

Questionnaire Survey of PHysical activITy in General Practitioners (PHIT GP Study).

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ABSTRACT

Objectives: To assess the levels of physical activity and other health related behaviours of General Practitioners (GPs) and compare their reported levels of physical activity with those of the general population.

Study Design: Cross sectional postal questionnaire survey.

Methods: A questionnaire, which did not allow identification of individual respondents, was posted to all 1074 (GPs) in Northern Ireland. It included the validated International Physical Activity Questionnaire (IPAQ) and questions relating to smoking and alcohol consumption. A national survey of a representative sample of the general population of similar age (29-67 years; n = 3010) provided comparative data.

Results: 735 GPs responded (68.4%). IPAQ data indicated that fewer GPs (43.4%) were "physically inactive" compared to the general population (56.2%) ($p < 0.001$) and to a subgroup of professionals (51.8%) ($p < 0.016$). Compared to the general population, relatively fewer GPs reported smoking (4.2% v 29%; $p < 0.001$); more reported drinking alcohol (86.5% v 71.6%; $p < 0.001$) but fewer reported drinking above recommended limits (12.6% v 16.9%; $p < 0.001$).

Conclusions: Our findings suggest that GPs are better than the general population at following health promotion advice. Since their personal habits influence the impact of their advice to their patients, their healthy lifestyles should be encouraged and further efforts should be made to promote activity among those who are physically inactive.

Keywords: Physical activity; Physician; Primary health care; smoking; alcohol consumption.

INTRODUCTION:

The physical and psychological benefits of physical activity are well documented and are highlighted in the Chief Medical Officer's report which recommends at least 30 minutes of moderate intensity physical activity a day.¹ It is recognised that the growing epidemic of obesity is linked to recent decline in physical activity levels.²

The more that doctors practise good personal health habits, the more likely they are to counsel their patients on a range of behaviours, such as physical activity, smoking, alcohol and diet^{3,4}. Doctors who are physically active themselves are three times more likely to regularly promote physical activity in their patients⁵. When doctors demonstrate their own personal health habits, patients find them to be more believable and better able to motivate changes in their diet and their physical activity levels⁶. One systematic review concluded that by counselling, GPs can increase physical activity in their patients⁷. A recent cluster randomised controlled trial showed counselling patients in general practice on exercise is effective in increasing their physical activity and improving their quality of life over 12 months⁸.

Social class is thought to have a bearing on physical activity. The Whitehall II study showed that people in a lower social

class do less physical activity than those in higher social classes or grades of employment⁹. In the Canada Health Survey 1981¹⁰ only 39% of the general population were categorised as being active compared with 46% of professional / managerial people. By contrast however, in 1990, when the survey was repeated among a group of Canadian physicians, only 30% of them were found to be physically active¹¹. A British study in 1992 comparing GPs and teachers showed that GPs reported taking significantly less exercise than teachers and very much less than they should advise their patients to take (at that time recommended levels were: at least twenty minutes, two to three times a week)¹². During the past decade there has been an increasing emphasis on the role of primary care in providing health promotion. However there is lack of current evidence on physical activity levels and other health related behaviours of GPs.

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Table I.

Comparison of Physical Activity Category of GP cohort with NI population and Professional / managerial subgroup

	GP Cohort n= 650 (%)	NI Cohort n = 3010 (%)	Comparison of GP cohort with NI cohort.	Professional Cohort n = 514 (%)	Comparison of GP cohort with Professional cohort.
PHYSICAL ACTIVITY CATEGORY					
Category 1	282 (43.4)	1693 (56.2)	$\chi^2 = 41.3$ $p < 0.001$	266 (51.8)	$\chi^2 = 8.2$ $p = 0.016$
Category 2	210 (32.3)	835 (27.7)		145 (28.2)	
Category 3	158 (24.3)	482 (16)		103 (20.0)	
PHYSICAL ACTIVITY CATEGORY (MALES ONLY)					
Category 1	182 (42.1)	773 (57.7)	$\chi^2 = 32.0$ $p < 0.001$	170 (53.1)	$\chi^2 = 9.5$ $p = 0.009$
Category 2	137 (31.7)	309 (23.1)		86 (26.9)	
Category 3	113 (26.2)	257 (19.2)		64 (20)	
PHYSICAL ACTIVITY CATEGORY (FEMALES ONLY)					
Category 1	99 (45.6)	920 (55.1)	$\chi^2 = 10.5$ $p = 0.005$	96 (49.5)	$\chi^2 = 0.7$ $p = 0.721$
Category 2	73 (33.6)	526 (31.5)		59 (30.4)	
Category 3	45 (20.7)	225 (13.5)		39 (20.1)	
INTENTION TO EXERCISE *					
1- No intention	31 (4.2)	718 (21.7)	$\chi^2 = 151.8$ $p < 0.001$	70 (12.5)	$\chi^2 = 34.7$ $p < 0.001$
2- Considering it	93 (12.7)	380 (11.5)		68 (12.1)	
3- Not enough	261 (35.5)	1131 (34.1)		199 (35.5)	
4- Regular <6/12	27 (3.7)	177 (5.3)		29 (5.2)	
5- Regular >6/12	313 (42.6)	902 (27.2)		194 (34.6)	
Missing	10 (1.4)	7 (0.2)		0 (0)	

n= number; χ^2 = chi squared; t = independent t test; p = significance level; CI = confidence Interval; SD = Standard Deviation.

Category 1 = Inactive; Category 2 = Minimally Active; Category 3 = Health Enhancing Physical Activity.

Within group comparisons for difference between males and females for GP cohort $\chi^2 = 3.0$, $p = 0.224$; for NI cohort $\chi^2 = 35.1$, $p < 0.001$; for Professional cohort $\chi^2 = 0.8$, $p = 0.655$.

* Cohort prior to data removal for IPAQ analysis: for GP Cohort n = 735; for NI Cohort n = 3315; for Professional Cohort n = 560.

We aimed to assess the physical activity levels of a cohort of general practitioners using a validated questionnaire and to explore their other health related behaviours.

METHODS

Ethical approval was obtained from Queen's University Belfast Research Ethics Committee. All GP principals in Northern Ireland (NI) (n=1074), identified from the Central Service Agency's (CSA) mailing list, were sent an information sheet outlining the study and inviting them to participate, a freepost return envelope, a freepost reply card and a questionnaire. The reply card was used to ensure anonymity: it contained an identifier but the questionnaire did not. The respondent returned the reply card separately to certify completion of the questionnaire. Questionnaires were posted in early September 2004 and non-respondents were sent one reminder after 6 weeks. There was no coercion to take part in the study and consent was taken as implied with the return of the questionnaire.

The questionnaire included the validated International Physical Activity Questionnaire (IPAQ)(short form)¹³. This

allowed an exercise category to be calculated for each respondent. Category 1 represented very low levels of activity, classified as 'inactive', Category 2 and Category 3 represented increasing levels of physical activity of at least current recommended levels i.e. 30 minutes of moderate intensity activity on most days of the week¹⁴. Other items in the questionnaire included sex, age, marital status, practice location, number of sessions worked, whether a shower facility was available at the surgery, intention to exercise, most common form of exercise undertaken.

Questions relating to other health related behaviours included smoking habits, alcohol consumption (we defined 'above recommended levels' of alcohol as greater than 14 units per week for women and greater than 21 units per week for men)¹⁵ and when and if the GP had had blood pressure (BP) and cholesterol checks performed on themselves.

The age and sex distributions of the GP cohort of principals were obtained from the CSA. Data relating to the general population were obtained from the Northern Ireland Health & Social Wellbeing Survey (2001, NIHSWBS)¹⁶ which included the IPAQ questions. Raw data were used for direct comparisons

Table II.

Comparison of characteristics of GP cohort with NI population and Professional / managerial subgroup

	GP Cohort n=735	NI Cohort n = 3315	Comparison of GP cohort with NI cohort.	Professional Cohort n = 560	Comparison of GP cohort with Professional cohort.
GENDER n (%)					
Male	479 (65.2)	1523 (45.9)	$\chi^2 = 89.7,$ $p < 0.001$	350 (62.5)	$\chi^2 = 1.1,$ $p = 0.305$
Female	255 (34.7)	1792 (54.1)		210 (37.5)	
Missing	1 (0.1)	0 (0)		0 (0)	
AGE years; mean (SD) [Range] missing	46.5 (8.2) [29 - 67] 0	46.3 (10.9) [29 - 67] 0	t = 0.299, $p = 0.77$ CI (-0.71, 0.96)	45.1 (10.2) [29 - 67] 0	t = 2.7, $p = 0.06$ CI (0.4, 2.4)
MARITAL STATUS n (%)					
Married	664 (90.3)	2393 (72.2)	$\chi^2 = 113.3$ $p < 0.001$	459 (82.0)	$\chi^2 = 24.8$ $p < 0.001$
Single	4 (6.3)	420 (12.7)		55 (19.8)	
Separated	10 (1.4)	179 (5.4)		14 (2.5)	
Divorced	8 (1.1)	185 (5.6)		25 (4.5)	
Widowed	6 (0.8)	138 (4.2)		7 (1.3)	
Missing	1 (0.1)	0 (0)		0 (0)	
SMOKING STATUS n (%)					
Never smoked	586 (79.7)	1085 (32.7)	$\chi^2 = 504$ $p < 0.001$	201 (35.9)	$\chi^2 = 220$ $p < 0.001$
Ex smoker	116 (15.8)	948 (28.6)		190 (33.9)	
Current smoker	31 (4.2)	963 (29)		104 (18.6)	
Missing	2 (0.3)	319 (9.6)		65 (11.6)	
ALCOHOL STATUS n (%)					
Drinker	636 (86.5)	2375 (71.6)	$\chi^2 = 20.6$ $p < 0.001$	410 (73.2)	$\chi^2 = 3.4$ $p = 0.065$
Non drinker	98 (13.3)	621 (18.7)		85 (15.2)	
Missing	1 (0.1)	319 (9.6)		65 (11.6)	
ALCOHOL STATUS n (%) (MALE)					
Drinker	426 (88.9)	1068 (70.1)	$\chi^2 = 8.6$ $p = 0.003$	245 (70.0)	$\chi^2 = 8.1$ $p = 0.005$
Non drinker	52 (10.9)	211 (13.9)		54 (15.4)	
Missing	1 (0.2)	244 (16)		51 (14.6)	
ALCOHOL STATUS n (%) (FEMALE)					
Drinker	209 (82)	1307 (72.9)	$\chi^2 = 4.3$ $p = 0.034$	165 (78.6)	$\chi^2 = 0.39$ $p = 0.534$
Non drinker	46 (18)	410 (22.9)		31 (14.8)	
Missing	0 (0)	75 (4.2)		14 (6.7)	
ALCOHOL CONSUMPTION n (%)					
Within recommended levels	556 (87.4)	1973 (83.1)	$\chi^2 = 7.1$ $p = 0.008$	350 (85.4)	$\chi^2 = 0.9$ $p = 0.34$
Above recommended levels	80 (12.6)	402 (16.9)		60 (14.6)	
ALCOHOL CONSUMPTION n (%) (MALE)					
Within recommended levels	367 (86.2)	813 (76.1)	$\chi^2 = 18.4$ $p < 0.001$	203 (82.9)	$\chi^2 = 1.3$ $p = 0.251$
Above recommended levels	59 (13.8)	255 (23.9)		42 (17.1)	
ALCOHOL CONSUMPTION n (%) (FEMALE)					
Within recommended levels	188 (90.0)	1160 (88.8)	$\chi^2 = 0.3$ $p = 0.608$	147 (89.1)	$\chi^2 = 0.07$ $p = 0.787$
Above recommended levels	21 (10.0)	147 (11.2)		18 (10.9)	

n= number; χ^2 = chi squared; t = independent t test; p = significance level; CI = confidence Interval; SD = Standard Deviation.

with the GP responses. A professional / managerial subgroup of NIHSWBS respondents was identified.

Comparisons between the groups in the categorical variables of sex, smoking habits, alcohol consumption, intention to exercise and exercise category were made using chi squared analysis. Age distributions between the groups were compared using an independent t test. Regression analysis was used to determine predictors of exercise category.

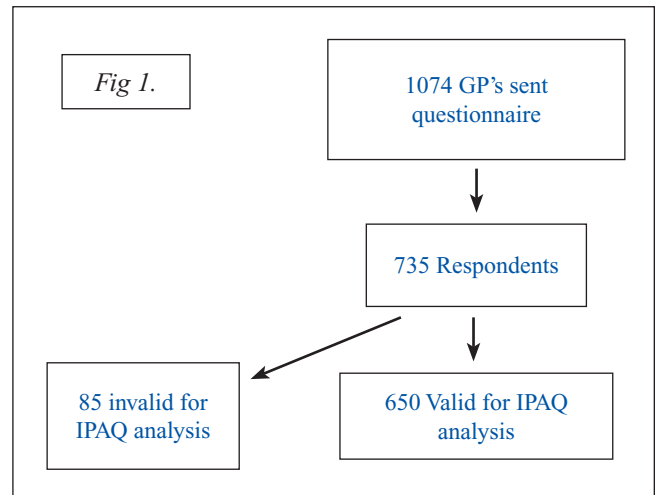
In accordance with strict data processing rules regarding incomplete responses and outlying values¹⁷, some of the returned IPAQ questionnaires were excluded from analysis of the exercise part of the study. Other results reported contain the complete set of replies.

RESULTS:

Of the 1074 questionnaires posted 735 GPs responded (68.4%). There were no significant differences between age and sex distributions of respondents and non-respondents. In the NI population survey data 3315 individuals in the same age range as the GP respondents (29 – 67 years) were identified.

Following exclusion of 85 (11.6%) of the 735 GP responses (adhering to IPAQ data processing rules¹⁷) the 650 valid responses were analysed regarding physical activity levels (650/1074; 60.5%). On the same basis, 305 (9.2%) cases were removed from the selected NI population cohort, leaving a sample of 3010. Of 560 identified as professional / managerial from the NI cohort, 514 responses were valid for analysis of physical activity. (See Figs 1 and 2).

A significantly smaller proportion of GPs were classified as being inactive (43.4%) than of the total NI population cohort (56.2%) or its professional / managerial subgroup (51.8%) ($p < 0.001$) (Table I). Within both the GP cohort and the professional / managerial subgroup there were no significant differences between males and females in their reported levels of physical activity, but within the total NI cohort males reported higher levels of physical activity than females. Comparing differences between groups for males only, GPs reported significantly more physical activity than both the total NI cohort and the professional / managerial subgroup. Female GPs reported significantly more physical activity compared with females from the total NI cohort but



similar to the professional / managerial subgroup. GPs were less likely to report having no intention of taking exercise than either the total NI cohort or the professional / managerial subgroup (4.2% v 21.7% & 12.5% respectively).

Walking was by far the most common physical activity reported by GPs (32%); approximately 10% of GP respondents also reported swimming, gardening, jogging, golf, cycling or going to the gym as forms of leisure-time physical activity.

Regression analysis showed that neither sex, number of sessions worked, having a shower in the practice or date of last BP or cholesterol check could predict a GP respondent's exercise category. Specifically, age did not predict the GPs' exercise category. However, in both the NI population cohort and the professional / managerial subgroup, age was a predictor of exercise category; for every 10 years increase in age among those in the NI general population cohort there was a 20% greater chance of inactivity. For every 10 years increase in age among the professional group there was a 30% greater chance of inactivity.

Table II shows that the proportion of males in the GP cohort (65.2%) was similar to the professional subgroup but was significantly greater than in the total NI cohort (45.9%). In comparison with the general population and the professional / managerial subgroup relatively more GPs were married

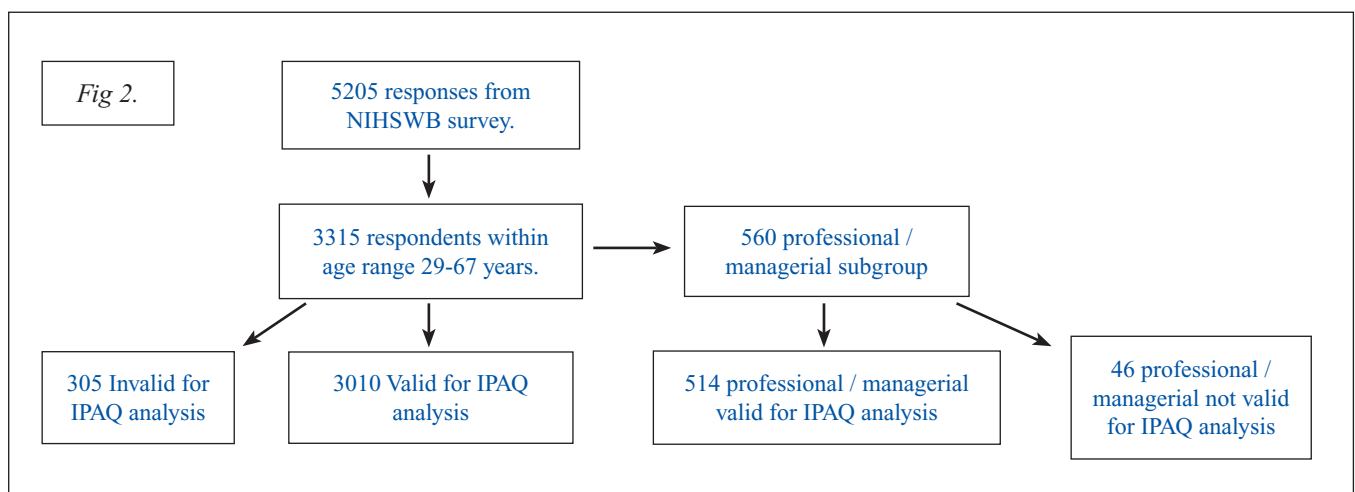


Table III
Comparison of characteristics of total GP cohort and cohort with responses valid for IPAQ analysis.

	Total GP Cohort n=735	GP cohort with Valid IPAQ Responses n = 650	Comparison
GENDER n (%)			
Male	479 (65.2)	432 (66.5)	$\chi^2 = 0.317$ p = 0.57
Female	255 (34.7)	217 (33.4)	
Missing	1 (0.1)	1 (0.2)	
AGE years; mean (SD) [range] missing	46.5 (8.2) [29 - 67] 0	46.1 (8.0) [29 - 65] 0	t = 0.83 p = 0.407 CI(-0.5, 1.2)
MARITAL STATUS n (%)			
Married	664 (90.3)	587 (90.3)	$\chi^2 = 0.07$ p = 0.99
Single	46 (6.3)	41 (6.3)	
Separated	10 (1.4)	9 (1.4)	
Divorced	8 (1.1)	8 (1.2)	
Widowed	6 (0.8)	5 (0.8)	
Missing	1 (0.1)	0	
PRACTICE LOCATION n (%)			
Urban	257 (35.0)	229 (35.2)	$\chi^2 = 0.04$ p = 0.978
Rural	162 (22.0)	145 (22.3)	
Urban/Rural Mix	314 (42.7)	274 (42.2)	
Missing	2 (0.3)	2 (0.3)	
No of SESSIONS PER WEEK mean (SD) [Range] Missing	8.4 (1.84) [1 - 14] 10 (1.3%)	8.4 (1.84) [1-14] 7 (1.1%)	t = -0.01, p = 0.989 CI (-0.5, 1.2)
SHOWER IN PRACTICE n (%)			
Yes	209 (28.4)	179 (27.5)	$\chi^2 = 0.05$ p = 0.82
No	521 (70.9)	468 (72.0)	
Missing	5 (0.7)	3 (0.5)	
INTENTION TO EXERCISE n (%)			
No intention	31 (4.2)	28 (4.3)	$\chi^2 = 0.157$ p = 0.691
Thinking about	93 (12.7)	83 (12.8)	
Not enough	261 (35.5)	240 (36.9)	
Regular <6/12	27 (3.7)	22 (3.4)	
Regular >6/12	313 (42.6)	271 (41.7)	
missing	10 (1.3)	6 (0.9)	
SMOKING STATUS n (%)			
Never smoked	586 (79.7)	522 (80.3)	$\chi^2 = 0.1$ p = 0.991
Ex smoker	116 (15.8)	99 (15.2)	
Current smoker	31 (4.2)	27 (4.1)	
Missing	2 (0.3)	2 (0.3)	
ALCOHOL STATUS n (%)			
Drinker	636 (86.5)	564 (86.8)	$\chi^2 = 0.02$ p = 0.889
Non drinker	98 (13.3)	85 (13.1)	
Missing	1 (0.1)	1 (0.2)	
ALCOHOL CONSUMPTION n (%)			
Within recommended levels	556 (87.4)	492 (87.2)	$\chi^2 = 0.1$ p = 0.922
Above recommended levels	80 (12.6)	72 (12.8)	
LAST BP CHECK n (%)			
Never	14 (1.9)	11 (1.7)	$\chi^2 = 0.478$ p = 0.924
< 2 years	545 (74.1)	485 (74.6)	
> 2 years	144 (19.6)	131 (20.2)	
Not sure	28 (3.8)	21 (3.2)	
Missing	4 (0.5)	2 (0.3)	
LAST CHOLESTEROL CHECK n (%)			
Never	138 (18.8)	127 (19.5)	$\chi^2 = 0.3$ p = 0.990
< 1 year	239 (32.5)	212 (32.6)	
1 -5 years	228 (31.0)	194 (29.8)	
> 5 years	116 (15.8)	105 (16.2)	
Not sure	14 (1.9)	12 (1.8)	
Missing	0 (0)	0 (0)	

n = number; χ^2 = chi squared; t = independent t test; p = significance level; CI = confidence Interval; SD = Standard Deviation.

(90.3%), had never smoked (79.7%); significantly more in the GP cohort than the general population reported drinking alcohol (86.5%). However, the proportion who reported drinking above recommended 'safe' levels of alcohol were smaller for GPs (12.6%) than for the general population (16.9%) ($p < 0.001$). Further subgroup analysis indicated that significant differences in levels of reported alcohol consumption between the groups were confined to males.

There were no significant differences in the distribution of the characteristics of the GP cohort before and after exclusion of those with invalid IPAQ data (Table III).

DISCUSSION

Main Findings of Study:

Our study shows that GPs report taking significantly more physical activity than other people of similar age in NI. GPs are also much less likely than the general population to report that they have no intention of doing physical activity.

Whilst reported levels of activity fell with age in the general population, and the professional subgroup, this was not observed among the GPs. The inverse association of physical activity levels with age is in keeping with previous work¹⁸ and was our reason for comparing an age matched sample of the general population with our cohort of GPs.

Our findings confirm reports of previous work which had shown that levels of physical activity are related to social class^{9, 10}. However, in relation to their social class peers, GPs in our study were more active, but this finding was only significant in respect of males.

Our study indicates that the number of GPs in NI who currently smoke (4.2%) is much less than that of the general population (29%). In the 1960s, following the emergence of evidence to suggest that smoking might be harmful to health, many doctors stopped smoking. Doll and Hills' landmark studies revealed over 85% of doctors smoked in the 1950s;¹⁹ this figure has since plummeted with approximately 30% smoking in the 1970s²⁰ and 10% smoking in the 1980s¹². Doctors appear to have 'led the way' towards adopting a non-smoking lifestyle: in comparison, approximately 40% of the general population smoked cigarettes in the late 1970s²¹. More recent data show that this figure dropped to approximately (27%) in 2000/01¹⁶.

Almost 75% of the GP respondents had their BP checked in last two years and 63% had a cholesterol check in the last five years; this compared with 69% and 52% respectively from a study of GPs in Britain in the early 1990s¹². This may suggest that GPs' awareness of the value of preventive health care may be increasing. We failed to identify comparative data for the general population.

The relationship between health and physical activity is now well established. With respect to physical activity, our current findings suggest that GPs are in a similar position to 'lead by example' as they have done with smoking. In the face of the growing obesity epidemic in the western world, it is ever more important that health workers assume a leading role in averting the health crisis which will inevitably occur if people do not increase their physical activity.

Strengths of the study

This study's strengths include its size, encompassing an entire region, with 735 of 1074 surveyed GPs (68.4%) responding, and the use of a validated physical activity questionnaire, the IPAQ. We were also able to use raw data from a major lifestyle survey of the general population for comparison. Previous work examining the physical activity levels of doctors' achieved lower response rates than our study. In one mail survey, 47% of 451 hospital doctors responded¹¹; in another, 48% of 408 GPs responded to a non-validated questionnaire¹². The higher response rate which we received may indicate increasing interest from GPs in physical activity.

Limitations of study

Our study is limited in that it measures self-reported activity rather than actual activity. However the IPAQ validation study demonstrates a good correlation between reported and actual activity¹³. GPs may be prone to overestimate their exercise habits precisely because they know the benefits of physical activity and what they should be doing. However, the efforts taken to ensure anonymity of the questionnaires should have minimised this possible source of bias.

CONCLUSION

Our findings show that GPs report healthier lifestyle choices compared to the population. Further studies should examine GPs' actual physical activity habits and explore their barriers to engaging in health enhancing levels of exercise. Previous research has shown that GPs' personal habits can influence their patients.⁶ They should be encouraged to 'practise what they preach' and, by their example, as well as their advice, to promote physical activity in the community in which they work.

GPs' reports suggest that many are following healthy lifestyle advice: ways of helping those who intend to become physically active should be explored.

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Conflict of Interest. All researchers in this study are independent of the Research and Development Office.

REFERENCES:

1. Donaldson L. At least five a week: evidence on the impact of physical activity and its relationship to health. A report from the Chief Medical Officer. London: Department of Health; 2004. Available from: <http://www.dh.gov.uk/PublicationsAndStatistics/Publications/PublicationsPolicyAndGuidance/fs/en>. Last accessed February 2007.
2. Struber JC. Considering physical inactivity in relation to obesity. *Internet J Allied Health Sciences Practice* January 2004;2(1):[about 13p.][Serial on the Internet] Available from: http://ijahsp.nova.edu/articles/Vol2num1/struber_obesity.htm. Last accessed February 2007.

3. Cornuz J, Ghali WA, Carlantonio DD, Pecoud A, Paccaud F. Physicians attitudes towards prevention: importance of intervention-specific barriers and physicians' health habits. *Fam Pract* 2000;**17(6)**:535-40.
4. Wells KB, Lewis CE, Leake B, Ware JE. Do physicians preach what they practice? *JAMA* 1984;**252(20)**:2846-8.
5. McKenna J, Naylor PJ, McDowell N. Barriers to physical activity promotion by general practitioners and practice nurses. *Br J Sports Med* 1998;**32(3)**:242-7.
6. Frank E, Breyan J, Elon L. Physician disclosure of healthy personal behaviours improves credibility and ability to motivate. *Arch Fam Med* 2000;**9(3)**:287-90.
7. Petrella RJ, Lattanzio CN. Does counseling help patients get active? Systematic review of the literature. *Can Fam Physician* 2002;**48**:72-80.
8. Elley CR, Kerse N, Arrol B, Robinson E. Effectiveness of counselling patients on physical activity in general practice: cluster randomized controlled trial. *Br Med J* 2003;**326(7393)**:793.
9. Marmot MG, Smith GD, Stansfield S, Patel C, North F, Head J, *et al.* Health inequalities among British civil servants: the Whitehall II study. *Lancet* 1991;**337(8754)**:1387-93.
10. Health and welfare Canada. The health of Canadians: report of the Canada health survey. Department of Health and Welfare. Ottawa, Ontario: 1981.
11. Gaertner PH, Firor WB, Edourd L. Physical inactivity among physicians. *Can Med Assoc J* 1991;**144(10)**:1253-7.
12. Chambers R. Health and lifestyle of general practitioners and teachers. *Occup Med* 1992;**42(2)**:69-78.
13. Craig CL, Marshall AL, Sjostrom M, Bauman A, Booth ML, Ainsworth BE *et al.* International physical activity questionnaire: 12-country reliability and validity. *Med Sci Sports Exer* 2003;**35(8)**:1381-95.
14. Pate RR, Pratt M, Blair SN, Haskell WL, Macera CA, Bouchard C, *et al.* Physical activity and public health. A recommendation from the centres for disease control and prevention and the American College of Sports Medicine. *JAMA* 1995;**273 (5)**:402-7.
15. Royal College of Physicians, Royal College of Psychiatrists and the Royal College of General Practitioners. Alcohol and the Heart: Sensible Limits Reaffirmed. Joint report of the Royal Colleges of Physicians, Psychiatry and Practitioners. London: Royal College of Physicians; 1995.
16. Northern Ireland Statistics and Research Agency. [NISRA] Health and wellbeing survey 2001. Belfast: NISRA; 2001. Available from: <http://www.nisra.gov.uk/wellbeing/index.html>. Last accessed February 2007.
17. IPAQ. Guidelines for data processing and analysis of the International Physical Activity Questionnaire (IPAQ) – Short form: scoring protocol. Revised 2005. Available from: www.ipaq.ki.se. Last accessed February 2007.
18. Department of Health. Health Survey for England 1998: cardiovascular disease. London: Department of Health; 1999. Available from: <http://www.archive.official-documents.co.uk/document/doh/survey98/hse98.htm>. Last accessed February 2007.
19. Doll R, Hill AB. The mortality of doctors in relation to their smoking habits. [Reprinted from: *Br Med J* 1954;**228**:1451-5.] *Br Med J* 2004;**328(7455)**:1529-3.
20. Allibone A, Oakes D, Shannon HS. The health and health care of doctors. *J R Coll Gen Pract* 1981;**31(233)**:728-34.
21. Department of Health. Statistics on smoking: England 1978 onwards. [Press release notices]. London: Department of Health; 2000.