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Research Article

A Study of Anti-Fat Bias among Danish General Practitioners and Whether This Bias and General Practitioners' Lifestyle Can Affect Treatment of Tension Headache in Patients with Obesity

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Keywords
Clinical vignette · Obesity management · Primary care · Weight bias

Abstract
Objectives: The study investigated whether treatment options for episodic tension-type headache vary among general practitioners (GPs) in Denmark depending on the patients' weight status and gender, and whether these decisions can be explained by the GPs' own anti-fat bias and lifestyle. ***Methods:*** A cross-sectional questionnaire study with responses from 240 GPs on measures of anti-fat bias, healthiness of GPs' lifestyles, and reported patient treatment decisions. ***Results:*** GPs tended to exhibit negative explicit and implicit anti-fat bias. There were no differences in choice of medical treatment for patients with obesity and those of a normal weight. GPs were more likely to advise a general health check to a patient with obesity ($p < 0.001$). GPs treating a male patient with obesity were less likely to believe that their patient would comply with the advised treatment compared to those with a male patient of normal weight. Compared with other patient types (4.4–7.7%), GPs who treated a male patient with obesity (27.9%) were more likely to advise a general health check only and no diary-keeping or follow-up consultation ($p < 0.001$). This was explained by the healthiness of the GPs' lifestyles (Spearman's $\rho = 0.367$; $p < 0.01$). ***Conclusion:*** Despite the presence of clear anti-fat bias, there were no differences in medical treatment, and GPs managed the general health of patients with obesity proactively. The fact that the GPs' own lifestyle influenced the likelihood that they would recommend diary-keeping and follow-up consultations for male patients with obesity is remarkable and requires further investigation.

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Introduction

Mounting research shows that employers, healthcare providers, educational staff, and the general public have negative attitudes to, and prejudicial beliefs about, people with obesity [1, 2]. Individuals with obesity feel that they are regarded as inferior and treated unfairly in multiple settings [2, 3]. This may perpetuate obesity [4] and lead to worsened health outcomes [5–8].

Negative attitudes and stereotypes may be worsening the health outcomes of people with obesity because the treatment decisions of healthcare providers could be adversely affected by patient obesity [9]. There have been few direct investigations into this, however, and the findings from the studies we have located are mixed. Doctors in hospitals in the US reported that they would spend less time with patients classified as overweight/obese [10], but in two US studies of medical students, separated by about 10 years, there were no signs of differences in treatment for patients with obesity [11, 12]. A study of Australian physiotherapists also failed to identify any differences in treatment for patients with obesity [13], while another Australian investigation found that dieticians were more likely to provide unsolicited weight management recommendations to women with obesity [14].

These studies pertain to only two countries and a limited number of disease-specific cases [10–14]. Therefore, additional investigations are needed to broaden the range of treatment cases and countries considered.

It is also very important to understand the factors that affect biased decision-making by those in the healthcare sector so that these can be addressed. Multiple studies have shown that healthcare providers tend to stereotype people with obesity and view them negatively [15–18], and there have been calls for the link between such attitudes and medical decision-making to be examined [9, 17]. In several countries [2] including Denmark [19], obesity is perceived by the general public as a condition caused by poor lifestyle choices and behavior in the form of over-eating and insufficient exercise. It therefore seems plausible that GPs with healthy lifestyles might be prone to show a lack of understanding of the plight of those affected by obesity.

Therefore, this study aimed to investigate: i) whether Danish GPs exhibit anti-fat bias, as revealed by negative attitudes and stereotyping beliefs; ii) whether treatment decisions are influenced by the patient's weight status; iii) whether GPs' own healthy lifestyles and anti-fat bias might influence their clinical decision-making.

Material and Methods

Participants

The data for this study were collected in November and December 2016 through an internet-based questionnaire completed by a sample of Danish GPs. The respondents were recruited partly by email through the survey company YouGov's panel of Danish GPs and partly via telephone calls made by YouGov to medical centers in Denmark. The study was approved by the Committee of Multipractice in General Practice established jointly by the Danish College of General Practitioners and the Organization of General Practitioners in Denmark (MPU 26–2016).

Procedure

A clinical vignette [20] was designed to assess the behavior surrounding medical decisions in response to episodic tension-type headache (2017 ICD-10-CM Diagnosis Code G44.21) and GPs' perceptions of their patients. Episodic tension-type headache was chosen as the case study because there is no causal association between obesity and such headaches. The case also allowed us to examine whether there are differences in treatment decisions where a further consultation with the patient is indicated, as the current recommended treatment of episodic tension-type headache involves diary-keeping and a follow-up consultation [21].

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The components of a vignette design can be divided into experimental aspects (i.e. factors that are systematically varied across vignettes to assess their effect on participants' responses), controlled aspects (i.e. factors that are kept constant across vignettes), and contextual aspects, where slight variations that are not expected to influence participants' responses are implemented across vignettes in order to promote verisimilitude [22].

The experimental aspect of this vignette was implemented at patient level. Respondents were asked to consider how they would treat one of four hypothetical patients who varied in gender and obesity status: a male and a female patient with obesity as well as a male and a female patient of normal weight. The patients were randomly assigned to respondents, and respondents were not aware of the other three hypothetical patients. All other textual and visual stimuli were controlled aspects and were therefore the same for all respondents, with the exception of facial features and clothing of the four patients, which were allowed to vary as contextual aspects of the vignette.

Vignette Set-Up

The clinical vignette was organized to resemble the complexity encountered in actual medical practice [20]. Respondents were instructed to consider a patient by reading a summary of the anamnesis. The summaries gave details of the health history (previous 2 years), age, gender, weight, and height of the patient. Gender and weight/height were experimental aspects that varied across vignettes. To make the consultation realistic, the headache disorder was not described to respondents in advance, but was expected to be inferred from the anamnesis text. The anamnesis was constructed with the intention of excluding migraine, cluster headache, headache caused by medication overuse, and other serious conditions and causes (such as biological warning features, psychological, and social issues), thus leaving episodic tension-type headache as the most probable diagnosis (Table 1).

To lend further realism to the consultation and to provide visual stimuli to indicate the patient's level of obesity, an accompanying patient photograph was provided for respondents. Pictures were taken of four volunteers posing as the hypothetical patients, who varied in gender (male or female) and obesity status (obesity grade III (BMI > 40 kg/m^2) or normal weight (BMI 18–25 kg/m^2)). The photographs were shot in an actual consultation clinic, from the same angle and with similar materials on the table and in the background. All volunteers were instructed to wear their normal everyday clothes, as patients wear their own clothes to GP consultations in Denmark. The patients' clothing was therefore allowed to vary.

Response options: Multiple response options were offered to respondents (Table 1, questions 1 and 2). In combination, responses to the two questions covered all options that currently appear in the recommended treatment of episodic tension-type headache [21]. Respondents were also asked for their view of the consultation: whether they would be irritated by the patient, and whether they thought the patient would follow the treatment plan (Table 1, question 3).

The vignette text and response options were drafted by the first and third author. The second author, who is an expert in this field and works part-time as a GP in Denmark, then reviewed the vignette, and modifications of the anamnesis and response options were implemented based on this review. After further communication among the three authors, a final vignette was pilot-tested with four GPs using the "think-aloud" method [23]. All of these GPs confirmed that the anamnesis was clear and that the fixed response options were also easily understandable and reflected their decisions to treat, except that they lacked the option to refer the patient to a physiotherapist. As a consequence, this was included as a fixed option in question 2 (Table 1).

Measures

Implicit Anti-Fat Bias

The implicit association test (IAT) was developed with the aim of identifying hidden or unrecognized prejudice [24]. The IAT uses word categorization tasks in which respondents are instructed to pair words that have contrasting connotations (e.g. Good and Bad) with target categories (e.g. Fat and Normal Weight) while under time pressure. The basic reasoning is that prejudiced respondents will sort fewer positive and more negative words into the stigmatized target category relative to the non-stigmatized category. We used the Implicit Anti-Fat Bias instrument [15] to measure implicit attitudes and stereotyping beliefs. This instrument was developed using a paper-and-pencil response format, but we presented it on computer monitors. In a pilot study of a sample of ordinary Danes (not reported in this paper), we found that respondents completing this instrument on a computer had to scroll down on their screens to respond to all word classification tasks. Respondents were therefore given 25 s to complete the task, which differs from the 20 s

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Table 1. Overview of information about the hypothetical patients and response options offered to GPs in the clinical vignette

Situation
A patient has contacted you and requested a consultation. Please find below patient information and results from the anamnesis.

Patient information
Age: 32 years; *Gender*: man[A]; *Height*: 175 cm; *Weight*: 140 kg[A]
History of consultation: no visits the last two years

Anamnesis
The patient has asked for a consultation due to recurrent episodes of headache that inhibit the patient's ability to engage in domestic and leisure activities; The patient has previously had episodes of headache but not as often as now; During the last two months the episodes have been much more frequent; The patient estimates that they occur at an interval of about two to three days; The pain is located in different parts of the head; There is no regularity as to when the headache occurs during the week or the day; When the pain has peaked the patient has taken one tablet of paracetamol; Sometimes, but not every time, this has had a positive effect; You conduct a clinical examination of the patient by measuring the blood pressure; The pressure is normal (under 140/90); In your diagnostic interview no biological, social or psychological information surfaces which can explain the episodes of headache

Question 1: Considering the anamnesis, which medical treatment do you suggest? (multiple responses are allowed)
– Higher dose of paracetamol
– I suggest NCAID
– I suggest aspirin
– I prescribe an opioid
– Other medical treatment
– No medical treatment

Question 2: Considering the anamnesis, which further treatment initiatives do you suggest? (multiple responses are allowed)
– No further treatment initiatives
– I ask the patient to keep a diary about when the pain occurs, and when the suggested medication is taken
– I book a new consultation appointment with the patient in order to assess the effect of the treatment
– I refer the patient to a physiotherapist
– I refer the patient to a headache clinic
– I suggest a new consultation with the aim of assessing the patient's general health situation
– Other

Question 3: To what extent do you agree in the following statements about this consultation? (Please respond on a scale from 1 "Completely disagree" to 5 "Completely agree")
This consultation could just as well have been carried out through phone or mail
It would irritate me that the patient asked about a consultation considering the patient's condition
I think the patient will follow the treatment initiatives that I suggest

[A] This was a clinical vignette involving presentation of four hypothetical patients to the surveyed GPs. Information about gender, height, and weight of the patient were varied into four patient types. The vignette information illustrated in this table depicts patient type 1: a man with obesity. The other patient types were: Patient type 2: normal-weight man (Gender: man; Height: 175 cm; Weight: 70 kg); Patient type 3: woman with obesity (Gender: woman; Height: 170 cm; Weight: 130 kg); Patient type 4: normal-weight woman (Gender: woman; Height: 170 cm; Weight: 65 kg).

in previous studies [15, 16]. No problems relating to understanding the IAT task were identified in the qualitative piloting of the GP questionnaire.

Respondents were first given a practice task that involved classifying words into one of four categories: Insects and Flowers (target categories), and Good and Bad. Following the practice task, participants performed the word-classification task with the target categories: Normal Weight and Fat, and the word pairs Good and Bad (attitude measure). A word classification task with the word pairs Lazy and Motivated was also performed (stereotype measure) [16]. The order was counterbalanced in both tasks so that one random half of the sample classified Good/Bad and Lazy/Motivated words with Fat first and the other half with Normal Weight first. Due to cost constraints, only one half of the GP sample responded to the Good/Bad word classification task, while the remaining half responded to the Lazy/Motivated task.

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As in the original study [15], respondents with ≥35% IAT errors and fewer than four categorized words were excluded from the analysis. The number of words that were classified correctly (i.e. according to the instruction) was then counted. In order to calculate implicit anti-fat bias scores, we utilized the combined information from each respondent regarding the number of words correctly classified when obese was paired with negative and positive words. The product: square root of differences method was used to calculate these scores, as recommended for the paper format IAT [25]. A positive score indicated anti-fat bias, zero indicated no bias, and a negative score indicated normal-weight bias.

Explicit Anti-Fat Bias

Two measures of explicit anti-fat bias were replicated from earlier research [15, 16]. Attitudes were assessed with the two questions: "What is your overall opinion of people with obesity?" and "What is your overall opinion of people of a normal weight?". The 7-point response scale ran from 1 = very positive to 7 = very negative. Laziness stereotyping was based on the two questions: "To what extent do you perceive people with obesity as motivated or lazy?" and "To what extent do you perceive people of a normal weight as motivated or lazy?". The 7-point response scale ran from 1 = very motivated to 7 = very lazy. One half of the GP sample responded to the two attitude questions; the other half responded to the two stereotyping questions. As in previous studies [15], explicit anti-fat bias scores were constructed by calculating difference scores: subtracting the response about normal-weight people from the response about people with obesity. A positive score indicated anti-fat bias, zero indicated no bias, and a negative score indicated normal-weight bias.

Healthy Lifestyle

The measure of diet- and exercise-related healthy lifestyle was constructed based on responses to four questions. Two of the questions concerned stated importance: "To me, it is important to exercise" and "It is important that my food is healthy". The other two concerned stated behavior: "I exercise a lot" and "I eat quite healthily" (response scale: 1 "completely disagree" to 5 "completely agree"). There was high response consistency (average polychoric correlations = 0.52; Standardized Cronbach's alpha = 0.81), implying that the items in combination depicted the intended construct well. To ensure measurement equivalence across GP subgroups, tests of Differential Item Functioning (DIF) were conducted against the variables gender, age and patient type, using the logistic regression approach [26]. Items were flagged with DIF if $p < 0.01$ and simultaneous changes in McKelveys & Zavoina's pseudo-R^2 [27] exceeded 0.035 [28]. As none of the four items exhibited DIF, they were all retained in the measure.

GP Decision Behavior and Perceptions of the Patient

Measures relating to three general themes were implemented using the vignette. The first theme focused on headache-related decisions, with a further sub-division into decision to treat, recommended optimal treatment of tension-type headache [21], and different combinations of suggesting diary-keeping or follow-up consultation.

The second theme focused on GPs' decisions regarding general health checks. It is good clinical practice for GPs to act on signs and symptoms of possible serious illness. We speculated that GPs would be more likely to advise a health check to patients with obesity given their higher risk of disease. Propensity to advise a general health check was measured irrespective of other treatment decisions, and with different combinations of suggesting diary-keeping or follow-up consultation.

The third theme recorded GPs' perceptions of the patient – specifically their confidence in patient compliance, and their impression that the patient was irritating and wasting their time.

Analysis

We reported the average number of words classified correctly when Fat was paired with Good/Bad and Lazy/Motivated words for the implicit measures of anti-fat. For the explicit measures, we reported average scores on the Positive/Negative and Motivated/Lazy 7-point response scales when GPs were asked about people with obesity and of normal weight. We assessed whether and to what extent there was a statistical difference with paired sample *t*-tests and Cohen's d_z effect size [29]. One-sample *t*-tests were used to assess whether implicit and explicit anti-fat bias scores were significantly different from zero.

Associations between patient characteristics and the decision behavior of the GP and their perceptions of the patient were examined with multivariate logit regression. A nominal variable with four categories indicating the patients' gender and obesity status was included as a predictor along with control variables

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relating to the sociodemographic and practice-related characteristics of the GPs. These variables were as follows: gender, age, geographical location of clinic, type of clinic, number of years working as a GP, and respondent recruitment via panel or telephone. From this model (which will be referred to as the "main effects" model), we reported whether the patient's obesity status and gender were associated with each outcome variable. In instances where a significant association was identified between patient obesity status and GP decision behavior and perception, we conducted post-hoc tests (with Bonferroni corrections to account for multiple comparisons) with pairwise comparisons of differences in proportions across the four patient types using Stata's (College Station, TX, USA) *margins*, and *mcompare (bonferroni*) commands.

Furthermore, in instances where a significant main effect from the obesity status and gender of patient was identified, hierarchical likelihood ratio tests were used to examine whether this could be explained by implicit or explicit anti-fat bias or healthy lifestyle. In the hierarchical procedure, the candidate variables (i.e. anti-fat bias measures and healthy lifestyle) were incorporated one at a time into the main effects model along with the interaction effect between the candidate variable and the patients' obesity status and gender. The association was considered to be significant if the change in likelihood ratio χ^2 between the main effects model and this second model was significant according to a χ^2 test at the $p < 0.01$ level (this more conservative threshold was chosen in order to account for multiple testing). The hierarchical procedure was executed using Stata's *lrtest*. Significant effects were illustrated graphically using Stata's *margins* and *marginsplot* command.

Analyses were performed in Stata (v. 14.2).

Results

Of 1,686 GPs and medical centers invited to participate in the study, 240 (14.2%) completed the questionnaire. Relative to the background population, GPs aged 60 years and above were overrepresented and those below 50 were underrepresented. There was also an overrepresentation of male GPs. GPs from the Capital Region were slightly underrepresented and those from Region Zealand overrepresented. There were no differences in the type of clinic (solo or partnership; Table 2). Of the respondents, 18 reported that they could not see the vignette pictures of the patients. They were subsequently removed from the analysis, giving a sample size of 222.

Explicit and Implicit Anti-Fat Bias

As seen in Table 3, explicit negative attitudes to people with obesity (4.59) were significantly stronger than the corresponding attitudes to people of normal weight (3.26) ($t(112) = 9.45$, $p < 0.001$). GPs also explicitly stereotyped individuals with obesity as more lazy (4.44) than people of normal weight (3.87) ($t(103) = 6.05$, $p < 0.001$). The average explicit anti-fat bias score was 0.97. This is significantly different from the neutral score of zero ($t(217) = 10.77$, $p < 0.001$).

In the implicit association tasks, the respondents classified significantly more words correctly when obese was paired with Bad ($Bad_{average} = 15.65$) than they did when obese was paired with Good ($Good_{average} = 10.22$) words ($t(74) = 10.42$, $p < 0.001$). Likewise, more words were classified correctly when obese was paired with Lazy ($Lazy_{average} = 14.91$) than with Motivated (Motivated = 9.62) words ($t(80) = 11.63$, $p < 0.001$). The average implicit anti-fat bias score was 3.56, which is significantly different from the neutral score of zero ($t(155) = 14.21$, $p < 0.001$).

Headache-Related Treatment Decisions

The GPs did not differ in their decisions to treat patients with obesity and patients of normal weight with medicine and/or non-medical therapy (e.g. physiotherapy) (Table 4). Similarly, they did not differ in advising the recommended optimal treatment of tension-type headache to patients with obesity and patients of normal weight.

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Table 2. Sociodemographic and practice-related descriptive statistics and comparison (where possible) with the GP population as per January 1, 2017

	Population proportions[A], %	GP sample (n = 240), %
Gender		
Men	48.8	64.2
Women	51.2	35.8
Age, years		
34–49	41.0	28.7
50–59	29.5	29.6
60 or more	29.5	41.7
Type of clinic		
More than one physician	69.6	68.3
Only one physician	30.4	31.7
Region		
Capital city area	30.7	22.5
Zealand	14.0	22.5
Southern Denmark	22.8	24.2
Mid-Jutland	23.6	20.0
North-Jutland	8.8	10.8
Years experience as GP		
Mean (SD)	Not known	18.5 (10.2)

[A] GP population data per January 1, 2017 was generously provided by the Union of General Practitioners in Denmark (http://www.PLO.dk).

There were differences in the likelihood of the GPs suggesting to the four patient types that a diary be kept to record when pain occurs and when prescribed medication is taken ($p < 0.05$). Post-hoc tests showed that GPs presented with a male patient with obesity (64.3%) were less likely to suggest keeping a diary than GPs presented with a male patient of normal weight (87.7%) ($p < 0.05$) or a female patient with obesity (86.2%) ($p < 0.05$). No differences attributable to patient weight were identified in the probability of the GP advising a follow-up consultation or suggesting both diary-keeping and a follow-up consultation. However, there were differences in the probability that they would *not* suggest diary-keeping or a follow-up consultation. This propensity was higher in GPs presented with a male patient with obesity (28.2%) than with the other three patient types (9.2–12.0%), although post-hoc tests could not confirm that male patients with obesity were treated significantly differently at the 0.05 level.

Neither implicit or explicit anti-fat bias nor healthy lifestyle could explain the different decisions for male patients with obesity at the 0.01 significance level.

Advising a General Health Check

There were differences in the likelihood of advising a general health check, irrespective of other decisions ($p < 0.001$). Post-hoc tests showed that GPs who had a male patient (71.7%) or female patient (71.8%) with obesity were more likely to suggest a general health check compared to GPs who had a male (35.0%) ($p < 0.05$) or female (44.6%) patient of normal weight ($p < 0.05$).

Differences also emerged in terms of the GPs' propensity to advise a general health check and a headache-related diary ($p < 0.05$). Post-hoc tests showed that GPs who had a female patient with obesity (58.5%) were more likely to suggest these investigations compared to GPs who had a male patient of normal weight (29.9%) ($p < 0.05$). There were also differences in likelihood to suggest only a general health check and no headache-related diary or follow-

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Table 3. Implicit and explicit dislike of and stereotypical beliefs about persons with obesity by Danish GPs, and derived explicit and implicit anti-fat bias scores

Explicit dislike and laziness stereotyping	Persons with obesity	Normal-weight persons	Paired sample *t*-test / effect size[A]
Dislike (1 = "Very positive" to 7 "Very negative")	4.59 (1.05)	3.26 (1.02)	$t(112) = 9.45, p < 0.001$; Cohen's $d = 0.88$
Perception of laziness (1 = "Very motivated" to 7 "Very lazy")	4.44 (0.80)	3.87 (0.37)	$t(103) = 6.05, p < 0.001$; Cohen's $d = 0.59$
Implicit dislike and laziness stereotyping	**Bad word pairing**	**Good word pairing**	**Paired sample *t* test**
Number of correct answers – IAT Dislike	14.65 (4.75)	10.23 (3.81)	$t(74) = 10.42, p < 0.001$; Cohen's $d = 1.20$
Implicit dislike and laziness stereotyping	**Laziness word pairing**	**Motivated word pairing**	**Paired sample *t* test**
Number of correct answers – IAT Laziness	14.91 (4.82)	9.62 (3.14)	$t(80) = 11.63, p < 0.001$; Cohen's $d = 1.29$
Anti-fat bias scores	**Scores**		**One sample *t* test for difference from 0**
Explicit anti-fat bias score[B]	0.97 (1.23)		$t(216) = 10.77, p < 0.001$
Implicit anti-fat bias score[C]	3.56 (3.13)		$t(155) = 14.21, p < 0.001$

Value represent means (SD).
[A] The specific effect size measure reported is Cohen's d_z, which is recommended by Lakens [29] in within-subject analyses.
[B] Difference score calculated on basis of combined responses on the 7-point scale: ($Score_{obese} - Score_{normal\text{-}weight}$).
[C] Calculated on basis of number of correct words classified when positive and negative words were given as stimuli. The product: square root of differences method was used [25]. It has the equation:

$$\frac{x}{y} \times \sqrt{(x-y)},$$

where × is the number of correctly classified words in the target category (i.e. obese or normal-weight) where the greatest number of words were correctly classified.

up consultation. Post-hoc tests showed that GPs who had a male patient with obesity (27.9%) were more likely to suggest only a general health check compared to GPs presented with the other patient groups (4.4–7.7%) ($p < 0.05$).

In a subsequent analysis, healthy lifestyle was found to have an impact on how the GPs handled the four patient types in terms of suggesting a general health check without diary-keeping or follow-up consultation. Thus, the model that included the healthy lifestyle and patient type interaction gave a significant improvement in model fit compared to the main effects model ($p < 0.001$). The pattern of this association is shown graphically in Figure 1, with scores on the healthy lifestyle variable mapped from the 20th percentile to the 80th percentile. We adopted these percentile cut-offs because 20% of the GPs responded at the maximum level of healthy lifestyle (i.e. "completely agree" to all four questions making up the measure), implying that no empirical variation would be discernible at higher percentiles.

Figure 1 shows that the likelihood of a GP advising a general health check but not suggesting diary-keeping or a follow-up consultation rises in tandem with the healthiness of the GP's lifestyle for male patients with obesity (Spearman's $\rho = 0.367$; $n = 60$; $p < 0.01$). This

Table 4. Headache-related treatment decisions, general health check decisions and perceptions of the patient (in %)[A] – across the four hypothetical patients presented to the GPs (n = 222)

	Man with obesity, %	Normal-weight man, %	Woman with obesity, %	Normal-weight woman, %	Test statistics[B] χ^2 (df); p value
Headache-related decisions					
Decision to treat headache[C]					
Medical treatment	56.7	53.2	59.8	55.4	0.50 (3); $p = 0.9199$
Non-medical treatment	4.6	5.7	9.8	2.1	2.89 (3); $p = 0.4092$
Medical and non-medical treatment	21.9	7.4	16.2	22.2	4.89 (3); $p = 0.1799$
No treatment	13.7	30.5	12.3	18.4	6.74 (3); $p = 0.0807$
Recommended optimal treatment of headache					
Treatment, keep a diary, follow-up consultation	24.6	25.2	38.7	33.0	3.31 (3); $p = 0.3458$
Different combinations of suggesting diary or follow-up consultation related to headache					
Keep a diary	64.3[II,III]	87.7[I]	86.2[I]	83.6	10.82 (3); $p < 0.05$
Follow-up consultation	31.7	36.7	44.6	44.7	2.56 (3); $p = 0.4637$
Keep a diary and follow-up consultation	25.0	33.3	42.2	39.9	4.10 (3); $p = 0.2504$
No diary and no follow-up consultation	28.2	9.2	11.5	12.0	8.68 (3); $p < 0.05$
General health check decision					
Suggesting general health check – irrespective of other decisions	71.7[II, IV]	35.0[I, III]	71.8[II, IV]	44.6[I, III]	20.17 (3); $p < 0.001$
Suggesting general health check – and combinations of suggesting diary or follow-up consultation related to headache					
General health check – keep a diary	37.2	28.9[III]	58.5[II]	36.7	10.12 (3); $p < 0.05$
General health check – follow-up consultation	14.4	12.3	27.5	13.7	5.54 (3); $p = 0.1365$
General health check – keep a diary and follow-up consultation	12.2	12.1	25.1	11.4	5.33 (3); $p = 0.1489$
General health check – no diary and no follow-up consultation	27.9[II, III, IV]	4.7[I]	7.7[I]	4.4[I]	16.48 (3); $p < 0.001$
Perception of patient					
Waste of time: "This consultation could just as well have been handled over the phone or by e-mail" (partly or completely agree)	0	1.9	1.6	1.8	2.56 (3); $p = 0.466$
Irritation: "It would irritate me that the patient asked for a consultation considering the patient's condition" (partly or completely agree)	1.7	0	1.6	0	1.68 (3); $p = 0.640$
Compliance: "I think that the patient will follow the proposed treatment" (partly or completely agree)	58.9[II]	86.1[I]	68.1	78.2	10.52 (3); $p < 0.05$

Roman numerals in square brackets are from post-hoc tests (after logit regressions described in note B of this table) where pairwise comparisons of differences in decisions / perceptions across the four patient types were conducted. Reported differences are adjusted to account for multiple comparisons (using the Bonferroni correction method). Specific numerals indicate: *I*: significant different from man with obesity, *II*: significant different from normal-weight man, *III*: significant different from woman, with obesity *IV*: significant different ($p < 0.05$) from normal-weight woman.

[A] Predicted probabilities were calculated from the logit regressions described in note B of this Table using Stata's "*margins*" command where control variables were set to the sample average with the "*atmeans*" sub-command.

[B] χ^2-test results from logit regression model as to whether patient type variable (obesity status and gender) is significant after controlling for socio-demography (age, gender, region, type of consultation (single or multiple GPs), years of experience as GP), and recruitment mode (from YouGov's panel or telephone invitation). In the case of the patient perceptions Waste of time and Irritation, test statistics are from bivariate χ^2-test, since it was not possible to calculate multivariate test statistics due to infrequent prevalence.

[C] The totals of "Decision to treat the headache" do not sum to 100%, because predicted probabilities are reported, which vary slightly from the observed probabilities.

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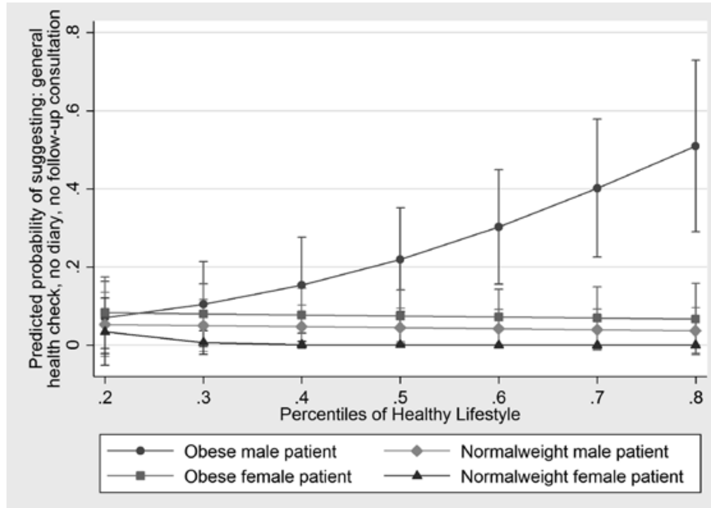

Fig. 1. Probability of suggesting a general health check (but not a diary or a follow-up consultation) according to the different levels of GPs' healthy lifestyle, and divided into patient weight status/gender. Predicted probabilities with 95% confidence intervals from logit regression model (n = 222).

pattern was not observed for GPs presented with male patients of normal weight or female patients (either with obesity or of normal weight).

Patient Perception

There were differences in the likelihood of believing that "…the patient will follow the proposed treatment" (p < 0.05). Post-hoc tests showed that GPs with a male patient with obesity (58.9%) were less likely than GPs with a male patient of normal weight (86.1%) to believe this (p < 0.05). Almost none of the respondents reported that they would be irritated that the patient contacted them with the condition or that the issue could have been handled without a consultation; there were no differences between patient types in this respect.

The difference in the likelihood of believing that patients with obesity would follow the treatment recommendations could not be explained by implicit or explicit anti-fat bias, nor by healthy lifestyle.

Discussion

This cross-sectional questionnaire found that Danish GPs tend to exhibit anti-fat bias, as revealed by negative attitudes and stereotyping. The latter was also detected at the clinic, where GPs were more likely to report their belief that the patients with obesity would not adhere to the advised treatment. Despite this, the study gives a rather positive impression of Danish GPs in terms of clinical decision-making. Although there were substantial differences in the GPs' reports of how they would treat a tension-type headache, the differences were generally unrelated to patient obesity. The GPs were clearly more inclined to advise a general health check to patients with obesity, indicating that they are attentive to the higher risk of disease experienced by patients with obesity and that they are willing to deal with this proactively through opportunistic screening [30]. Additionally, the GPs who treated a patient with obesity were no more irritated nor did they feel to any greater extent that the consultation was a waste of time.

These signs of impartiality in the care of patients with obesity and of normal weight are, however, counterbalanced in part by the finding that GPs treating male patients with obesity were less likely to suggest headache diaries or a follow-up consultation. In addition, GPs presented with a male patient with obesity were less likely than GPs with a male patient of normal weight to believe in patient compliance. This is indicative of biased decision behavior and mindset in dealing with men with obesity. On the other hand, the male patient with obesity was just as likely as the female patient to be offered a general health check under the same circumstances, indicating a similar degree of concern about the increased health risks associated with obesity. Therefore, another interpretation of the difference in decisions concerning keeping a diary could be that GPs do not expect male patients with obesity to complete the diary, thus making the intervention redundant. This expectation may be based on clinical experience or may reflect cultural beliefs about gender.

It is concerning that the decision not to suggest diary-keeping or follow-up consultation and to advise only a general health check to male patients with obesity increased in tandem with the healthiness of the GP's diet- and exercise-related lifestyle. It is not clear why the lifestyle behavior of the GP only affected decisions about male patients. One speculation is that GPs with healthy lifestyles have greater self-control and self-efficacy – a correlation that has been seen in other population groups [31, 32] – and that they expect men in particular to display these traits. Social role theory has revealed that men are perceived as agentic, i.e. the entrepreneurs of society and breadwinners within the family, with the ability to control their own lives [33]. Health-focused and self-determining GPs may therefore perceive men with obesity as individuals with failed agency. It may therefore make less sense to suggest diary-keeping, since this requires the patient to show commitment and self-control.

In line with other studies [10–12, 14], the Danish GPs we studied expected patients with obesity to be less compliant. We augment these earlier findings by showing that the difference in attitudes relating to compliance primarily occurs when the patient is male. Levels of both implicit and explicit anti-fat bias were considerable and similar to those identified among GPs in the USA [15, 16]. However, it is noticeable that implicit and explicit anti-fat bias did not influence clinical decisions or perceptions of patients in this study. The only other study on practicing medical doctors, which investigated hospital doctors in the US [10], also showed a mixed picture of GPs being biased but fair in their handling of patients with obesity. An important difference is that the Danish GPs did not view these patients more negatively, whilst the hospital doctors (in the US) did [10].

Weaknesses of the study include the low response rate and the fact that the surveyed respondents did not entirely represent the Danish GP census in terms of gender, age, and geographical location of the clinic (NUTS2 regions). Non-response bias therefore cannot be ruled out, yet we expect that this would have a limited effect since an experimental vignette design was employed along with multivariate adjustment for socio-demographic differences. The external validity of the clinical vignette method in relation to real-world behavior remains unclear [22]. The Healthy Lifestyle measure was developed specifically for this study and has not previously been validated. However, the measure had good internal consistency, and there was no DIF. IAT was used to measure implicit anti-fat attitudes and stereotyping. This method has been criticized for its lack of validity [34], including low predictive validity [35].

To our knowledge, this was the first study to compare how GPs' treatment of patients with obesity differed depending on the patient's gender, and the first to investigate whether decisions were influenced by the GPs' own health-related lifestyles and anti-fat bias. The study also adds a European perspective to the literature, since decisions made by healthcare professionals regarding patients with obesity have previously only been studied in the US and in Australia [10–14]. Despite widespread anti-fat bias, we did not detect a tendency for GPs to treat patients with obesity differently in medically relevant decisions. It is concerning that male patients with obesity were asked less frequently than other types of patients to keep headache diaries or offered follow-up consultations. This difference was associated with the GP's lifestyle. Since cultural beliefs about self-determination may underpin this, a strategy

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aiming to promote awareness among Danish GPs that their perceptions of the two genders may have an unrecognized impact on their handling of patients with obesity might remove the differential behavior. It may be particularly important to communicate this to GPs with healthy lifestyles involving exercise and a good diet.

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Disclosure Statement

The authors declare no conflict of interest.

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