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The sedentary profile of primary care patients

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ABSTRACT

Background Primary care is one of the key environments in which to target public health and sedentary behaviours are increasing being linked to several adverse health outcomes. The aim of this study was to determine the prevalence and correlates of sedentary behaviour in an adult primary care population.

Methods The International Physical Activity Questionnaire was used to collect data on the weekday sitting of participants. Stratified random sampling based on urban/rural location and deprivation was used to identify three primary care centres from which the sample was drawn.

Results Data were collected from 885 participants (96.7% response rate) of whom 64% ($n = 565$) were female and 36% ($n = 320$) were male. The mean age was 42 (SD 14.2). Overall 48% ($n = 418$) of participants sat for >4 h daily with a median sitting time of 240 min (IQR 150–480). Attendance at the urban non-deprived primary care centre (B = 0.237, $P < 0.001$), male gender (B = 0.284, $P < 0.001$), overweight/obesity (B = 0.081, $P = 0.048$) and having a disability or injury limiting physical activity (B = 0.093, $P = 0.028$) were associated with higher sitting times.

Conclusion This study established the factors that influence sedentary behaviours in the primary care population which can help inform the development and targeting of promotional strategies.

Keywords physical activity, primary care, public health

Background

There is a growing body of evidence to suggest that sedentary behaviour is a distinct risk factor, independent of physical activity, for multiple adverse health outcomes.[1,2] Sedentary behaviours are defined as any waking behaviours characterized by an energy expenditure of ≤1.5 METs (where 1 MET equals the energy expenditure at rest)[3] while in a sitting or reclining posture[4] and typically include activities such as watching television, using a computer and driving a car. Studies have found strong evidence to support a relationship between sedentary behaviours and all-cause and cardiovascular disease mortality, and moderate evidence for a positive relationship between sitting time and the risk of Type 2 diabetes and site-specific cancers.[5,6]

Whilst there are yet no widespread or well accepted public health guidelines that quantify the limits of sedentary behaviour in adults, a number of countries include recommendations to minimize the amount of time being sedentary and to avoid periods of prolonged sitting.[7–9] Within the health sector, primary care is one of the key environments in which to monitor and target public health and in Ireland, increasing investment is being directed towards primary care with a strategic focus on the prevention of chronic disease and the promotion of health and wellbeing.[10] This offers a unique opportunity to develop sedentary behaviour interventions that align with governmental policy and are integrated into health reform.

In order to inform the development and targeting of promotional strategies, it is necessary to have accurate surveillance data quantifying the sedentary behaviours of the primary care population. Population studies with a primary focus on assessing sedentary behaviours in adults have become more prevalent in the last decade.[11,12] A commonly used approach to the

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study of sedentary behaviours is to consider the interrelationships between individuals and their social and physical environment such as that proposed by the socio-ecological model.[13] This approach uses a comprehensive framework to explain sedentary behaviour, proposing that determinants at all levels—individual, social, environmental and policy are all contributors.[14] Two reviews have recently summarized the evidence regarding the factors that influence sedentary behaviours in adults.[15,16] These include individual factors such as age, gender and health status, behavioural factors including physical activity and smoking, as well as factors related to socio-economic status and the environment.[15,16]

A measure of sedentary behaviour has only recently been included in the National Health Survey in Ireland, with preliminary findings suggesting that adults spend an average of 5.3 h sitting each weekday.[17] At present, it is unclear whether national level data provides an accurate measure of the sedentary behaviours of the primary care population. Primary care services in Ireland are accessed free of charge by ~40% of the population who are in receipt of a medical card, which is available to people of low income or with certain chronic diseases, the remainder of the population are subject to fees, some of which may be refundable through private medical insurance. Medical card eligibility has been shown to exert a significant effect on primary care visiting with medical card holders more likely to consult with their GP than non-medical card holders.[18] Therefore, people accessing primary care may have less favourable health profiles or due to poorer socio-economic circumstances be considered more at risk than the general population. Reliance solely on general population data may not provide an accurate measure or investigation into the factors that influence sedentary behaviours specifically in a primary care population. The aim of this study was to determine the prevalence and correlates of sedentary behaviour in an adult primary care population.

Methods

Computer generated, stratified random sampling was used to identify three primary care centres in the Leinster region of the Republic of Ireland from which the sample was drawn. This geographical area is the largest operational region within the National Health Service, with approximately one-quarter of the Irish population resident there and was chosen for its good mix of rural and urban locations. Stratification was based on the urban/rural location of the centre and the SARHU National Deprivation Index which is a score given to each of the electoral districts in Ireland, calculated through four census-based indicators widely thought to represent material disadvantage.[19]

Following a pilot study to test the feasibility of the study tool and data collection process, the sample was drawn equally from the three primary care centres: (i) an urban deprived location, (ii) an urban non-deprived location and (iii) a rural primary care location with mixed deprivation scores. A sample size of 750 was calculated based on data from the pilot ($n = 159$) and an additional 10% added to allow for subgroup analysis. Sample size adhered to the recommended criteria of 20 cases per variable when calculating sample size for regression analysis.[20]

The short version of the self-administered International Physical Activity Questionnaire (IPAQ) was used to collect data on sitting time and physical activity levels of participants.[21] This questionnaire contains one item asking participants to recall how much time they spent sitting on weekdays during the last 7 days. It has been found to have acceptable validity (Spearman's correlation coefficients 0.3) and reliability (Spearman's correlation coefficients above 0.70) in this measure[21] and has also been used to measure sitting in several large international prevalence studies[11,12,22] as well as in the National Health Survey in Ireland.[17]

Using a standardized scoring protocol the IPAQ was also used to classify participants as active or inactive. Active was defined as meeting the public health recommendations equating to 150 min of moderate intensity exercise per week or an equivalent amount of vigorous activity.[23] Those not meeting the recommendations were classified as inactive.

An additional questionnaire collated information on socio-demographic details, the presence of a disability/injury limiting physical activity and history of self-reported cardiovascular disease and risk factors. Questions on illness variables were adopted from the National Health Survey in Ireland.[24] The questionnaires are presented under supplementary information. Consenting adults between the ages of 18 and 69 years, capable of completing the questionnaires in English were consecutively recruited as they presented for their primary care appointment. Data were collected from November 2011 to January 2012 with approximately 5 days spent in each of the three centres. This study was granted ethical approval by the Research Committee of St James's and Tallaght Hospitals, Dublin.

Statistical analysis

Data from the questionnaires were inputted to SPSS version 19.0 (SPSS, Inc., Evanston, IL, USA) and analysed using descriptive and inferential statistics. Sitting time was presented as a categorical measure; divided into five—2 hourly categories and as a continuous score expressed as median (IQR) minutes per weekday. Data were presented according to socio-demographic variables: gender, age, education and primary care area; physical activity variables: active or inactive; having an injury/disability

limiting physical activity (yes/no) and illness variables: history of cardiovascular disease (yes/no), smoking (yes/no), overweight/obese (yes/no). BMI was calculated from self-reported height and weight and used to classify people as normal weight (18.5–24.9 kg/m^2), overweight (25–29.9 kg/m^2) or obese (BMI >30 kg/m^2).[25] Generalized linear regression, scale response, gamma with log link was used to examine for associations between sitting time and socio-demographic, physical activity and cardiovascular variables. The level of significance for statistical testing was set at $P \leq 0.05$. Counts for missing data are provided in the tables.

Results

Overall 915 people were invited to complete the questionnaire. After excluding adults who declined to participate ($n = 15$, 1.6%) and removing incomplete datasets ($n = 11$, 1.2%), data from 885 participants were analysed (97% response rate). Overall 64% ($n = 565$) of participants were female and 36% ($n = 320$) were male with a mean age was 42 (SD 14.2).

Table 1 presents the weekday sitting time (median minutes) and sitting category of participants according to socio-demographic, physical activity and illness variables. The median sitting time for all participants was 240 min (IQR 150–480). Overall, one-fifth (20.6%, $n = 179$) of participants sat for up to 2 h per weekday. The largest proportion of participants (31.4%, $n = 273$) reported sitting between 2 and 4 h daily. In total, almost half (48%, $n = 418$) of all primary care patients sat for >4 h a day, one-third (32.8%, $n = 286$) sat for more than 6 h and 15% ($n = 133$) sat for more than 8 h each day.

Table 2 presents the results from the regression analysis and details the significant factors remaining in the model. Attendance at the urban non-deprived primary care centre (B = 0.237, $P < 0.001$), being male (B = 0.284, $P < 0.001$), being overweight/obese (B = 0.081, $P = 0.048$) and having a disability or injury limiting activity (B = 0.093, $P = 0.028$) were associated with higher sitting times. Female gender, increasing age, higher educational achievement and living in a rural environment were predictive of lower sitting times. There was no association between sitting time and physical activity, smoking or cardiovascular disease.

Discussion

Main findings of this study

Overall 48% ($n = 418$) of the primary care population sampled sat for >4 h a day with a median weekday sitting time of 240 min (IQR 150–480). Attendance at the urban non-deprived primary care centre, male gender, being overweight/obese and having a disability or injury limiting activity were positively associated with sitting. Males reported 2 h more daily sitting than females. The urban non-deprived participants as the most sedentary, sat for 2 h and 25 min more per day than the least sedentary rural group.

What is already known on this topic

The finding that 48% of primary care patients sat for >4 h a day compares with a prevalence estimate of 41%, for adults worldwide.[12] The median sitting time for all participants was 240 min or 4 h per weekday. This is identical to the estimate reported by Bennie *et al.*, for Ireland, in their recent study examining the prevalence and correlates of sitting across 32 European countries using the Eurobarometer survey series data.[11] It is however, somewhat lower than the pooled median of 300 min per day, reported in the same study, for all countries included in the analysis. It is also lower than the 5.3 h of sitting reported in the preliminary findings from the most recent Irish National Health Survey, which also used the IPAQ as a measurement tool.[17]

The lower prevalence estimate for sitting in this study may be explained by the higher proportion of females in our sample. This is however representative of the primary care population with previous data highlighting that females of all ages are more likely to consult with their GP than males.[24,26] Males were more likely to report higher sitting times and sat for 2 h more, per day, than females. Bennie *et al.* also reported higher sitting times for males but the difference between the genders was much less marked at 30 min.[11] An earlier epidemiological study comparing sitting time across 20 countries, reported no differences between the genders for the pooled sample, but in country-specific analysis, sitting was higher in males for seven countries, higher in females for five, with the remaining eight countries showing no difference.[12] Females generally carry out higher amounts of housework and childcare, both of which have been shown to be associated with lower sitting times.[27]

Age was negatively associated with sitting which is a somewhat surprising finding, as to date, the majority of studies generally report positive associations between sitting time and age, indicating that as people get older their behaviour becomes more sedentary.[16] However, over 60% (62.8%, $n = 556$) of study participants were under the age of 44 and <10% were aged 65 or over indicating that the study sample was relatively young. Sitting time was high amongst younger participants with 40% (40.2%, $n = 70$) of 18- to 29-year olds sitting for >6 h daily. There was also a significant relationship between education and sitting time, with increasing educational attainment associated with lower sitting times. This is consistent with other

Table 1 Weekday sitting times according to socio-demographic, physical activity and illness variables

		Sitting time in minutes median (IQR)	*0 to 2 h % (n)*	*>2 to 4 h % (n)*	*>4 to 6 h % (n)*	*>6 to 8 h % (n)*	*>8 h % (n)*
Total[a]	*n* = 885	240 (150–480)	20.6 (179)	31.4 (273)	15.2 (132)	17.6 (153)	15.2 (133)
Gender							
Male	36.2 (320)	360 (187–480)	13.8 (44)	23.6 (75)	18.2 (58)	23.6 (75)	20.8 (66)
Female	63.8 (565)	240 (120–420)	24.5 (135)	35.9 (198)	13.4 (74)	14.1 (78)	12.1 (67)
Age[b]							
Mean 42 (SD 14.2)							
18–29	20.2 (179)	270 (180–480)	17.8 (31)	29.9 (52)	12.1 (21)	24.1 (42)	16.1 (28)
30–44	42.6 (377)	240 (120–480)	25.1 (93)	27.8 (103)	12.4 (46)	16.5 (61)	18.1 (67)
45–64	27.2 (241)	240 (180–420)	20 (48)	32.1 (77)	18.3 (44)	17.1 (41)	12.5 (30)
65–69	9.2 (81)	240 (180–360)	8.9 (7)	46.8 (37)	24.1 (19)	10.1 (8)	10.1 (8)
Education[c]							
Primary	15.8 (140)	300 (150–480)	19 (26)	27 (37)	17.5 (24)	16.8 (23)	19.7 (27)
Secondary	35.6 (315)	240 (150–420)	21.2 (65)	35 (107)	13.1 (40)	17 (52)	13.7 (42)
Third level	47.7 (422)	240 (180–480)	20.7 (87)	30.6 (129)	16.2 (68)	18.1 (76)	14.5 (61)
Primary care area							
Urban deprived	33.3 (295)	240 (180–480)	18.6 (52)	32.9 (92)	16.4 (46)	17.1 (48)	15 (42)
Urban non-deprived	33 (292)	345 (180–480)	13 (38)	28.1 (82)	15.8 (46)	23.6 (69)	19.5 (57)
Rural	33.7 (298)	180 (120–360)	29.9 (89)	33.2 (99)	13.4 (40)	12.1 (36)	11.4 (34)
Physical activity[d]							
Active	52.8 (467)	240 (150–480)	22.2 (102)	30.3 (139)	14.6 (67)	17 (78)	15.9 (73)
Inactive	47.2 (418)	240 (180–480)	18.7 (77)	32.7 (134)	15.8 (65)	18.2 (75)	14.6 (60)
Disability/Injury limiting physical activity[d]							
Yes	44.5 (394)	240 (180–480)	20.5 (80)	29.4 (115)	13.3 (52)	18.4 (72)	18.4 (72)
No	55.4 (490)	240 (150–420)	20.5 (98)	33.1 (158)	16.7 (80)	16.9 (81)	12.8 (61)
Cardiovascular disease[d]							
Yes	5.2 (46)	240 (180–480)	13.3 (6)	35.6 (16)	22.1 (10)	15.6 (7)	13.4 (6)
No	94.7 (838)	240 (150–480)	20.9 (172)	31.2 (257)	14.8 (122)	17.7 (146)	15.4 (127)
Smoker[e]							
Yes	33.3 (295)	240 (150–480)	20.1 (58)	30.1 (87)	15.6 (45)	17.2 (50)	17 (49)
No	66.2 (586)	240 (150–480)	21 (121)	31.9 (184)	15.1 (87)	17.6 (102)	14.4 (83)
BMI[f]							
Normal	47 (422)	240 (120–480)	19.1 (79)	29.5 (122)	15.6 (65)	19.6 (81)	16.2 (67)
Overweight	32.9 (291)	240 (180–480)	22.5 (65)	32.5 (94)	13.5 (39)	17.7 (51)	13.8 (40)
Obese	18.3 (162)	240 (172–420)	20.1 (32)	34 (54)	17.6 (28)	11.9 (19)	16.4 (26)

[a]Data missing for 15 participants.
[b]Data missing for seven participants.
[c]Data missing for eight participants.
[d]Data missing for one participants.
[e]Data missing for four participants.
[f]Data missing for 10 participants.

studies in the literature using total sitting time and TV viewing as a measure.[28,29]

Attendance at the urban non-deprived primary care centre was associated with higher sitting times compared with the other two groups. The median sitting time for this group was 345 min (5 h and 45 min). This was 2 h and 25 min more than the least sedentary rural sample. It may be that more of the urban non-deprived sample were employed in office-based professions which required longer occupational sitting. Also, due to the geographical location of the area that was largely residential, there may have been more transport-related sitting whilst commuting to work. Research has only begun to

Table 2 Correlates of sitting

Variable	*B*	P-*Value*
Gender: (ref. female)		
Male	0.284	<0.001
Age (scale)	−0.006	<0.001
Education: (ref. primary only)	−0.198	0.002
Secondary		
Third level	−0.203	0.002
Primary care location (ref. urban deprived)		
Urban non-deprived	0.237	<0.001
Rural	−0.127	0.01
Physical activity (ref. active)	−0.045	ns
Inactive		
Disability/injury limiting physical activity (ref. no)	0.093	0.028
Cardiovascular disease (ref. no)	0.015	ns
Smoker (ref. no)		
Yes	−0.029	ns
BMI (ref. normal)		
Overweight/obese	0.81	0.048

identify the environmental correlates of sedentary behaviour with inconclusive results to date.[30,31]

There was no association between sitting and the other behavioural factors examined in this study namely physical activity and smoking. There are conflicting results in the literature regarding an association between physical activity and sedentary time, with some evidence to suggest an inverse relationship between sitting time and activity[11,12] and others supporting the present findings that sedentary time is independent of physical activity.[32,33] Our findings may have been influenced by the relatively young age of participants and the higher proportion of females in the sample. Young people are more likely to be active but are also more likely to be in fulltime education where sitting is high.[12] Females are more likely to have lower activity levels and yet may also demonstrate lower sitting times.[11,34]

Almost half (44.5%, $n = 394$) of all participants reported an injury or disability that limited their ability to be physically active and this was significantly associated with sitting time. Whilst it is likely that some of these were acute injuries necessitating short term activity restrictions, it is probable that many others were long-term chronic conditions where increasing sedentariness will add to the overall pattern of disability and poor health. This highlights the important role that primary care clinicians can play in promoting a more active lifestyle. The lack of an association between sitting time and physical activity in this study reinforces the need to promote both public health messages, i.e. move more and sit less. That is, we cannot assume that interventions designed to promote physical activity will automatically reduce sedentary behaviours in this population. Of the other health indicators examined in this study being overweight/obese was also positively associated with sitting, a finding strongly supported by the literature.[16]

Limitations of this study

Despite the acceptable measurement properties of the IPAQ for sitting,[21,22] there are still limitations imposed by the reliance on a single question to determine weekday sitting time. The IPAQ does not allow for the categorization of sitting into different domains, for example, work, leisure and transport, as it does with physical activity. Also there is evidence to suggest that when compared with more objective measures of sedentary time there is a tendency to underestimate sitting with self-report.[4,35] Whilst further studies using more objective measures of sedentary time are needed, these studies are expensive and pose logistical difficulties in large populations.[35] Despite the acknowledged limitations of the IPAQ it remains the most widely used tool in surveillance and national health studies allowing comparability across countries and populations.[11,12,36] A significant strength of this study was the excellent response rate (96.7%) with almost all patients approached consenting to take part.

What this study adds

This research investigated the prevalence and correlates of sedentary behaviour specifically in a primary care population. We found the overall prevalence of sedentary behaviour in this population to be similar to estimates provided using self-report measures in general populations. Despite this, sedentary time remains high with almost a half of the primary care population sitting for over 4 h a day and a third sitting for >6 h a day. This study established the factors that may help in predicting sedentary behaviours in the primary care population, which in turn can help target screening and inform the development of effective promotional strategies. In particular we identified that males, urban non-deprived dwellers, people who are overweight/obese and those with a disability or injury that limited their physical activity were more likely to be sedentary. As evidence linking sedentary behaviours to adverse health outcomes continues to accumulate, a focused public health strategy to target this risk factor is warranted.

Supplementary data

Supplementary data are available at the *PUBMED* online.

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