.24)	0.7863
Intestinal polyps	1.26 (1.18–1.34)	1.12(1.05–1.19)	1.24 (1.15–1.34)	1.20(1.12–1.28)	0.0312
Mental illness	1.56 (1.50–1.63)	1.45(1.39–1.50)	2.03 (1.89–2.19)	1.87(1.75–2.01)	<0.0001
History of cancer in the family	1.04 (1.01–1.06)	1.03(1.01–1.06)	1.00 (0.97–1.03)	1.01(0.98–1.04)	0.2401
Hormone therapy use	–	–	–	–	–
Never	1.00	1.00	–	–	–
Previous or current user	1.31 (1.28–1.34)	1.29(1.26–1.32)	–	–	–
Number of pregnancies	–	–	–	–	–
0	1.00	1.00	–	–	–
1	1.10 (1.05–1.16)	1.07(1.01–1.12)	–	–	–
2	1.08 (1.03–1.12)	1.07(1.02–1.12)	–	–	–
3	1.11 (1.06–1.16)	1.08(1.03–1.13)	–	–	–
4	1.15 (1.10–1.21)	1.08(1.03–1.14)	–	–	–
5	1.24 (1.17–1.32)	1.11(1.05–1.18)	–	–	–
6	1.29 (1.19–1.39)	1.13(1.05–1.22)	–	–	–
7	1.36 (1.20–1.53)	1.19(1.06–1.33)	–	–	–
8	1.38 (1.19–1.61)	1.21(1.05–1.40)	–	–	–

[a]Consultations and home-visits.
[b]Adjusted for age.
[c]Fully adjusted model.
[d]p Value for interaction between gender and given covariate.

Findings in relation to other studies

We found that 20.4% of the cohort members had no face-to-face contacts with their GP at baseline year, consistent with previous results by Gupta and Greve.[13] Gender differences persisted but attenuated when female-specific factors were included in the model, but 18% higher GP utilization by women remained unexplained, in line with previous findings.[1,3,5] A U.S. study by Green and Pope reported that female gender remained an independent long-term predictor of higher use of medical services when controlling for factors likely to cause gender differences.[5] Likewise, Krasnik et al., who restricted the study to participants 50 years and older in order to exclude possible contacts related to children in parous women, still found higher rates of GP use in women.[1] It has been suggested that gender differences may be explained by differences in health perception and that women are more sensitive and thus more likely to report symptoms than men.[3] Furthermore, it has been suggested that men and women have different disease patterns. While women have higher prevalence of non-threatening chronic diseases that are manageable in GP, men have higher prevalence of more severe, life-threatening chronic diseases requiring hospital admission or treatment within the secondary health care sector.[3,18] The Danish National Institute of Public Health showed in a population-based survey, that the prevalence of mental illness is higher among women, in all age groups (from 16 years of age),[19] however, we find that gender differences in GP utilization persist, even when analysis are adjusted for mental disorders.

Lifestyle factors

Surprisingly, GP visits were weakly inversely associated with alcohol consumption, which contradicts results by van Steenkiste et al.[6] Inconsistencies may be explained by differences in the Danish and Dutch study populations, general drinking habits, and definition of alcohol consumption. The inverse association between drinking alcohol and visits to GP was marginally stronger in women than men in the present study. Smoking was positively associated with GP visits, which is similar to previous findings by Vos et al. Furthermore, Vos et al. reported lower attendance rates among smoking men and the reverse for women, we found both female and male smoker to have higher rates of GP visits than nonsmokers. Furthermore, we found significantly stronger association of smoking with GP visits in men than women. As the effect of lifestyle factors has previously been evaluated in relation to frequent attendance in general practice in Denmark, we present novel estimates of an effect of alcohol use and smoking on GP use in the general population, which needs to be reproduced. We found weak association between GP visits and physical activity and none with BMI, in agreement with Gupta and Greve.[13]

Socio-demographic factors

Employment status was a strong determinant of GP visits, with employed participants having 19% fewer GP visits than unemployed. However, as mentioned earlier, some of those classified as unemployed in our study, may have been retired or on disability pension. Our finding is inconsistent with Krasnik et al., where occupational status had no effect on GP use, after adjusting for gender, health status (functional limitations, mental health, chronic diseases), vulnerability and life-events.[1] Inconsistencies may be due to differences in the age of participants in the two studies, lack of adjustment for vulnerability and life-events in our cohort, or lack of separation of information in our cohort on retired and unemployed. We found a stronger effect of employment status in men than women, in line with earlier observation that men are more vulnerable after unemployment than women.[20] GP visits were inversely associated with education, with least number of visits among those with the highest completed education, in agreement with earlier findings of a systematic decrease in GP contacts with higher education for both men and women.[21]

Medical factors

Pre-existing diseases were the strongest determinants of GP visits, including hypertension, mental disorders, diabetes, angina pectoris and stroke. This is consistent with Krasnik et al. who identified functional limitations and chronic diseases as strong determinants of GP utilization, while general subjective health measures (own perception of general health and health compared to others) were insignificant.[1] The association between GP visits and all: heart attack, high cholesterol, angina pectoris, hypertension, diabetes, intestinal polyps, and mental disorders were significantly modified by gender, with higher number of visits in men than women.

Female reproductive factors

As estimated effect of 47% higher GP attendance rate in women than men, attenuated the most after

adjustment for gender-specific variables, including number of pregnancies and previous or current use of HT, related to menopausal symptoms. We found that women with one or more previous pregnancies use their GP 9% more than those with no history of pregnancies. Since GP contacts related to children were removed from the data and the study population is aged above 50 years, the influence of parity may seem strange. Nevertheless, the higher attendance rates among parous women in this age group may be explained by long-term consequences of pregnancy or delivery, such as problems related to incontinence, bladder infections or genital prolapse.[22,23] This study presented novel result that a large amount, but not all of gender variations in GP utilization is explained by a female reproductive factor.

Meaning of the study: possible mechanisms and implications

In summary, some of the gender differences in health seeking behavior remained unexplained, even after adjusting for gender-specific utilization and lifestyle factors. However, psychological factors and preexisting disease may explain some of the remaining gender variation, which have been identified as important determinants of frequent attendance to GP.[24] Furthermore, 20–30% of the symptoms presented in general practice are classified as medically unexplained symptoms,[25] and they are more common in women, which may explain some of the gender variations in GP visits. Although the total number of GP contacts has increased by 17% from 1992 to 2001 in Denmark, number of face-to-face GP contacts exclusively, which are used as outcome in this study, increased only slightly, by 5%.[26] Similarly, Moth et al. [4] reported only small changes in the reasons for encounter with GP between 1993 and 2009. This implies that current mechanisms that cause individuals to contact their GP most likely do not differ substantially from estimates reported in this study, based on data in 1993–97. Furthermore, this study is based on population of 50–65-year-old individuals, but results seem rather consistent with related study in younger age groups (20–65) in Denmark.[13] Still, more studies with more recent data on GP use, and in different ages, both younger, and older age groups, in the light of ageing populations, are needed. Future studies need better data on psychological diseases, vulnerability, life-events, substance abuse, etc. as these may be important GP determinants. Finally, this study will help deepen understanding of gender differences in GP attendance. GPs should be aware in daily clinical practice that women and men have different health seeking behaviors and beliefs. This is important in the evaluation of symptoms and the communication with the patients. It is of special significance in the age group 50–65 years, where incidence of major chronic diseases and cancer is steeply increasing. It will be relevant to evaluate whether difference in GP utilization can explain some of this gender difference in overall and cause specific mortality. Results of this study may furthermore be relevant for policy makers in primary health care to target specific groups of men in order to raise awareness of importance of contacting GP with serious symptoms early. For example, recent campaign by Danish Cancer Society in Denmark has targeted men specifically to be more aware of early symptoms of colorectal cancer,[27] and to contact their GP early with these symptoms, due to men being at higher risk from and having considerably poorer survival from colorectal cancer than women.

Disclosure statement

The authors report no conflicts of interest.

Ethical approval

Relevant Danish ethical committees and Danish Data Protection Agency have approved the study (J.nr. 2013-41-1600), and written informed consent was provided by all participants at recruitment.

References

[1] Krasnik A, Hansen E, Keiding N, et al. Determinants of general practice utilization in Denmark. Dan Med Bull DENMARK. 1997;44:542–546.

[2] Vedsted P, Christensen MB. Frequent attenders in general practice care: a literature review with special reference to methodological considerations. Public Health. 2005;119:118–137.

[3] Vedsted P. Kønsforskelle i brug af sundhedsvæsnet [Gender differences in the use of the Danish health care system], English summary. Ugeskr Læger. 2007;169:2403–2408.

[4] Moth G, Olesen F, Vedsted P. Reasons for encounter and disease patterns in Danish primary care: changes over 16 years. Scand J Prim Health Care. 2012;30:70–75.

[5] Green CA, Pope CR. Gender, psychosocial factors and the use of medical services: a longitudinal analysis. Soc Sci Med. 1999;48:1363–1372.

[6] van Steenkiste B, Knevel MF, van den Akker M, et al. Increased attendance rate: BMI matters, lifestyles don't. Results from the Dutch SMILE study. Fam Pract. 2010;27:632–637.

[7] Vos HMM, Schellevis FG, van den Berkmortel H, et al. Does prevention of risk behaviour in primary care

require a gender-specific approach? A cross-sectional study. Fam Pract. 2013;30:179–184.
[8] Vedsted P, Fink P, Sørensen HT, et al. Physical, mental and social factors associated with frequent attendance in Danish general practice. A population-based cross-sectional study. Soc Sci Med. 2004;59:813–823
[9] Vedsted P, Olesen F. Social environment and frequent attendance in Danish general practice. Br J Gen Pract. 2005;55:510–515.
[10] Smits FTM, Mohrs JJ, Beem EE, et al. Defining frequent attendance in general practice. BMC Fam Pract. 2008;9:21
[11] Smits FT, Brouwer HJ, Zwinderman AH, et al. Predictability of persistent frequent attendance in primary care: a temporal and geographical validation study. PLoS One. 2013;8:e73125.
[12] Koskela T-H, Ryynanen O-P, Soini EJ. Risk factors for persistent frequent use of the primary health care services among frequent attenders: a Bayesian approach. Scand J Prim Health Care. 2010;28:55–61.
[13] Gupta ND, Greve J. Overweight and obesity and the utilization of primary care physicians. Health Econ. 2011;20:53–67.
[14] Andersen JS, Olivarius NDF, Krasnik A. The Danish National Health Service Register. Scand J Public Health. 2011;39:34–37.
[15] De Fine Olivarius N. The Danish National Health Service Register a tool for primary health care research. Dan Med Bull. 1997;44:449–453.
[16] Tjønneland A, Olsen A, Boll K, et al. Study design, exposure variables, and socioeconomic determinants of participation in Diet, Cancer and Health: a population-based prospective cohort study of 57,053 men and women in Denmark. Scand J Public Health. 2007;35:432–441
[17] Gjerstorff ML. The Danish Cancer Registry. Scand J Public Health. 2011;39:42–45.
[18] Larsen FB, Nordvig L. Helbred og sygdom. In: Hvordan har du det? Sundhedsprofil for region og kommuner, voksne [How do you feel? Health profile for regions and municipalities, adult population]. Denmark: Region Midtjylland Center for Folkesundhed; 2008. pp. 20–66.
[19] Christensen AI, Ekholm O, Davidsen M, et al. Sundhed og Sygelighed i Danmark 2010 [Health and Morbidity in Denmark 2010]. Statens Inst. Folk. Syddansk Univ. 2010.
[20] Sundhedsstyrelsen. Determinanter som er påvirket af social position [Determinants affected by social position]. Ulighed i Sundh. – érsager og indsatser. 2011. p. 74–75.
[21] Ministeriet for Sundhed og Forebyggelse. Ulighed i Sundhed [Inequity in Health] [Internet]; [cited 2016 Jul 4]. 2013. p. 31. Available from: http://www.sum.dk/~/media/Filer-Publikationer_i_pdf/2013/Ulighed-i-sundhed-2013/Ulighed-i-sundhed-marts-2013.ashx
[22] Rortveit G, Daltveit AK, Hannestad YS, et al. Urinary incontinence after vaginal delivery or cesarean section. N Engl J Med. 2003;348:900–907.
[23] Chiaffarino F, Chatenoud L, Dindelli M, et al. Reproductive factors, family history, occupation and risk of urogenital prolapse. Eur J Obstet Gynecol Reprod Biol. 1999;82:63–67.
[24] Vedsted P, Fink P, Olesen F, et al. Psychological distress as a predictor of frequent attendance in family practice: a cohort study. Psychosomatics. 2001;42:416–422.
[25] Rosendal M, Olesen F, Fink P. Management of medically unexplained symptoms. BMJ. 2005;330:4–5.
[26] Vedsted P, Olesen F. Brug af dansk almen praksis i dagtid [Use of Danish general practice during daytime] English summary. Ugeskr Læger. 2005;167:3280–3282.
[27] Campaign "Hold øje mand!" by The Danish Cancer Society [Internet]; [cited 2016 Jul 4]. Available from: https://www.cancer.dk/holdoejemand