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Short Communication

Accumulation of unhealthy behaviors: Marked social inequalities in men and women

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ABSTRACT

The objective of this study was to compare the accumulation of unhealthy behaviors at the bottom of the social scale in men and women and, secondarily, to compare social and gender-based inequalities.

Fifty-two general practitioners from the Paris area volunteered to participate. A sample of 70 patients (stratified by gender) aged 40–74 years was randomly chosen from each physician's patient panel and asked to complete a questionnaire about their social position and health behaviors: tobacco and alcohol use, unhealthy diet, and physical inactivity. Mixed Poisson models were used to describe, with relative risks (RRs) and relative inequality indexes (RIIs), the social inequalities in the accumulation of these four unhealthy behaviors.

In 2008–2009, 71% of the 3640 patients returned their questionnaires. Men had an average of 1.59 of the 4 unhealthy behaviors we studied, and women 1.35 (RR = 1.18; 95% CI [1.11–1.25]). The mean number of unhealthy behaviors increased significantly for both genders from the top to the bottom of the social scale. The order of magnitude of RIIs was similar among men and women, ranging from 1.33 (occupational RII among women, 95% CI [1.11–1.60]) through 1.69 (financial RII among women, 95% CI [1.43–1.99]). None of the interaction tests between gender and social position was significant. The social inequalities had significantly wider amplitudes than those between genders for two of the three indicators of social position. The amplitude of social gradients related to unhealthy behaviors was similar between men and women and exceeded the gender inequality between them.

1. Introduction

The reduction in life expectancy and deterioration in health status of individuals at the bottom, compared with the top, of the social scale, is a public health problem common to all countries: social inequalities in health (Mackenbach et al., 2008). One of their most poorly understood aspects is that social differences appear to be more marked among men than women (Hunt and Macintyre, 2010; Matthews et al., 1999). We know that a part of these inequalities correspond to the socially differentiated adoption of unhealthy behaviors or habits. Smoking, excess alcohol consumption, physical inactivity/sedentarity, and an unbalanced diet are examples of behaviors that are both risk factors for many diseases (Lim et al., 2012) and much more prevalent at the bottom of the social scale (Mackenbach et al., 2017; Stringhini et al., 2010, 2011). Unhealthy behaviors are also associated with gender: men adopt these behaviors more frequently (Emanuel et al., 2012; Erol and Karpyak, 2015; Peters et al., 2014) and are at greater risk of acquiring several of them than women (Noble et al., 2015). We thus hypothesized that the more marked social inequalities among men than women might be explained, at least partially, by men's accumulation of more unhealthy behaviors. Although several recent studies have studied the influence of gender and social position on the accumulation of unhealthy behaviors (Noble et al., 2015), a careful search uncovered none that studied both simultaneously.

The objective of this study was therefore to compare the amplitudes of the accumulation of unhealthy behaviors at the bottom of the social scale in men and women. To specify the relative importance of both types of inequalities (social and gender-based), we secondarily aimed to

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compare the amplitude of each.

2. Methods

This study is an ancillary analysis of data from an observational cross-sectional survey named *Prev Quanti* (Thebault et al., 2017), designed to document social inequalities in preventive care provided by general practitioners (GPs) in France. This survey took place in 2008–09 among GPs who supervised students training in general practice during an internship at their offices. We used email and telephone to recruit 50 participants among the 215 physicians then working with two medical school departments of general practice in the Paris metropolitan area. Each was paid €300 for work estimated to take around 10 h.

For each participating GP, a random sample of 35 men and 35 women aged 40 to 74 years was drawn from their patient lists (patients who had reported them to be their regular doctor) furnished by the national health insurance fund. There were no exclusion criteria.

All patients self-reported their unhealthy behaviors and social position in a postal questionnaire (80 items including 10 on gynecology) mailed to them by their GPs, who also completed a form for each patient included, using information in their medical files.

Four unhealthy behaviors were considered: smoking (current consumption of tobacco), excessive alcohol consumption (at-risk consumptions according to the WHO criteria: 40 g/day for men and 20 g/day for women, mean over the past seven days), unhealthy diet (ate fewer than 5 portions of fruits and vegetables the previous day) and physical inactivity (no regular physical activity over the week). Our variable of interest was the proportion of unhealthy behaviors adopted by a patient (i.e., the number of unhealthy behaviors of each patient, divided by four – the number of behaviors studied).

The socioeconomic position of each patient was assessed according to three indicators:

- Occupation: occupational class was based on the patient's current or last occupation (or, for patients who had never worked, their partner's last occupation), coded into four categories derived from the standard classification of occupations in France (French National Institute for Statistics and Economic Studies, INSEE) and ranked as follows: managers and superior intellectual professions; intermediate professions; office, sales, and service workers, and blue-collar workers.
- Education: educational level was categorized in three levels according to the highest diploma: did not pass school-leaving exam, passed it, or university diploma.
- Financial situation: patients had to answer a question about their perceived financial situation coded into four categories: “I'm not managing”, “It's tight, I must be careful”, “It's OK”, “I'm quite comfortable”.

The social inequalities in this accumulation of unhealthy behaviors were described by relative risks (RRs) and relative inequality indexes (RIIs), which are interpreted as RRs comparing both ends of the social scale. But unlike RRs, which describe deviations between two social categories of a population, RIIs have the advantage of furnishing a single, synthetic measure of social inequalities for the entire population. The higher the RII, the stronger the social inequalities. In addition, RIIs (i.e., scales of social inequalities) can be compared between populations with different social structures (a comparison impossible for RRs) and are habitually compared between men and women (Mackenbach and Kunst, 1997).

In our analyses, we used mixed Poisson models with a random intercept (Snijders and Bosker, 2011) to take the hierarchical structure of the data into account (behaviors were grouped by patient and patients were grouped by physician) and thus obtain unbiased estimators (Diez, 2002). Besides age (divided into 5-year age groups, collected from the patient's questionnaire), all models were adjusted for variables collected from the physician's files: body mass index (divided into 3 classes < 25, $25– < 30$ and $\geq 30\ kg/m^2$), number of consultations during the past year (0, 1, 2, or 3 or more consultations) and length of doctor-patient relationship (0–1, > 1–3 and > 3 years) – all characteristics that may vary across the social groups and influence unhealthy behaviors. We first performed analyses stratified for gender, then tested interactions (between gender and social position), and finally compared social and gender inequalities.

All analyses were conducted with Stata and SAS software. The National Data Protection Authority (CNIL, Commission nationale de l'informatique et des libertés), which is responsible for ethical issues and protection of individual electronic data, approved the study. All patients were informed of the study's subject by their GP and provided informed consent to participate.

3. Results

The study included the first 52 GPs who volunteered to participate. The forms used to collect information from the GP files were completed for 98.9% (n = 3600) of the 3640 patients; the patient participation rate was 71.6% (n = 2605). Our analyses finally included the 2599 patients (71.4%) for whom both patient and doctor data were available.

Their mean age was 53.9 (± 9.5) years, and their most frequent socio-occupational category was managers (55.0% of men and 40.5% of women, Table 1).

The mean number of unhealthy behaviors increased significantly for both genders from the top to the bottom of the social scale (for all 3 of the socioeconomic indicators we used, Table 2), with RIIs of a similar order of magnitude among men and women, ranging from 1.33 through 1.69.

Men had a mean of 1.59 of the 4 unhealthy behaviors studied, and women 1.35 (RR = 1.18; 95% CI (1.11–1.25); $P < 0.001$). This result, showing gender inequality in unhealthy behaviors, is from the adjusted model that did not include any social position indicator, but the RRs were nearly identical when any one of the three indicators of social position was introduced into the model. None of the three tests of the interaction between gender and social position was significant. The social inequalities for educational level and perceived financial situation had wider amplitudes ($P < 0.001$ and $P < 0.008$, respectively) than those for gender, but there was no difference in width of amplitude for occupation ($P = 0.16$).

Sensitivity analyses (not presented) adjusted only for age yielded essentially identical results.

4. Discussion

In our study, the number of unhealthy behaviors increased from the top to the bottom of the social scale among both men and women. The amplitude of social gradients related to the accumulation of unhealthy behaviors did not differ between men and women and exceeded the amplitude of the gender inequalities between them.

4.1. Limitations and strengths

Our study has several limitations. First, we did not use a standardized questionnaire to collect the patients' dietary and physical activity data, but the questions were framed simply and unambiguously, close to the way physicians ask about these facts during appointments. For diet, we chose the threshold value of 5 portions of fruit and vegetables daily, as recommended, but by asking the patients about their consumption the day before rather than over the previous week.

Second, PrevQuanti observed a lower rate of unhealthy behaviors than the *Baromètre santé* (*Health Barometer*), a French survey representative of the general population. The difference lies principally in PrevQuanti's lower estimates of the rates of unhealthy diet and physical

Table 1
Patients' characteristics, by gender.

m	Men (n = 1259)		Women (n = 1340)	
	N	n (%)	N	n (%)
Age (years)	1259		1340	
40–49		453 (36.0)		499 (37.2)
50–59		390 (31.0)		425 (31.7)
60–75		416 (33.0)		416 (31.0)
Chronic disease	1259	456 (26.3)	1340	271 (20.2)
Body mass index (kg/m^2)	1226		1304	
< 25		571 (46.6)		846 (64.9)
25– < 30		502 (41.0)		288 (22.1)
≥30		153 (12.5)		170 (13.0)
Length of doctor-patient relationship (years)	1247		1325	
0–1		91 (7.3)		77 (5.8)
> 1–3		439 (35.2)		407 (30.7)
> 3		717 (57.5)		841 (63.5)
Number of consultations in the past year	1256		1333	
0		186 (14.8)		169 (12.7)
1		170 (13.5)		177 (13.3)
2		209 (16.6)		193 (14.5)
≥3		691 (55.0)		794 (59.6)
Smoking[a]	1258	384 (30.5)	1333	331 (24.8)
Excessive alcohol consumption[b]	1166	195 (16.7)	1202	106 (8.8)
Unhealthy diet[c]	1133	740 (65.3)	1222	665 (54.4)
Physical inactivity[d]	1259	611 (48.5)	1340	637 (47.5)
Occupation[e]	1160		1255	
Blue-collar workers		190 (16.4)		42 (3.4)
Office, sales, and service workers		126 (10.9)		377 (30.0)
Intermediate professions		206 (17.8)		328 (26.1)
Managers and superior intellectual professions		638 (55.0)		508 (40.5)
Educational level	1235		1314	
Did not pass school-leaving exam		164 (13.3)		190 (14.5)
Passed school-leaving exam		384 (31.1)		424 (32.3)
University diploma		687 (55.6)		700 (53.3)
Perceived financial situation	1219		1309	
"I'm not managing"		51 (4.2)		74 (5.7)
"It's tight, I must be careful"		372 (30.5)		408 (31.2)
"It's OK"		613 (50.3)		673 (51.4)
"I'm quite comfortable"		183 (15.0)		154 (11.8)

[a] Current consumption of tobacco.
[b] At-risk consumptions according to the WHO criteria: 40 g/day for men and 20 g/day for women (mean over the past seven days).
[c] Ate fewer than 5 portions of fruits and vegetables the previous day.
[d] No regular physical activity over the week.
[e] Based on the patient's current or last occupation (or, for patients who had never worked, their partner's last occupation).

inactivity; the smoking and alcohol levels were very similar. These may have been underestimated due to either or both of two different types of bias: selection and social desirability. It is nonetheless difficult to know the direction and extent to which these biases might modify the social and gender inequalities observed.

Third, the three characteristics classically used in social epidemiology to estimate individual social positions are occupation, educational level, and income. We used the first two, but chose to use a proxy for income, given the delicacy of asking patients about their income in the French context of a doctor's visit where the patient pays the doctor's fees at the end of the consultation. Accordingly, we simply asked the patients about their perceived household financial situation. This subjective assessment is widely used and its value has been clearly demonstrated (Hagenaars and de Vos, 1988).

Fourth, our sample does not include men or women younger than 40 years. Young people are known to be at higher risk than their elders of accumulating unhealthy behaviors (Noble et al., 2015). Nonetheless, we do not know whether social gradients are more marked among young men than young women and therefore whether the presence of people younger than 40 would have modified our comparison between sexes.

Our study has also several strengths, including its very satisfactory response rate for a postal questionnaire. Another important strength is our use of RIIs, which enabled us to compare populations with different social distributions. The RIIs thus allow comparisons over time (our data are starting to be somewhat dated, and the study may be repeated to determine whether social gradients have been modified) and space (to compare the social gradients between different countries).

4.2. Comparison with the literature

Our search found no data from the literature comparing the amplitude of social gradients for the accumulation of unhealthy behaviors between the genders (with appropriate measures). The generalizations of our results should therefore be confirmed by other analyses, given that health behaviors as well as their social and gender differences vary according to their cultural setting (Stringhini et al., 2011). Nonetheless, studies have examined each unhealthy behavior separately and shown that the social gradient for smoking was higher among men (Bricard et al., 2015) while those from physical activity and diet were similar in both genders (Malon et al., 2010). These results are consistent with those observed in our sample (the RIIs for each of the 4 unhealthy behaviors studied are reported in the Supplementary material).

4.3. Interpretation

The gap between the top and bottom of the social scale for the accumulation of unhealthy behavior has an amplitude at least similar to if not stronger than the gaps between men and women. For example, according to perceived financial situation, men and women at the bottom of the social scale had an average of 1 unhealthy behavior more than those at the top (specifically, 0.93 for the men and 1.01 for the women), while the gap between the genders was 0.24 behaviors. Social position is thus a stronger risk factor than gender for the accumulation of unhealthy behaviors. This result has previous been mentioned in the literature (Meader et al., 2016) but without any statistical comparison. The explanation for the less marked social inequalities in health among women than men must therefore be sought elsewhere than in the accumulation of unhealthy behaviors.

5. Conclusion

The social inequalities in the accumulation of unhealthy behaviors have a similar amplitude among men and women. Men at the bottom of the scale are the social group at greatest risk, but the women also must not be forgotten. While male gender and a lower social position are two characteristics associated with more unhealthy behaviors, the predominance of the social dimension over gender should be underlined. Consequently, GPs must pay particular attention to the health behaviors of their patients at the bottom of the social hierarchy, regardless of their sex. They should also preferentially use health promotion techniques that target several behaviors and have been developed specifically for disadvantaged populations.

Supplementary data to this article can be found online at https://doi.org/10.1016/j.pmedr.2018.07.008.

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Table 2
Number of unhealthy behaviors and association with the patient socioeconomic position, by gender[a].

	Men			Women		
	Mean number of unhealthy behaviors (of 4)	RR/RII [95%CI]	*P*	Mean number of unhealthy behaviors (of 4)	RR/RII [95%CI]	*P*
Occupation	n = 1505			n = 1362		
Managers and superior intellectual professions	1.48	1	0.002	1.26	1	0.011
Intermediate professions	1.64	1.11 [0.99, 1.24]		1.31	1.04 [0.93, 1.16]	
Office, sales, and service workers	1.85	1.22 [1.07, 1.39]		1.48	1.18 [1.06, 1.31]	
Blue-collar workers	1.74	1,18 [1.06, 1.32]		1.58	1.30 [1.01, 1.67]	
RII		1.37 [1.16, 1.62]	< 0.001		1.33 [1.11, 1.60]	0.002
Educational level	n = 1613			n = 1421		
University diploma	1.47	1	< 0.001	1.29	1	0.005
Passed school-leaving exam	1.76	1.20 [1.10, 1.31]		1.43	1.13 [1.03, 1.25]	
Did not pass school-leaving exam	1.76	1.25 [1.11, 1.40]		1.46	1.21 [1.06, 1.38]	
RII		1.46 [1.25, 1.71]	< 0.001		1.34 [1.12, 1.60]	0.001
Perceived financial situation	n = 1591			n = 1419		
“I'm quite comfortable”	1.38	1	< 0.001	1.10	1	< 0.001
“It's OK”	1.50	1.09 [0,96, 1.23]		1.26	1.13 [0.96, 1.32]	
“It's tight, I must be careful”	1.75	1.26 [1.10, 1.44]		1.50	1.35 [1.15, 1.59]	
“I'm not managing”	2.31	1.61 [1.34, 1.94]		2.11	1.77 [1.48, 2.12]	
RII		1.50 [1.28, 1.76]	< 0.001		1.69 [1.43, 1.99]	< 0.001

RII: relative index of inequality, 95%CI: 95% confidence interval.
Readers' guide: The RR compares one category to the reference category (RR = 1). The RII, which can be interpreted as the RR for those at the bottom of the social hierarchy compared to those at the top, summarizes the social inequalities across all categories.
[a] Adjusted for age, number of consultations during the past year, length of doctor-patient relationship, and body mass index.

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Conflicts of interest

None.

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