Patients with osteoarthritis are least likely to receive lifestyle advice compared with patients with diabetes and hypertension: A national health survey study from Denmark

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SUMMARY

Objectives: To investigate the association between having osteoarthritis (OA), hypertension, or diabetes, either alone or in combination, and receiving guideline-recommended exercise or weight-reduction advice.

Design: Cross-sectional study.

Methods: We applied logistic regression to analyse self-reported data from the 2017 Danish National Health survey (DNHS). We calculated the proportions and odds ratios of receiving exercise advice and weight-reduction advice (if BMI > 30) from the general practitioner (GP) in seven patient groups: those with OA or hypertension or diabetes or any combination of these diseases.

Results: From the 183,372 DNHS responders, we included 71,717 patients (>45 years) who reported consulting a GP during the previous year. Among patients with only one disease, those with OA were least likely to receive exercise advice (13%, 1441/11,024) and weight-reduction advice (27%, 504/1877), while those with diabetes were most likely to receive these advice (32%, 387/1200 and 55%, 160/289, respectively).

For OA-only patients, the adjusted odds ratios of receiving exercise advice and weight-reduction advice were 1.4 (95% CI 1.3 to 1.5) and 1.6 (95% CI 1.4 to 1.8), respectively, compared with patients with none of the three diseases. For diabetes-only patients, the adjusted odds ratios were 4.2 (95% CI 3.7 to 4.7) and 5.4 (95% CI 4.2 to 7.0), respectively.

Conclusion: Few patients with OA self-reported having received guideline-recommended exercise advice, or weight-reduction advice if obese, from their GP. Furthermore, patients with OA were less likely to report having received these advice compared with patients with other chronic diseases.

1. Introduction

According to international clinical guidelines, exercise and weight-reduction (if indicated) are first-line treatments for patients with osteoarthritis (OA) of the knee and/or hip, which are the most commonly affected joints [1–4]. These treatments provide pain reduction, improve function and increase quality of life for these patients [5–7].

In several European countries, the general practitioner (GP) acts as a gatekeeper to specialist services in the healthcare system. In Denmark, OA is estimated to be the second most common reason for consulting a GP [8]. Since the GP is the first point of contact with the healthcare system, first-line treatment for OA such as advice on exercise and weight reduction are expected to be provided by the GP.

Exercise and weight-reduction advice is not only recommended for patients with OA. It is also guideline-recommended treatment for other chronic conditions, such as hypertension and diabetes [9–11]. Previous
studies investigating the delivery of lifestyle advice to patients with OA, hypertension, or diabetes have shown large variation in the likelihood of receiving such advice [12–19]. This variation in receiving lifestyle advice may be explained by differences in the research methods used, differences in the underlying healthcare systems and differences in previous health campaigns [12–19]. To be able to compare the proportion of patients receiving lifestyle advice for different diseases, and assess changes in these proportions over time, it is critical to do this in similar healthcare systems with the same underlying study population.

In this study, we aimed to investigate the proportion of patients with symptomatic self-reported OA who reported having received lifestyle advice from their GP. In addition, we investigated the associations between having OA, hypertension or diabetes either alone or in combination and receiving exercise advice or, if obese, receiving weight-reduction advice. Lastly, we investigated if the proportion of patients with OA (either alone or in combination with the other diseases) receiving lifestyle advice changed from the Year 2013 to the Year 2017.

2. Methods

In reporting this cross-sectional study, we followed the ‘Strengthening the Reporting of Observational Studies in Epidemiology’ (STROBE) guideline [20].

2.1. Setting and data sources

We used data from the cross-sectional Danish National Health Surveys (DNHS). The DNHS aim to monitor the health status of the Danish population. Since 2010, they have been distributed every 3–4 years at the beginning of February to a representative sample of Danish citizens aged 16 years or older. Each year, the sample is randomly selected from the list of personal identification numbers, as having an identification number is a mandatory requirement for all residents in Denmark. The surveys include questions on health-related quality of life, health behaviour, morbidity, and social relations. A detailed description of the DNHS design, including the original questions in Danish, has previously been published and can be found on the DNHS webpage (http://www.anskernesundhed.dk/) [21–23]. In this study, we mainly used data from the latest survey conducted in 2017, where 312,349 citizens were invited to participate. To investigate changes over time in the proportion receiving lifestyle advice, we also used data from the 2013 survey, which was distributed to 300,450 citizens.

2.2. Participants

To ensure a better match between patients with OA and those in the reference group, we only included survey participants aged 45 years or older with a positive (yes) reply to the question: ‘Have you consulted your GP during the last 12 months?’ In addition, participants needed to provide complete data on outcome, exposure and confounder variables to be eligible for the study. To ensure that weight-reduction advice was definitely indicated, we restricted this analysis to obese individuals (i.e. BMI ≥ 30) in line with the World Health Organisation’s (WHO) definition [24].

2.3. Outcome variables

The outcomes of interest were receiving advice on exercise (yes/no) and on weight-reduction (yes/no). These were assessed with the questions: ‘Did your GP during the last 12 months advise you to a) exercise, and b) reduce weight?’ In both cases, available response options were ‘yes’, ’no’ and ‘do not remember’. Participants replying ‘no’ or ‘do not remember’ were considered as not having received the advice.

2.4. Exposures

Based on self-reported OA, hypertension, and diabetes, the study participants were divided into seven patient (exposure) groups and one reference group. The exposure groups included patients with: 1) OA only, 2) hypertension only, 3) diabetes only, 4) OA and hypertension, 5) OA and diabetes, 6) hypertension and diabetes; and 7) OA, hypertension and diabetes. The reference group included participants having none of the three diseases of interest.

We considered a participant (45 years or older) to have symptomatic OA if they reported having OA and current symptoms in the extremities or joints, which is in line with the NICE guidelines [25]. Presence or absence of symptoms was assessed with the question: ‘Have you during the last 14 days been bothered by pain or discomfort in the arms, hands, legs, knees, hips or joints, and if so, have you been bothered a little or a lot?’ (response options: ‘yes, a lot’, ‘yes, a little’ and ‘no’). Participants replying ‘Yes a lot’ or ‘Yes a little’ were considered to have current symptoms. Presence or absence of self-reported OA was assessed with the question: ‘Do you currently have, or have you previously had, OA?’ (response options: ‘Yes, I have it now’, ‘Yes, I have previously had it’ or ‘no’). We considered participants replying ‘Yes, I have it now’ or ‘Yes, I have previously had it’ to have self-reported OA.

Based on the questions in the DNHS, we considered participants to have hypertension or diabetes if they self-reported to have the disease. Presence or absence of self-reported hypertension or diabetes was separately assessed via the question: ‘Do you currently have or have you previously had hypertension/diabetes?’ (response options: ‘Yes, I have it now’, ‘Yes, I have previously had it’ or ‘no’). We considered participants replying ‘Yes, I have it now’ or ‘Yes, I have previously had it’ to have self-reported hypertension or diabetes, respectively.

To investigate potential changes in the proportion of patients from 2013 to 2017 who received lifestyle advice, we combined all patient groups with OA (with or without concomitant disease) from 2017 into one group and compared them with patients from the 2013 DNHS survey.

2.5. Confounders

The following confounders, potentially impacting exposure and outcome, were available from the DNHS: age, sex, body mass index (BMI), educational level, and level of physical activity. BMI was calculated from self-reported height and weight. The highest level of education (‘Currently studying’, ‘Primary school’, ‘Short education’, ‘Short higher education’, ‘Middle-long higher education’, ‘Long higher education’, ‘Other education’) was evaluated by combining three separate questions on educational level. The original questions regarding educational level can be found in Supplement 1.

Level of physical activity was assessed with two questions in the DNHS: 1) time spent being physically active per week, and 2) time spent in hard physical activity per week. The time spent on hard physical activities was included in both questions: 1) ‘During a regular week, how much time do you spend on moderate and hard physical activities, where your breath is substantially increased, you sweat, and which cause you to be out of breath and to find it hard to talk (e.g. swimming, running, cycling at high speed, strength training or ball games)’. We added the number of minutes from the two questions and dichotomised the level of physical activity as either ‘following the WHO recommendation’ or ‘not following the WHO recommendation’. The WHO recommends at least 150 min of moderate physical activity, or at least 75 min of hard physical activity, or an appropriate combination of moderate and hard physical activity, per week. As hard physical activities count twice as much as moderate physical activities according to the WHO recommendations, we just
added the time spent in physical activity and spent in hard physical activities, and evaluated if this was at least 150 min.

### 2.6. Statistical methods

Descriptive statistics are presented as means and standard deviations, or percentages, as appropriate. No power calculation was performed for this descriptive study. The odds of receiving 1) exercise and 2) weight-reduction advice (if obese) was estimated using logistic regression models with exercise and weight-reduction advice as dependent variables (two separate models) and the seven patient groups as independent variables. All models are reported unadjusted and adjusted for age, sex, BMI, educational level, and level of physical activity. Additionally, in all models, statistical weights, supplied by the DNHS, were included to account for non-response by certain population groups. Statistics Denmark calculated the statistical weights based on information from relevant national registers, which were linked to the responding individuals by their unique personal identification number. The statistical weights account for differences in age, sex, educational level, income before tax, socio-economic group, marital status, ethnic background, number of visits to the GP, hospital stays, municipality of residence, and owner/tenant status. The difference in the proportions of patients with OA (alone or in combination with one or both of the other diseases) receiving lifestyle advice involving 1) exercise and 2) weight reduction between 2013 and 2017 were assessed using a chi-squared test stratified by sex. A p-value < 0.05 was considered statistically significant. The data analysis was conducted in STATA/IC 15.0 (StataCorp, College Station, TX, USA) and R (version 3.5.2 (http://www.r-project.org/ last accessed 2018-12-20)).

### 3. Results

In total, 183,372 participants responded to the DNHS in 2017, of which 120,338 were 45 years or older. Of these, 71,717 were included in the analysis on exercise advice, of which 14,033 participants were obese and, thus, included in the analysis on weight-reduction advice (Fig. 1). Characteristics of the 71,717 included participants are reported in Table 1. Of these participants, 12,385 (17%) received advice on exercise. Characteristics of the 14,033 obese participants are provided in Supplement 2, of whom 4851 (35%) received exercise advice and 5232 (37%) received weight-reduction advice. Both types of advice were received by 3751 (27%) and neither type of advice by 7701 (55%).

Thirteen percent of patients with OA only received exercise advice, which yielded the lowest odds ratios of receiving exercise advice among the three patient groups compared with the reference group (OR 1.4, 95% CI 1.3 to 1.5) (Fig. 2). Among the patients with only one disease, those with diabetes were most likely to receive exercise advice (32%, OR 4.2, 95% CI 3.7 to 4.7). Having combinations of the three investigated diseases generally led to higher odds of receiving exercise advice, although OA was not driving the increasing odds (i.e. OA, in addition to hypertension and diabetes, did not increase the odds of receiving advice) (Fig. 2).

Among obese patients with only one disease, those with OA-only were least likely (27%) to receive weight-reduction advice compared with the reference group (OR 1.6, 95% CI 1.4 to 1.8), whereas those with diabetes (55%) were most likely to receive weight-reduction advice (OR 5.4, 95% CI 4.2 to 7.0) (Fig. 3). Having combinations of the three diseases generally led to higher odds of receiving weight-reduction advice, though having OA did not seem to drive this increase (Fig. 3).

For the analysis comparing the proportion of patients receiving lifestyle advice in 2017 with that of 2013, 162,283 responders from the DNHS 2013 were available. Of those, 64,379 were eligible and had complete data. In total, 19,628 and 22,949 participants had OA (either alone or in combination with the other diseases) in 2013 and 2017, respectively, and 4430 (2013) and 5933 (2017) were obese.

The proportion of patients with OA who received exercise advice remained stable at around 20% in both 2013 and 2017 (Table 2). The proportion of obese patients with OA who received weight-reduction advice decreased slightly from 43% in 2013 to 40% in 2017, with women mostly driving this decrease (Table 2).

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**Flow chart of included patients from 2017**

![Flowchart](image)

**Fig. 1.** Flowchart of all included participants from the seven disease groups from the Danish National Health Survey (DNHS) 2017 (BMI = Body Mass Index, GP = general practitioner, OA = Osteoarthritis).
Table 1
Characteristics of the participants from the Danish National Health Survey 2017.

| Total n = 71,717 | None of the diseases | OA-only | Hypertension-only | Diabetes-only | OA and Hypertension only | OA and Diabetes | Hyper-tension and Diabetes | OA, Hyper-tension and Diabetes |
|------------------|----------------------|---------|-------------------|---------------|-------------------------|----------------|---------------------------|-----------------------------|
| Number           | 29,269               | 11,024  | 15,400            | 1200          | 9222                    | 562            | 2899                      | 2141                        |
| Age, mean (SD)   | 58.4 (10.0)          | 62.6 (10.0) | 64.1 (10.3)       | 62.7 (10.6)   | 67.2 (10.0)             | 65.1 (10.0)   | 65.5 (9.6)                | 68.0 (9.3)                  |
| Sex, n (%)       | 15,643 (53.4)        | 6967 (63.2) | 7100 (46.1)       | 484 (40.3)    | 5332 (57.8)             | 287 (51.1)    | 947 (32.7)                | 997 (46.6)                  |
| Women            | 13,626 (46.6)        | 4057 (38.8) | 8300 (53.9)       | 716 (59.7)    | 3609 (42.2)             | 275 (48.9)    | 1952 (67.3)               | 1144 (53.4)                |
| Men              | 25.4 (4.2)           | 26.2 (4.5) | 26.9 (4.6)        | 27.3 (4.8)    | 28.1 (5.2)              | 29.2 (5.3)    | 29.4 (5.5)                | 30.9 (6.0)                  |
| BMI, mean (SD)   | 21,660 (74.0)        | 7816 (70.9) | 10,805 (70.2)     | 818 (68.2)    | 5992 (65.0)             | 347 (61.7)    | 1828 (63.1)               | 1160 (54.2)                |
| Following WHO    | 7609 (26.0)          | 3208 (29.1) | 4595 (29.8)       | 382 (31.8)    | 3230 (35.0)             | 215 (38.3)    | 1071 (36.9)               | 981 (45.8)                 |
| recommendations   | Not following WHO    |          |                   |               |                         |                |                           |                             |
| Educational level, n (%) |          |                   |               |                         |                |                           |                             |
| Under education  | 110 (0.4)            | 39 (0.4)    | 31 (0.2)          | 8 (0.7)       | 17 (0.2)                | 1 (0.2)       | 7 (0.2)                   | 6 (0.3)                    |
| Primary school   | 1680 (5.7)           | 1062 (9.6)  | 1512 (9.8)        | 145 (12.1)    | 1585 (14.7)             | 83 (14.8)     | 426 (14.7)                | 412 (19.2)                 |
| Short education  | 11,226 (38.4)        | 4678 (42.4) | 6368 (41.4)       | 487 (40.6)    | 3956 (42.9)             | 255 (45.4)    | 1207 (41.6)               | 928 (43.3)                 |
| Short higher education | 3210 (11.0)        | 1021 (9.3)  | 1572 (10.2)       | 100 (8.3)     | 722 (7.8)               | 32 (5.7)      | 275 (9.5)                 | 170 (7.9)                  |
| Middle-range higher education | 7724 (26.4)    | 2806 (25.5) | 3548 (23.0)       | 241 (20.1)    | 1992 (21.6)             | 100 (17.8)    | 526 (18.1)                | 338 (15.8)                 |
| Long higher education | 3924 (13.4)        | 820 (7.4)   | 1469 (9.5)        | 125 (10.4)    | 593 (6.4)               | 43 (7.7)      | 226 (7.8)                 | 95 (4.4)                   |
| Other education  | 1395 (4.8)           | 596 (5.4)   | 900 (5.8)         | 94 (7.8)      | 584 (6.3)               | 48 (8.5)      | 232 (8.0)                 | 192 (9.0)                  |

(BMI = Body mass index, OA = osteoarthritis, SD = Standard deviation, WHO = World Health Organization).

Fig. 2. Proportion and crude and adjusted (age, sex, educational level, BMI and level of physical activity) odds ratios of receiving exercise advice (CI = confidence interval, OR = odds ratio).
4. Discussion

The majority of patients with OA did not self-report to have received guideline-recommended lifestyle advice regarding exercise and weight reduction from the GP. Compared with patients with hypertension-only or diabetes-only, patients with OA-only were least likely to receive this lifestyle advice. No increase was observed in the proportion of patients with OA in the period from 2013 to 2017, who self-reported to have received advice on exercise and weight reduction. The results indicate a lack of implementation of this first-line treatment for patients with OA.

The estimated odds from the adjusted model’s ratio calculations for exercise advice revealed a decrease compared with the crude odds ratios. The main driver for this finding was BMI. With increasing BMI, the chance of having received exercise advice increased in our data. As the reference group had a lower BMI than all the patient groups, there was a decrease in the crude compared with the adjusted odds ratios. The adjusted odds ratios for weight-reduction advice revealed an increase compared with the crude odds ratios. Here, the main driver was age. With increasing age, participants were less likely to receive advice on weight reduction. As the age of the reference group was lower than that of the patient groups, the adjustments increased the odds ratios.

In this study, we aimed at investigating the proportion of patients with OA who reported having received exercise advice and weight-reduction advice from the GP and to compare this proportion with that of patients with hypertension and diabetes, where similar advice is recommended [9–11]. As expected, the characteristics of our OA participants are similar to those from other studies that included Danish citizens [26]. This was also true for BMI which, compared with other countries, is somewhat lower [26,27]. Previous studies report a large variation in the proportion of patients with OA, hypertension, or diabetes receiving lifestyle advice [12–18]. Previously reported proportions of patients receiving advice on exercise range between 29% and 77% [12–18]. For weight-reduction advice, the proportions range from 29% to 90% [12,13,15–17]. This large variation might be partly explained by the different underlying diseases, but also by the different underlying health care settings, systems, study populations, recall periods, and disease definitions. For example, some studies investigated weight-reduction advice independent of an indication of obesity, and others used different age limitations or narrow data sources. Further, in different countries and health care systems, advice given by health professionals other than GPs might be culturally more appropriate. This might be the case in countries where the GP is not the gatekeeper to the health care system. Our data, from a nationwide population-based sample, allowed us to investigate the likelihood of patients with different combinations of diseases (i.e. OA, hypertension, diabetes) to receive lifestyle advice. The estimated odds from the adjusted model’s ratio calculations for exercise advice revealed a decrease compared with the crude odds ratios. The main driver for this finding was BMI. With increasing BMI, the chance of having received exercise advice increased in our data. As the reference group had a lower BMI than all the patient groups, there was a decrease in the crude compared with the adjusted odds ratios.
Clearly, such factors may negatively affect the implementation of
studies did not consider the co-occurrence of other morbidities also
requiring lifestyle advice [12–19]. Considering all patients with OA, with
or without concomitant disease, we found that 21% received exercise
advice, while just 13% of patients with OA-only reported having received
exercise advice. The remaining difference in the proportions receiving
lifestyle advice between those reported in the literature and in our results
is supported by the findings of a European study. In that study, patients
from Denmark were least likely to report having received lifestyle advice
compared with patients from the UK, the Netherlands, Portugal or Nor-
way [16].

Similar to previous studies, when considering only one disease, we
found that patients with diabetes were most likely to receive lifestyle
advice, followed by patients with hypertension [13,14,18,19]. One po-
tential reason for the difference in likelihood of receiving lifestyle advice
for the various conditions is the average number of GP visits per year.
While the Danish Organisation of General Practitioners (DSAM) recom-
mends two to four annual visits for patients with diabetes and hyper-
tension, there is no such recommendation for patients with OA
(https://www.dsam.dk/). Besides having more consultations to give
advice, clinicians might assume that lifestyle advice is more important for
patients with diabetes than for patients with hypertension or OA. GPs
may therefore prioritise giving this advice more commonly to this patient
group. However clinical guidelines recommend lifestyle changes equally
to all three diseases as first-line treatment. The difference in average
number of annual consultations between patients with different di-
agnoses might further introduce a difference in recall bias. If the average
last contact with the GP is further back in time for patients with OA, this
may lead to higher recall error than amongst those who have seen their
GP more recently.

Exercise and weight reduction is mainly recommended for patients
with OA in the hip or knee, which are the most common forms of OA.
Nevertheless, a proportion of patients may have, for instance, hand OA,
where exercise is not endorsed to the same extent by guidelines. This
could potentially contribute to the lower proportion of OA patients
receiving lifestyle advice. Lastly, the differences in delivery of lifestyle
advice between diseases may be explained by differences in health
campaigns and guideline implementation strategies, and media coverage
of the different diseases. Nevertheless, there seems to be scope for
improvement in implementing guideline-recommended treatment for all
patient groups.

Our finding of no increase in receiving exercise and weight reduction
advice from 2013 to 2017 in patients with OA is surprising. It indicates
that the release of the Danish clinical guidelines for knee osteoarthritis
at the end of 2012 and the implementation of the physiotherapist-delivered
exercise therapy and patient education program Good Life with Osteo-
arthritis in Denmark (GLA:D) in 2013 were insufficient initiatives to in-
crease awareness and help change the delivery of first-line treatments
from the GP [5,28].

4.1. Clinical implications

Our study highlights that implementing the delivery of lifestyle advice from GPs needs to be improved. To increase the quality of care, implementation studies suggest that a combination of interventions is more effective than just one [29,30]. Types of interventions include audit and feedback, computerised decision tools and advocacy from opinion leaders. In implementing clinical guidelines, it is important to consider the characteristics of: 1) the guideline, 2) the targeted health professionals, 3) the environment, and 4) the patient [29,30].

Many OA patients have comorbidities and some believe that exercise and physical activity may potentially worsen their joint pain [31,32]. Clearly, such factors may negatively affect the implementation of
delivery of lifestyle advice in general practice. Furthermore, clinicians often feel they lack expertise in advising on lifestyle changes and only have limited time during the clinical encounter. In addition, discussion about weight reduction can be considered a sensitive conversation that may be avoided [33,34]. To improve the quality of care, interventions should therefore address these patient and health professional character-
tics by providing relevant information to both. Environmental fac-
tors could be addressed with support from work colleagues by motivating
each other to provide patients with information, and from politicians and
policy-makers by providing financial incentives to provide
guideline-recommended lifestyle advice and/or by introducing reporting
standards for medical advice.

4.2. Limitations

This study has limitations. As always in survey studies with complete
case analysis, non-response and selection bias is an issue; however, in the
current study, statistical weights were used to try to take this into ac-
count. Further, in our analysis, we adjusted for physical activity as it is
associated with the presence of disease as well as with receiving lifestyle
advice from the GPs, who might assume that exercise advice should only
be given to the inactive patients. However, clinical guidelines recom-
mend exercise for all patients and further studies are highlighting that the
benefits of education and exercise are similar in patients with higher and
lower levels of physical activity prior to treatment [35].

We investigated if patients received lifestyle advice from the GP, as
patients’ first contact in the Danish health care system is the GP. The GP
should thus ensure that patients receive the advice regardless of whether
or not they will receive the advice again from other health care pro-
fessionals, which would simply reinforce its value. However, we did not
have information on why and how often the GP was consulted during the
previous year by these survey responders. Consequently, other diseases
where lifestyle changes are recommended could also have resulted in
their receiving advice on lifestyle changes. Another issue with receiving
lifestyle advice from the GP is that the GP may have given the advice, but
it was not remembered by the patients. However, it is critical to evaluate
the receipt of lifestyle advice, as this encourages the patient to change
their lifestyle accordingly, which is often difficult. Receiving the same
advice from other health professionals would also be useful and further
support the patient in following that lifestyle advice.

Lastly, we relied on self-reported disease status for classification of
patients. However, to improve specificity of diagnosis, we only included
participants in the DNHS above 45 years of age, and furthermore, for OA
diagnosis, we also required participants to have had joint pain or
discomfort in the previous 14 days, to ensure that OA was symptomatic.

5. Conclusion

In summary, we found that only about 20% of patients with osteo-
arthritis and 40% of obese patients with osteoarthritis self-reported to
have received guideline-recommended advice on exercise and weight
reduction in Denmark, respectively. The proportion of osteoarthritis
patients who self-reported to have received this advice from their GP did
not improve from 2013 to 2017. Patients with osteoarthritis were least
likely to receive exercise and weight-reduction advice, compared with
patients with hypertension or diabetes, where this advice was also rec-
ommended by respective clinical guidelines. Our findings highlight the
need for actions to improve the delivery of first-line treatments for pa-
tients with knee or hip osteoarthritis.

Declarations

Ethics approval and consent to participate

In the introductory letter with each survey, it was emphasised that
participation was voluntary. Thus, if patients responded, it was assumed
that they consented to participate in the survey.

Consent for publication

Not applicable.

Availability of data and material

All data from the DNHS are available through application to the National Institute of Public Health, University of Southern Denmark.

Competing interests

The authors have no conflicts of interest.

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Author contributions

LB, KST and JBT conceived the study. All authors participated in designing the study, and LB performed the analysis. All authors participated in data interpretation. LB and JBT drafted the manuscript, which was revised and edited by all co-authors for important intellectual content. All authors approved the final version of the manuscript.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jocaarto.2020.100067.

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