Prevalence, Co-Occurrence and Clustering of Lifestyle Risk Factors Among UK Men

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Abstract

Objective: Men – more than women - engage in unhealthy lifestyle practices that place them at greater risk of developing non-communicable disease. This paper aims to explore the prevalence, co-occurrence and clustering of four core lifestyle risk factors and examine the socio demographic variation of their distribution, among men living in two central London boroughs.

Method: A stratified street survey was undertaken with N=859 men. Prevalence odds ratios calculated risk factor clustering and a multinomial logistic regression model examined the socio-demographic variation.

Results: Over 72% of men presented with combinations of lifestyle risk factors. Physical inactivity combined with a lack of fruit and vegetables was the most common combination. Co-occurrence was more prominent for unemployed, widowed, divorced/separated and white British men. Clustering was evident for adherence and non-adherence to UK health recommendations.

Conclusion: Men may benefit from targeted health interventions that address multiple – rather than single – health related behaviours.

Keywords: men's health, clustering, lifestyle risk reduction

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Introduction

Over time, the impact of risk factors that underwrite the burden of disease have changed substantially, shifting from risk factors for communicable diseases in children towards those for non-communicable diseases in adults.[1] However, this shift is subject to considerable global variation, being less common in regions where poverty and poor sanitation are widespread.[2] Underpinning this shift - in the western world - are changes in social practices.[3] Reduced physical activity levels (linked with increased sedentary behaviour), inadequate fruit and vegetable intake, drinking cultures that are accepting of both regular and binge drinking and smoking rates all play a part.[4]

There is ample evidence that these behaviours contribute significantly to the development of non-communicable diseases.[5] For example, in 2010 the leading risks for global disease burden included both tobacco smoking (incorporating second-hand smoke inhalation) and alcohol use.[1] Further, unhealthy diets and physical inactivity are considered the largest contributors to disability adjusted life years (DALYs).[6] However, compared to our understanding of individual unhealthy behaviours, relatively little is known about their co-occurrence.[7] The available data suggests that unhealthy lifestyle behaviours frequently occur in combination, [8-11] and that the associated health risks are multiplicative rather than additive.[12]

The incidence of lifestyle risk factors shows a socioeconomic/demographic gradient that ought to be reflected in preventative Public Health policy.[6] In the UK, unhealthy lifestyle behaviours are reported more frequently in the lower social classes, among individuals reporting lower levels of education and in men.[8,13,14] While data illustrates a responsiveness to lifestyle improvement programmes among men who are in higher socio-economic and educational groups,[15] a large proportion of men appear to be underserved and/or unreached.[16,17] This has generated a significant degree of avoidable premature death and chronic disease among these groups.[18-21]

Lambeth and Southwark are two inner London boroughs covering of 26.82 Km^2 and 28.85 Km^2 respectively with populations of around 300k residents,[22] and high population densities.[23] Lambeth is ranked as the 29th most deprived local authority in England and Southwark as the 41st.[24] Life expectancy for men in Lambeth and Southwark is lower than the national average, lower than most other London boroughs and significantly lower than that of women in both boroughs.[25] Moreover, there is a difference in life expectancy for males of 5.3yrs between those in the most and least affluent parts of Lambeth and of 10.4yrs between males in the most and least affluent parts of Southwark.[25]

To date, little has been done to examine the lifestyle behaviours of men in these London boroughs. This paper aims to determine the most prevalent co-occurring lifestyle risk factors for men living in Lambeth and Southwark. Further, it aims to examine variations in the socio demographic clustering of these risk factors.

Method

The Men's Health Forum - a national charity (https://www.menshealthforum.org.uk/) -was commissioned by Guy's and St. Thomas' Charity to address the health of men in Lambeth and Southwark. This research - undertaken by Leeds Beckett University - formed part of the wider scoping study and community men's health needs assessment.[26] These data are the first of their kind with this group. They may help to establish the core lifestyle behaviours and groups around which to frame future health related programmes to deliver the greatest impact on mortality and morbidity rates.

Study Population and Data Collection Protocol

Having gained ethical approval, a face-to-face street survey was conducted between March and April 2013. The total survey sample consisted of *N*=859 men. To reflect the demographic profile of each borough, the sample was stratified by age and ethnicity. Only men living in Lambeth or Southwark were eligible to participate (i.e. men passing through the boroughs for work reasons etc. were excluded). The survey questionnaire was piloted and refined for use with staff at the Men's Health Forum to ensure usability.[27] The data capture was contracted out to an independent market research company. Prior to data collection, fieldworkers were briefed by the university team leading the research to ensure all aspects of the survey were understood. The interview sites for the face-to-face surveys were Borough St Market, Clapham High St, Clapham Junction, Streatham High St, Peckham High St, Waterloo Market, Elephant and Castle, East St Market and Dulwich. Sites were chosen to ensure best access to the stratified sample required.

Socio Demographics

The socio demographic variables age, economic status, ethnicity and marital status were included in this survey. (See Table 1) Age was split in to eight categories (18-24, 25-34, 35-44, 45-54, 55-64, 65-74 and 75+) for descriptive analysis and tests for associations. However, this variable was split into 3 categories (18-34, 35-54 and 55+) for regression modelling. Ethnicity compared white British respondents with men from all other ethnicities. Economic status was split in to 6 categories for descriptive analysis (Employed, unemployed, retired, student, not working due ill health or disability and volunteering). For regression modelling, economic status compared economically active respondents (i.e. working full time or part time) with those who were economically inactive (i.e. unemployed, not working due to disability/ill health or retired). Marital status was split in to 6 categories for descriptive analysis (Single, married, living with partner, widowed, divorced/separated and other). For regression modelling, marital status compared men who were married or living with a partner with men who were single or widowed/divorced/separated.

Lifestyle Risk Factors

Based on UK physical activity recommendations,[28] participants were asked to report the number of days over the preceding week that they achieved ≥30 minutes of moderate to vigorous intensity physical activity (MVPA).[29] Participants failing to accumulate the equivalent of ≥150 minutes MVPA each week were categorised as being insufficiently active and presented this risk factor. Diet was measured by calculating total fruit and vegetable portions (≥100gs) consumed on a typical day. Participants were deemed to have a lifestyle risk factor if they ate less than five daily portions.[30] Alcohol consumption was measured against existing recommendations for adult men.[31] Participants were asked to report their alcohol intake on an average week. Men exceeding the national guidelines (≥21 units per week) were assigned this risk factor. Participants were also asked if they had never smoked, were a former smoker or a current smoker. Current smokers were classified as presenting this particular risk factor.[32]

Analyses

The analysis of this study consisted of three parts. First, the descriptive characteristics of the population are described by socio demographics and individual lifestyle risk factors. Differences in these variables between men from Lambeth and Southwark are statistically tested by Chi-square tests for association (χ^2) and Mann-Whitney tests (U). Secondly, the co-occurrence and clustering of lifestyle risk factors were calculated. The total number of lifestyle risk factors presented by each participant is reported (0-4). The number and percentage of each of the 16 possible combinations of lifestyle risk factors is also described. Clustering exists when the observed combination of lifestyle risk factors exceeds the expected prevalence of the combination. This expected prevalence was calculated on the basis of the probabilities of each risk factor based on their occurrence in the study population.[8,13] The associations between two sets of lifestyle risk factors were examined by calculating the prevalence odds ratios (POR) and statistically tested by Chi-square tests (χ^2).

$$POR = \frac{\text{Number of respondents without both risk factors}}{\text{Number of respondents with both risk factors}} \times \frac{\text{Number of respondents with the one risk factor}}{\text{Number of respondents with the other risk factor}}$$

Finally, we examined the socio demographic variation in the prevalence of the lifestyle risk factors. A multinomial logistic regression model assessed the probability that an individual had lifestyle risk factors compared to a reference group of '0'.[33] The socio demographic variables age, employment and relationship status were collapsed to remove singularities found in the hessian matrix. Analyses were conducted using SPSS for windows version 19.0.

Results

In total, the sample included N=859 men living in Lambeth and Southwark. Characteristics of the sample are shown in Table 1. Participants were for the most part 18-44 years old (63.2%, *n*=543), and in paid employment (67.4%, *n*=579). The ethnic configuration of the sample was predominantly white British (59.5%, *n*=511) and being single was the most frequently reported marital status (44.5% *n*=382). There were no statistically significant differences (χ^2 *p*= >.05) in socio demographics between men from Lambeth and Southwark. With reference to lifestyle behaviours, 73% (*n*=627) of men failed to consume ≥5 daily portions of fruit and vegetables, 72.8% (*n*=625) of men were insufficiently active, 29.5% (*n*=253) drank more than the recommended alcohol intake each week

and 25.1% (n=216) were current smokers. Significantly more men in Southwark presented diet ($\chi^2[1]=5.043$, $p<.05$) and physical activity ($\chi^2[1]=13.059$, $p<.001$) as a lifestyle risk factor compared to men in Lambeth.

Table 2 shows the observed and expected prevalence of each combination of lifestyle risk factors. Data highlights that only 6.5% (n=56) of participants reported no lifestyle risk factors, 21.7% (n=186) reported one, and 42.9% (n=369) reported two. Nearly 23% (n=196) of men reported three lifestyle risk factors and 6.1% (n=52) presented all four in combination. Analysis indicates that men in Southwark presented significantly higher lifestyle risk factor totals compared to men in Lambeth (U=82955.00 $p<.05$). For clustering, the observed prevalence of men displaying none, and all four lifestyle risk factors was greater than could have been expected on the basis of the individual probabilities of the four risk factors alone. Other combinations where the observed prevalence exceeded the expected prevalence – or clustered – included (i) smoking and excessive alcohol consumption, (ii) physical inactivity and a lack of fruit and vegetables and (iii) excessive alcohol with a lack of fruit and vegetables and smoking. For individual lifestyle risk factors, the prevalence of physical inactivity and a lack of fruit and vegetables individually were less than expected, whereas the prevalence of smoking and excessive alcohol consumption individually were greater than expected.

Table 3 shows the absolute prevalence and prevalence odds ratios (POR) of combinations of two lifestyle risk factors. It suggests that a lack of fruit and vegetables and physical inactivity are clustered, as are smoking and excessive alcohol consumption.

The multinomial multilevel logistic regression model is displayed in Table 4. The dependent variable was an individual's lifestyle risk factor total. Men from BME backgrounds were 65% less likely to report all four lifestyle risk factors (Odds Ratio [OR]: 0.35, 95% Confidence Interval [CI]: 0.16 - 0.77) compared to white British men. Compared to men who were in employment, unemployed men were three and a half times more likely to report all four lifestyle risk factors (OR: 3.43, 95% CI: 1.11 – 10.58). Further, men who were widowed, divorced or separated were over four times more likely to report all four lifestyle risk factors (OR: 4.26, 95% CI: 1.02 - 17.86) compared to men who were married or living with a partner.

Discussion

This paper examined the prevalence, co-occurrence and clustering of physical inactivity, tobacco smoking, unhealthy diet and excess alcohol consumption in men living in two London boroughs. Combined, these unhealthy behaviours can have a significant influence on non-communicable disease[5] and life expectancy.[9] Data from this paper revealed that lifestyle risk factor incidence was highly prevalent both individually and in combination across the sample. For the most part, men residing in Southwark presented considerably worse health risk profiles compared to men in Lambeth.

Around 22% of men reported one lifestyle risk factor. Independently, physical inactivity was the most frequently occurring (10%) followed by diet (8.1%). Our results suggest that these behaviours may be a best buy for single lifestyle behaviour programmes. In contrast, participants that smoked and reported no other lifestyle risk factors accounted for 1.5% of the sample and those reporting alcohol alone accounted for 2%. Although these risk factors were not prominent in isolation, they were highly predictive of other unhealthy behaviours. For example, 94% of smokers and 93% of men exceeding alcohol recommendations reported additional lifestyle risk factors. While there is evidence to suggest that interventions focussed on addressing single behaviours are more effective at altering a targeted behaviour compared to multiple interventions,[34] this paper has shown that men rarely present risk factors in isolation. Unhealthy behaviours are often interconnected,[35] therefore interconnected approaches to their prevention and treatment may be required.

In total, three-quarters of the participants reported unhealthy behaviours in combination. Mapping the linkages is an important and complex challenge. The most prevalent combination of lifestyle risk factors comprised physical inactivity co-occurring with a diet low in fruit and vegetables. Overall, 30% of the sample reported this particular combination and 56% reported this combination alone or with additional risk factors. Other studies have identified the co-occurrence of these behaviours as the most prevalent combination of risk factors in men, 17%,[13] 24%,[8] 37%.[33] Our data adds to the growing evidence base highlighting the prevalence of these behaviours. Given that physical inactivity and diet are the largest contributors to DALYs[6] and are among the leading causes of non-communicable disease in higher income

countries,[36] interventions that combine energy expenditure with nutritional strategies appear a workable and necessary line of intervention

Clustering suggests that behaviours have a propensity to go together, indicating that they are related. Fundamentally, engaging in one behaviour modifies the risk of engaging in another.[10] The clustering of all four lifestyle risk factors found in this study has previously been reported elsewhere.[8,13] Further, a cluster including smoking and excessive alcohol consumption has also been found in other research involving UK men,[8,13,14,37] reinforcing the strong relationship between these behaviours. A recent systematic review reported that a considerable percentage of studies identified a healthy cluster depicted by the lack of any risk factors.[10] Our data confirms these findings. Future research should look to untangle and test the mechanisms that generate these clusters.

Data investigating the associations found between demographic variables and clustering have been blurred to date.[10] Despite that, some groups of men – more than others - within our sample were more at risk of presenting unhealthy behaviours. Multiple lifestyle risk factors were more widespread among men who were unemployed, widowed, divorced or separated and white British. Previous research has also highlighted an increased prevalence of multiple risk factors among economically inactive participants.[8] To our knowledge, this is the first study to find that multiple lifestyle risk factors were more prevalent among white British men and men who are widowed, divorced or separated. Future research aimed at improving health with marginalised groups of men may benefit from incorporating multiple lifestyle behaviour change with components designed to help manage relationships and improve social networks.

These findings should be viewed within the study's methodological limitations. The non-probability sample and its size may be subject to volunteer bias and therefore limit the external validity of the results. Further, the cross-sectional design limits the causal inferences that can be drawn from the data and may be prone to non-response bias if participants who consented to take part differed from those who did not. Given the self-reported nature of the survey, the results reflect the men's own understanding of their health rather than a clinical or objective assessment. The data may have been subject to response bias given the nature of the questions and an unknown level of ascertainment bias may have occurred.

Although our data lend support to the call for strategies that promote multiple healthy lifestyle practices,[9,38-41] there are currently a lack of approaches that intersect multiple behaviours. Furthermore, where results have been positive, effect sizes are often small.[40] Nevertheless, simultaneous methods of lifestyle change have been effective for individuals already diagnosed with CVD or diabetes.[40,42] This being the case, when individuals are capable of changing multiple lifestyle practices, establishing the optimal number they can change simultaneously is key.[43] Some practitioners have preferred to tackle multiple risk factors sequentially,[44] conceivably because achieving change in one area may increase self-efficacy and thereby increase motivation to change other behaviours.[45,46] Yet this approach is not better than - and may be inferior to - simultaneous methods.[47]

Ultimately, changes in lifestyle risk factor profiles are gradual.[36] The current default position is an environment that promotes unhealthy behaviours. As a result, health systems can assume, with a fair degree of accuracy that problematic lifestyle practices observed now will be problematic for years to come. Health systems should have a clear plan for long term sustained non-communicable disease prevention by managing the common underlying risk factors of their incidence.

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Competing Interests: None declared.

Ethical Approval: Ethical approval was obtained from the Faculty of Health and Social Sciences Research Ethics Committee at Leeds Beckett University.

Table 1: Characteristics of Respondents

		All Respondents (*n*=859)	Lambeth (*n*=449)	Southwark (*n*=409)
Socio Demographics				
Age	18-24 25-34 35-44 45-54 55-64 65-74 75+	14.6% 28.6% 20.0% 17.6% 9.7% 6.3% 3.3%	15.1% 28.7% 19.4% 17.8% 10.0% 6.0% 2.9%	13.9% 28.6% 20.5% 17.4% 9.3% 6.6% 3.7%
Ethnicity	White British BME	59.5% 40.5%	60.7% 39.3%	58.3% 41.7%
Employment Status	Employed Unemployed Retired Student NW ill Health/Disability Volunteering	67.4% 11.4% 9.8% 9.8% 1.2% 0.5%	68.6% 12.2% 9.4% 8.0% 1.3% 0.4%	66.0% 10.5% 10.3% 11.7% 1.0% 0.5%
Marital Status	Single Married Live With partner Widowed Divorced/Separated Other	44.5% 28.5% 17.0% 3.4% 6.5% 0.1%	48.3% 27.4% 15.4% 3.3% 5.3% 0.2%	40.3% 29.8% 18.6% 3.4% 7.8% 0.0%
Lifestyle Risk Factors				
Lack of Fruit/Vegetables	<5 Portions/Day	73.0%	69.7%	76.5%
Physical Inactivity	<5 days per week	72.8%	67.5%	78.5%
Excessive Alcohol	≥21 Units/Week	29.5%	28.3%	30.8%
Smoking	Yes	25.1%	27.2%	22.8%
Number of LRF's	4 3 2 1 0	6.1% 22.8% 42.9% 21.7% 6.5%	6.5% 20.3% 40.5% 24.9% 7.8%	5.6% 25.7% 45.5% 18.1% 5.1%

Note: One respondent did not provide data on which borough they lived in, NW = Not working due to, LRF's = Lifestyle Risk Factors, BME = Black and Minority Ethnic.

Table 2: Prevalence of Combinations Lifestyle Risk Factors; Observed vs. Expected

Identified Lifestyle Risk Factors					Prevalence	
Number of Risk Factors	***Lack of Fruit/Veg***	***Physically Inactive***	***Current Smoker***	***Excessive Alcohol***	***Observed % (n)***	***Observed / Expected***
4	✔	✔	✔	✔	6.1 (52)	1.54
					Total 6.1 (52)	**1.54**
3	✔	✔	✔	***X***	8.8 (76)	0.94
	✔	✔	***X***	✔	11.1 (95)	0.94
	✔	***X***	✔	✔	1.5 (13)	1.03
	X	✔	✔	✔	1.4 (12)	0.96
					Total 22.8 (196)	**0.95**
2	✔	✔	***X***	***X***	30.5 (262)	1.09
	✔	***X***	✔	***X***	3.4 (29)	0.96
	✔	***X***	***X***	✔	3.5 (30)	0.78
	X	✔	✔	***X***	1.6 (14)	0.47
	X	✔	***X***	✔	3.3 (28)	0.75
	X	***X***	✔	✔	0.7 (6)	1.28
					Total 42.9 (369)	**0.97**
1	✔	***X***	***X***	***X***	8.1 (70)	0.78
	X	✔	***X***	***X***	10.0 (86)	0.96
	X	***X***	✔	***X***	1.5 (13)	1.16
	X	***X***	***X***	✔	2.0 (17)	1.22
					Total 21.7 (186)	**0.91**
0	***X***	***X***	***X***	***X***	6.5 (56)	1.68
					Total 6.5 (56)	**1.68**

Note: ✔ = Risk factor present, ***X*** = Risk factor absent, Veg = vegetables,

Table 3: Prevalence and Prevalence Odds Ratio of Combinations of Two Lifestyle Risk Factors

	All Respondents (*N*=859)		
Identified Combination of Risk Factors	***Prevalence***	***POR***	***$\chi^2(1)$***
Lack of Fruit & Vegetables & Physically Inactive	56.5%	2.24	**3.931 ***
Lack of Fruit & Vegetables & Excessive Alcohol	22.2%	1.17	0.172 ns
Physically Inactive & Excessive Alcohol	21.9%	1.09	0.062 ns
Lack of Fruit & Vegetables & Current Smoker	19.8%	0.83	1.371 ns
Physically Inactive & Current Smoker	17.9%	1.06	1.122 ns
Current Smoker & Excessive Alcohol	9.7%	1.75	**6.095 ***

Note: POR = Prevalence Odds Ratio, * = $p<0.05$, ns = Not Significant $p>0.05$

Table 4: Odds Ratios and 95% Confidence Intervals for Predictors of the Number of Lifestyle Risk Factors

	One Lifestyle Risk Factor			Two Lifestyle Risk Factors			Three Lifestyle Risk Factors			Four Lifestyle Risk Factors		
	OR	95%CI		OR	95%CI		OR	95%CI		OR	OR	
Age												
(18-34)												
35-54	1.26	0.66 to 2.42	n.s.	1.21	0.66 to 2.23	n.s.	1.04	0.55 to 1.99	n.s.	1.15	0.50 to 2.65	n.s.
55+	2.13	0.86 to 5.32	n.s.	1.95	0.81 to 4.66	n.s.	1.39	0.55 to 3.49	n.s.	2.00	0.67 to 6.01	n.s
Ethnicity												
(White British)												
BME	0.49	0.27 to 0.91	*	0.42	0.24 to 0.75	**	0.40	0.22 to 0.75	**	0.35	0.16 to 0.77	**
Employment Status												
(Employed)												
Student	0.61	0.26 to 1.40	n.s.	0.50	0.23 to 1.11	n.s.	0.52	0.23 to 1.22	n.s.	0.25	0.50 to 1.20	n.s.
Retired	3.05	0.68 to 13.58	n.s.	3.39	0.79 to 14.58	n.s.	1.93	0.42 to 8.85	n.s.	2.45	0.42 to 14.28	n.s.
Unemployed	0.52	0.17 to 1.65	n.s.	1.48	0.55 to 3.96	n.s.	1.27	0.45 to 3.55	n.s.	3.43	1.11 to 10.58	*
Marital Status												
(Married/LWP)												
Single	1.02	0.55 to 1.88	n.s.	1.01	0.56 to 1.80	n.s.	0.97	0.52 to 1.79	n.s.	1.31	0.59 to 2.94	n.s.
Widowed/DS	1.23	0.32 to 4.67	n.s.	2.10	0.61 to 7.28	n.s	2.20	0.61 to 7.92	n.s	4.26	1.02 to 17.86	*

Note: *=$p<.05$, **=$p<.01$, n.s. = non-significant; the reference group of predictor variables are given in parentheses, BME= Black and minority ethnic, LWP = Live with Partner, DS = Divorced or Separated

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