

Leisure time physical activity behavior in three British cities

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Increasing the level and amount of exercise in the population has been seen as a way to improve the general health as well as an important factor in the prevention of coronary heart disease^{1–6}. Further it has been stressed that there is a need for the development of a behavioral epidemiology to serve as a basis for health promotion interventions². This behavioral epidemiology is not simply the assessment of fitness but provides insight into the distribution, pattern and determinants of health related behaviors.

Several levels of physical activity have been postulated as preventive. As a minimum, 20 minutes of brisk walking, or a similar amount of activity per day has been advised⁴; as an optimum 30 minutes of dynamic activity straining large muscle groups every other day is advised. Ideally the exercise should induce sweating and hard breathing. For example, the United States Public Health Service has set targets for exercise: by 1990 60% of the population should engage regularly in vigorous physical exercise⁵.

This article presents a survey of physical activity in three British cities (London, Glasgow and Edinburgh) with regard to what proportion of the population engages in physical activity for exercise, the kind of behavior undertaken and the time devoted to this physical activity. Special attention is given to gender, age group, and occupational group differences, in part because previous research indicates that there are important differences between these groups^{6,7}.

Comparisons between the three cities is of note because of observed regional differences in CHD mortality and blood pressure in Britain. Britain has a high mortality from coronary heart disease, compared with other developed countries, while Scotland has a mortality rate which is among the highest in Europe⁸. Also it has been found that the mean blood pressure of the Scottish population is higher than in other regions; alcohol use, sociodemographic disadvantages and, specifically, lack of exercise have been cited as important causes for the situation in Scotland⁹.

In a population survey there are many ways to define and ask about physical activity and distinguish between people who are physically active and those who are not. The higher effort definition follows WHO guidelines and defines it as a person engaging in at least three periods of physical activity per week for at least 20 minutes each time. This

definition may be compared with the definition used in the Canadian Health Promotion Survey where physical activity was defined as engaging in physical activity for exercise at least three times per week for at least 15 minutes^{10,11}. A lower effort definition sets the appropriate level as exercising for at least once a week for 20 minutes. This definition seems more comparable with the American NCHS studies where the respondents were simply asked if they engaged in physical activity or sports for exercise regularly¹¹. Also, a similar definition was used in the Canadian study for the description of moderate levels of leisure time physical activity¹⁰. A Finnish study defined physical activity for exercise as at least three hours of physical activity such as running, skiing, swimming or heavy gardening per week¹², while in a Swiss study physical activity was defined as engaging in a sporting activity at least once a week¹³. In short, the literature shows a lack of specific agreement on what makes up physical activity.

Subjects and Methods

The data analyzed are based upon daily interviews carried out by computer assisted telephone interviewing (CATI) over the entire year of 1989. Telephone interviewing, now used widely in health surveys^{14–16}, provides reliable and valid estimates of physical activity behavior^{17,18}. The respondents were selected using a two stage procedure: 1) household telephone numbers were selected by a random digit dialing procedure, thus, unlisted telephone numbers were included in the sampling procedure¹⁹; 2) once contact was established an inventory of all adults aged 18–60 in the household was taken and a second random procedure, based on a computer program built into the CATI, selected a random respondent within the household. The interview contains around 90 questions on health-related behavior, risk factors for disease and lifestyle. Five health-related behaviors are examined in detail, one of which is exercise, the others are drinking, smoking, diet, and sexual behavior. The interview lasts around 15 minutes, but because of respondent variation has a standard deviation of around 7 to 8 minutes. The interviews were conducted by 53 experienced female interviewers. Three full time staff are employed to manage and control the system. Overall response

Tab. 1. Sample profile by age, sex (gender) and city. Number of cases, sample proportions (.), and population proportions [.] for Scotland.

City	London		Glasgow		Edinburgh	
	Male	Female	Male	Female	Male	Female
18–19	66	75	47	63	17	26
20–29	654 (34)	756 (32)	371 (29) [32]	425 (25) [30]	206 (31) [33]	251 (30) [32]
30–39	557 (29)	693 (30)	399 (31) [25]	465 (28) [25]	199 (30) [26]	227 (27) [26]
40–49	417 (22)	494 (21)	283 (22) [23]	402 (24) [23]	144 (22) [22]	193 (23) [23]
50–59	288 (15)	395 (17)	245 (19) [20]	401 (24) [22]	110 (17) [18]	166 (20) [21]
60	16	13	23	22	7	5
Total	1998	2426	1368	1778	683	868

(valid n, city by sex by age = 9121; Missing = 14; total n = 9135).

rates according to the CASRO procedure²⁰ for 1989 ranged from 65.2% in May 1989 to 76.7% in November 1989; response rates are consistently higher in Scotland than in the London area. Further information on technical procedures and methodological issues related to the data collection method are found in^{21–23}.

The analysis is based on 9135 respondents aged 18 to 60 years living in the metropolitan areas of London (49% of the respondents), Glasgow (35%) and Edinburgh (17%). The average age of the respondents was 36.9 years. The number of cases per month ranged from 470 in January 1989 to 1052 in April 1989.

Table 1 presents the sample profile of the three cities by age and sex. The table also shows a comparison with Scottish population data²⁴; similar data for the London area was not yet available at the time of writing. This comparison is more illustrative than exact: 1) the population data covers a wider, more rural, area than the telephone exchange area from which the data was sampled; and 2) the mid-1989 population data is based on estimates based from the 1981 census. Thus, comparing our data which population data is problematic outside census years; nevertheless, a comparison with our 1989 sample for Scotland reveals that the age group 20 to 29 is overrepresented and the age group 30 to 39 underrepresented. However, only in the case of females living in Glasgow does the difference between the observed and the expected data reach statistical significance (Chi-sq = 23.2; df = 3; $p < 0.00$); in all three cities more females than males are sampled; in Glasgow and Edinburgh females were overrepresented (Chi-sq: 46.5; df: 1; $p < 0.00$, Chi-sq: 20.3; df: 1; $p < 0.00$, respectively); this is largely due to response bias.

Occupation was classified into six categories based on the Registrar General's classification scheme²⁵ and consists of: 1) Professional (8.5% of the respondents); 2) Intermediate (32.5%); 3) Skilled non-manual (28.2%); 4) Skilled manual (18%); 5) Semi-skilled (10.1%) and 6) Unskilled (2.8%). In 1987 the Research Unit in Health and Behavioural

Change undertook a face-to-face survey to study phone ownership and its relation to health behavior in the Glasgow and Edinburgh areas²⁶. As telephone ownership is related to occupational status, the representation of these groups in the sample poses complex problems in the interpretation of population estimates. As will be seen, respondents in lower occupational groups report less physical activity for exercise than respondents in higher occupational groups. Their under-representation in the sample leads therefore to an over-estimation of physical activity in any population estimates. On the other hand, females make up 56% of the sample, while females are an estimated 51% of the population. As females exercise less on average than males their over-representation in the sample will lead to an under-estimation of exercise at the level of the population. However, the effects of over- and under-representation of particular groups in the sample should not be overemphasized. A comparison between weighted and unweighted data was made after weighting the sample for discrepancies in the representation of occupational groups in the sample compared with the population. The difference found was 2.1% for females (49.3% exercising at least once a week vs 47.2% weighted) and 1.7% for males (58.2% vs 56.5% weighted). Only unweighted data are presented below because in our estimation one should not attach too much value to small differences when the task at hand is to examine relative differences between behaviors and social structural characteristics.

Three questions on exercise provided the basis for this analysis: the first asked the respondents if they took part in any physical activity for exercise during the previous month; the second asked about the number of times they exercised for at least 20 minutes during the past week; and the third asked about the type of activity they engaged in. There are 20 different coding categories for this last question. Because of their utility and applicability to survey data on exercise the metabolic equivalents (METs) of physical activities were calculated²⁶. One MET is approximately equivalent to 1 kcal/kg/hour energy

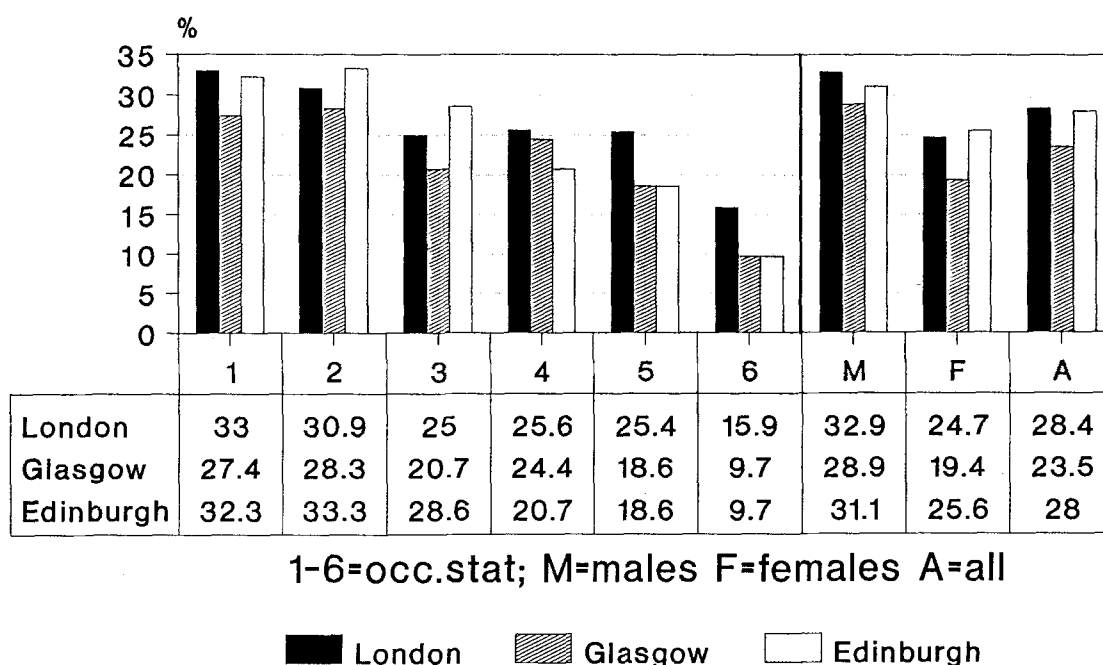
consumption, an average of 75 kcal/hour for a man weighing 75 kg. The scoring of physical activity using METS values in survey research is still in a developmental stage, but preliminary research shows a positive association between energy expenditure assessed with METS scores and cardio-pulmonary fitness²⁷. In this paper METS scores will be used to summarize our findings with regard to reported activities by our respondents. Our aim is to see if there is any systematic relation between respondent characteristics and the basic strenuousness of physical activities assessed by way of METS-scores; we are less interested in assessing each respondent's energy consumption than in examining whether particular social groupings tend towards more or less strenuous activities. The scoring of types of physical activity with a certain METS value is based on the definition provided in the Canadian Fitness Survey²⁷.

Results

Figure 1 shows the distribution by city, occupational status and gender of the respondents who report engaging at least three times per week in physical activity for exercise for at least twenty minutes; as shown in Figure 2, a less stringent definition of exercise increases the proportion of physically active respondents to 54.4% for London, 49.6% for Glasgow and 57.4% for Edinburgh (Chi-sq: 30.0; df: 2; p < 0.001), and to 58.2% for males

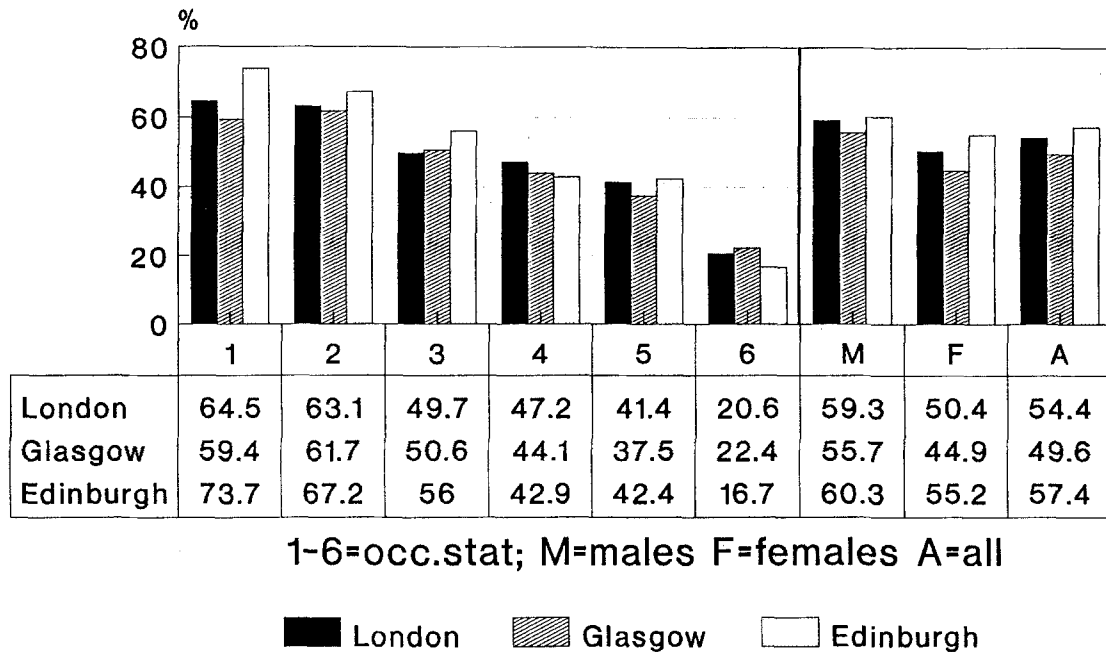
and 49.3% for females (Chi-sq: 72.0; df: 1; p < 0.001). As can be seen, respondents from higher occupational groups, professionals and intermediates, report the most exercise (Chi-sq: 326.2; df: 5; p < 0.001), regardless of definition. The exercise level in the lowest occupational group, unskilled labour, is very low. Females on average exercise less than males. This difference was found consistently among all occupational groups in the three cities. The lesser overall performance in Glasgow is partly related to the effects of age and occupational structure; some of these effects can be removed by applying a regression analysis to the number of times the respondents exercised per week, since our question had seven answering categories ranging from more than seven times to less than once a week and never. Taking age, occupational and gender differences between the cities into account and applying a regression analysis without re-categorizing the exercise variable lowered the estimates for London and Edinburgh and increased those from Glasgow slightly, but the overall relationship among the three cities remained.

Figure 3 shows the proportion of respondents engaging in physical activity for exercise, for males and females of different age groups with respect to the two definitions (stringent and less stringent). The observation that older respondents engage in less physical activity than younger respondents is mostly due to a decrease in the amount of moderate physical activity reported; the proportion of respondents engaging in relatively high amounts of



For occupational status (n=8111)
For males (n=4054); females (n=5081)

Fig. 1. Percent physical activity 3 or more times per week by occupational status and gender of respondents (stringent definition of physical activity).



For occupational status (n=8111)
For males (n=4054); females (n=5081)

Fig. 2. Percent physical activity once or more times per week by occupational status and gender of respondents. (less stringent definition of physical activity).

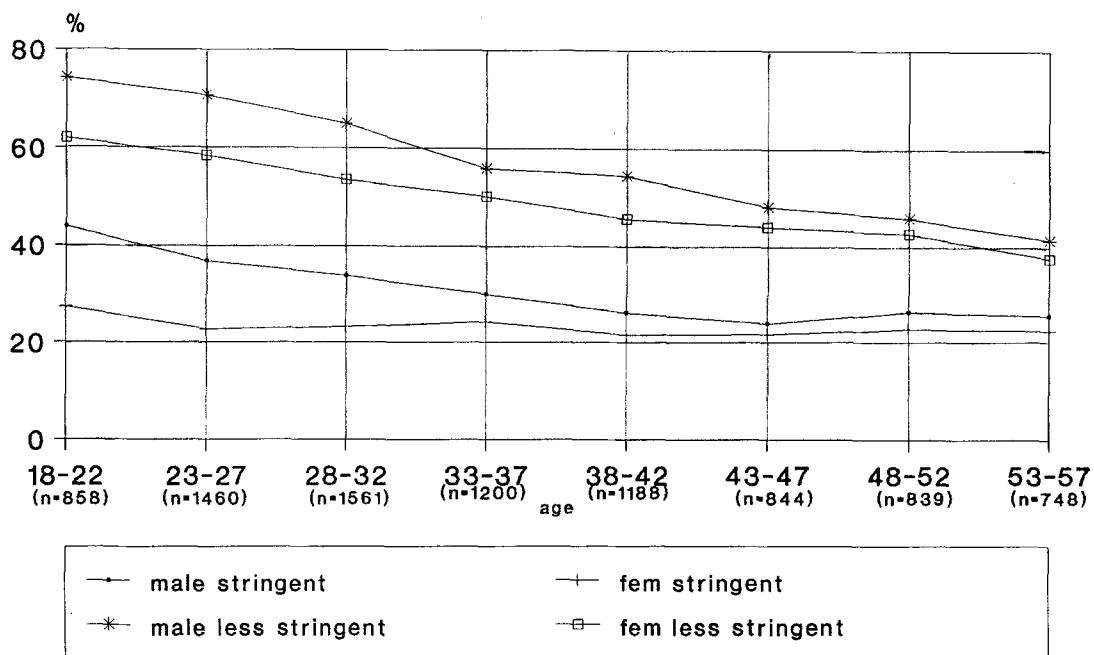


Fig. 3. Percent physical activity by age and gender; two definitions (age in five year grouping).

physical activity decreases slowly and even stabilizes among older respondents; this is particularly the case among females, where the decrease is not statistically significant (logistic regression t: -1.8; p > 0.05).

In Tables 2 to 4 the "top seven" types of physical activity are shown for different sub-groups of

respondents who report exercising on at least three occasions per week for 20 minutes. Most striking is that for all groups these types of physical activity are made up of only 10 of the 20 precoded activities. Two of these activities seem to be peculiar to certain groups of respondents, notably golf among older respondents and tennis among professionals and

Tab. 2.

All Respondents Valid N: 2434		Females 1167		Males 1276		London 1258		Glasgow 740		Edinburgh 436		
%	N	%		%		%		%		%		
Walk:	26.2	637	Walk:	32.8	Walk:	20.0	Walk:	24.1	Walk:	27.2	Walk:	30.5
Yoga:	9.9	242	Keep:	14.5	Yoga:	14.1	Yoga:	10.8	Keep:	11.1	Jogg:	10.3
Keep:	9.8	239	Swim:	11.7	Jogg:	13.5	Keep:	10.2	Yoga:	9.5	Swim:	9.9
Swim:	9.6	233	Aero:	9.1	Foot:	11.4	Swim:	9.7	Swim:	9.2	Yoga:	8.3
Jogg:	9.1	222	Cycl:	7.0	Cycl:	7.9	Jogg:	9.9	Foot:	9.1	Keep:	6.7
Cycl:	7.5	182	Yoga:	5.4	Swim:	7.6	Cycl:	8.9	Jogg:	7.2	Cycl:	6.4
Foot:	6.2	151	Jogg:	4.4	Keep:	5.5	Foot:	5.2	Cycl:	5.7	Aero:	6.7

Reported activities and their METS scores:

Aero (Aerobics): 8	Cycl (Cycling): 7
Foot (Football/Hockey): 7	Golf (Golf): 4
Jogg (Jogging/Running): 12	Keep (Keep fit): 5
Swim (Swimming): 4	Tenn (Tennis/Badminton): 6
Walk (Walking): 4	Yoga (Yoga): 2.

Tab. 3. “Top seven” physical activities for exercise and proportion of respondents reporting these activities, by occupational category. Respondents who exercised at least three times per week for 20 minutes.

Professional N: 212	Intermediate 806	Skilled Manual 551	Skilled Non-Manual 357	Semi-Skilled 179	Unskilled 27
Walk: 27.4	Walk: 23.1	Walk: 31.2	Walk: 23.0	Walk: 27.9	Walk: 22.2
Yoga: 11.8	Swim: 12.0	Swim: 9.8	Yoga: 12.9	Yoga: 15.1	Keep: 22.2
Jogg: 11.3	Jogg: 11.3	Keep: 9.1	Keep: 12.6	Keep: 12.8	Cycl: 11.1
Swim: 8.0	Yoga: 9.2	Jogg: 8.9	Foot: 11.5	Cycl: 10.6	Swim: 11.1
Keep: 7.1	Cycl: 7.8	Yoga: 7.8	Jogg: 9.0	Jogg: 8.9	Yoga: 7.4
Foot: 5.2	Keep: 7.8	Aero: 7.1	Swim: 8.1	Foot: 5.6	Jogg: 7.4
Tenn: 4.7	Foot: 5.2	Cycl: 6.0	Cycl: 6.7	Swim: 4.5	Foot: 7.4

Leisure time activities and their METS scores: see footnote Tab. 2.

Tab. 4. “Top seven” activities for exercise and proportion of respondents reporting these activities, by three age groups. Respondents who exercised at least three times per week for 20 minutes (percentages).

18–30 years Valid N: 990	Age Groups			All Respondents	
	31–50 years 1076	51–65 years 365		Exercising > or = once a week 4866	
%	%	%	%	N	
Walk: 13.1	Walk: 30.7	Walk: 48.5	Walk:	18.5	902
Foot: 12.4	Keep: 11.0	Keep: 11.0	Swim:	14.8	721
Jogg: 9.5	Jogg: 10.4	Swim: 6.8	Keep:	10.3	499
Swim: 9.4	Swim: 10.7	Golf: 6.6	Yoga:	8.8	427
Keep: 8.2	Cycl: 7.9	Cycl: 5.5	Foot:	7.5	364
Cycl: 7.6	Yoga: 7.6	Jogg: 4.1	Jogg:	7.1	347
Aero: 7.6	Tenn: 3.9	Yoga: 3.0	Tenn:	5.4	263

Leisure time activities and their METS scores: see footnote Tab. 2.

respondents aged between 31 and 50 years. Walking is clearly the most common form of physical activity for exercise while football is the only team sport and organized activity on the list. The last column of Table 4 shows the "top seven" for the respondents who exercised once or more per week. Comparing the first column with the last one shows a decrease in the proportion of walkers and an increase in the proportion of swimmers.

In terms of METS scores of the reported activities the following can be observed: 1) females on average engage in less strenuous activities than males ($t = 7.4$; $p < 0.001$); 2) older respondents engage on average in less strenuous activities than younger respondents ($t = -6.7$; $p < 0.001$); 3) if the two highest occupational categories are contrasted with the other four categories a statistically significant difference is found ($t = 2.25$, $p < 0.05$), with the higher occupational groups engaging in more strenuous activities; and 4) the differences between the three cities and the two definitions was small and not significant.

Conclusions

Only 26% of our respondents in three British cities reported physical activity at least three times per week for 20 minutes, therefore exercising below the expectations of standards set by international bodies such as the World Health Organization. However, from an international perspective, the situation is not so bleak. Stephens et al.⁶ found in their review of eight American and Canadian health surveys conducted between 1972 and 1983 that approximately 20% of the population engaged in exercise at a level generally recommended for cardiovascular benefits, a figure lower than our 26%. In those surveys at least 40% of the population was found to be completely sedentary. Our data show this sedentary component to be slightly higher in Britain with the proportion of respondents reporting low rates of exercise (less than once a week) as 46% in London, 50% in Glasgow and 43% in Edinburgh. More recent information from the Canadian Health Promotion Survey¹⁰ seems to suggest that the level of exercise in the Canadian population is higher. It is estimated that approximately 54% of adult Canadians exercise three or more times per week, 18% do so one or two times per week and 27% not at all. Compared with American data this level of exercise seems to be very high¹¹.

The exercise data from the three British cities does not seem to provide much evidence that differences in exercising patterns are an important factor in explaining any reported differences in mortality and blood pressure between England and Scotland and it seems that other behavioral and environmental

factors, such as dietary patterns and stress related factors, must be of at least equal importance.

The sub-group analysis seems to reflect findings from international studies in exercise behavior^{6,7}, such as the finding that in Britain, females exercise less than males and older respondents exercise less than younger ones. One also finds a decrease in the proportion of the population exercising in the lower occupational categories although the three cities discussed appear to differ from other surveys in that blue collar workers do not seem to differ much from white collar workers. In North America white collar workers seem on average to be more physically active than blue collar workers. The analysis of the METS scores reflects the results found in Canada^{28,29}. Male respondents, younger respondents and respondents in the higher occupational groups engage in leisure time exercise with higher levels of strenuousness than female respondents, older respondents and respondents from the lower occupational groups.

Finally, the data do reveal some patterns which may be unique to Britain, such as a relatively high proportion of sedentary individuals and the relative importance of certain sporting activities, golf the most notable. In general, however, the data and the structural correlates found in the data seem to be remarkably consistent with results from international studies. Also the relatively new approach on the basis of METS scores does not really produce surprising results. However, there are number of questions which cannot be answered by considering cross-sectional data. For instance the fact that the proportion of the population engaging in physical activity decreases in the higher age groups and also the strenuousness of the activities engaged in decreases with age is difficult to interpret because both age and generational effects may have played a role³⁰. Though it may be that people tend to reduce their involvement with exercise as they get older, there could also be a cohort effect, that is each new generation exercising at a higher level than the previous one. Estimating the extent of each effect is of importance for future health interventions. If it is mainly cohort effects which explain the lower exercise behaviour of the older age groups, then a high effort among the young will result in a population trend to increase exercise behavior. However, if aging effects play an important role, then considerable resources have to be targeted towards the maintenance of exercise behavior. This would ensure that people would not only start exercising but also maintain this behavior until they are much older. We believe that the answer to such questions is of primary importance for future research. Regular, long term, population monitoring using surveys seems to be a practical and suitable approach to study how such patterns develop.

Summary

This article provides baseline information on leisure time physical activity. The data were collected in 1989 by telephone in the cities of London, Glasgow and Edinburgh. Twenty-eight percent of the respondents living in London reported that they engage in physical activity for exercise three or more times per week. For Glasgow and Edinburgh these figures are 24% and 28% respectively. Female respondents, respondents in the lower occupational categories and older respondents exercised on average less than male respondents, respondents from the higher occupational categories and younger respondents. Walking was the most popular form of physical activity for exercise in the three cities, for all age groups, all occupational groups and both sexes. Female respondents, respondents from the lower occupational categories and older respondents engaged in less strenuous physical activities. The differences between groups were independent of the stringency of the definition of exercise. The data showed that levels of leisure time physical activity for exercise do not meet standards which are advocated internationally. However, the levels and patterns found are similar to those found in North American studies. It would appear that the differences between the two Scottish cities and London are small.

Résumé

Activité physique récréative dans trois villes britanniques

Cet article décrit les activités physiques de loisir dans les villes de Londres, Glasgow et Edimbourg, telles qu'elles ont été relevées dans une enquête téléphonique dans la communauté. 28% des résidents à Londres ont déclaré pratiquer une activité sportive de loisir trois fois par semaine ou plus. A Glasgow et Edimbourg les proportions étaient, respectivement, 24 et 28%. Les femmes, les membres des classes sociales défavorisées et les personnes âgées pratiquaient moins souvent une telle activité physique. La marche à pied était la forme la plus fréquente d'activité physique dans les trois villes, dans tous les groupes d'âge, dans toutes les classes sociales et dans les deux sexes. Les femmes, les membres des classes sociales inférieures et les personnes âgées pratiquaient des activités moins intensives; les différences observées ne dépendaient pas de la définition du type d'activité physique. Les résultats montrent que la pratique d'une activité physique n'est pas fréquente, en tout cas inférieure à celle recommandée. Par ailleurs, le niveau et les formes de l'activité physique dans cette étude sont conformes à ceux des résultats nord-américains; on notera en particulier les différences modestes entre les deux villes écossaises et Londres.

Zusammenfassung

Körperliche Freizeitaktivität in drei Britischen Städten

Dieser Artikel beschreibt die bevölkerungsweite körperliche Freizeitaktivität, wie sie 1989 mittels Telefoninterviews in den drei Städten London, Glasgow und Edinburgh erhoben wurde. 28% der in London lebenden, an der Umfrage teilnehmenden Personen gaben an, sich dreimal oder häufiger pro Woche körperlich in der Freizeit zu betätigen. In Glasgow und Edinburgh betrug der entsprechende Anteil 24% bzw. 28%. Frauen, Angehörige der unteren Sozialklassen und ältere Personen waren seltener körperlich-sportlich aktiv als Männer, Angehörige der oberen Sozialklassen und jüngere Personen. Gehen/Wandern war die häufigste Form der körperlich-sportlichen Betätigung in allen 3 Städten, in allen Altersgruppen und Sozialklassen sowie in beiden Geschlechtern. Frauen, Angehörige der unteren Sozialklassen und ältere Personen betrieben weniger intensive körperlich-sportliche Aktivitätsformen. Die genannten Unterschiede waren nicht von der Stringenz der Definition körperlich-sportlicher Aktivität abhängig. Die Ergebnisse zeigen, dass das Niveau der körperlichen Freizeitaktivität nicht so hoch liegt, wie es aufgrund internationaler Empfehlungen wünschenswert wäre. Andererseits entsprechen Niveau und Formen der Körperbetätigung in der vorliegenden Studie in etwa nordamerikanischen Ergebnissen. Insbesondere sind die Unterschiede zwischen den beiden schottischen Städten und London geringfügig.

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Acknowledgements

This study was supported by the Scottish Home and Health Department (SHHD), the Scottish Health Education Group (SHEG) and the Economic and Social Research Council (ESRC). The conclusions are those of the authors' and do not represent those of the funding agencies.

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