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Prevalence and correlates of physical activity in a sample of UK adults observing social distancing during the COVID-19 pandemic

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ABSTRACT

Objective To investigate the levels and correlates of physical activity during COVID-19 social distancing in a sample of the UK public.

Methods This paper presents analyses of data from a cross-sectional study. Levels of physical activity during COVID-19 social distancing were self-reported. Participants also reported on sociodemographic and clinical data. The association between several factors and physical activity was studied using regression models.

Results Nine hundred and eleven adults were included (64.0% were women and 50.4% of the participants were aged 35–64 years). 75.0% of the participants met the physical activity guidelines during social distancing. Meeting these guidelines during social distancing was significantly associated with sex (reference: male; female: OR=1.60, 95% CI 1.10 to 2.33), age (reference: 18–34 years; ≥65 years: OR=4.11, 95% CI 2.01 to 8.92), annual household income (reference: <£15 000; £15 000–<£25 000: OR=2.03, 95% CI 1.11 to 3.76; £25 000–<£40 000: OR=3.16, 95% CI 1.68 to 6.04; £40 000–<£60 000: OR=2.27, 95% CI 1.19 to 4.34; ≥£60 000: OR=2.11, 95% CI 1.09 to 4.09), level of physical activity per day when not observing social distancing (OR=1.00 (per 1 min increase), 95% CI 1.00 to 1.01), and any physical symptom experienced during social distancing (reference: no; yes: OR=0.31, 95% CI 0.21 to 0.46).

Conclusion During COVID-19, social distancing interventions should focus on increasing physical activity levels among younger adults, men and those with low annual household income. It should be noted in the present sample that women and younger adults are over-represented.

What are the new findings

- In the present sample of UK adults following UK COVID-19 social distancing guidance, a high level of physical activity was observed.
- Meeting physical activity guidelines was observed in women and older adults.
- Interventions should now be developed to support women and older adults in sustaining this level of physical activity post pandemic.

INTRODUCTION

Physical activity is defined as any bodily movement produced by skeletal muscle that results in energy expenditure.[1] Regular and sustained participation in physical activity is associated with almost every facet of health across the lifespan[2–4] and importantly the prevention of all-cause early mortality.[5] Moreover, acute exercise is an immune system adjuvant that improves defence activity and metabolic health.[6] Global governments have produced recommendations for adequate levels of physical activity. One key message from the WHO guidance is that adults should achieve at least 150 min of moderate physical activity and/or 75 min of vigorous physical activity per week.[7] However, despite this the proportion of UK adults meeting the physical activity guidelines is low[8] and declines with age.[9]

Among key determinants of changes in physical activity levels are significant life events.[10] In March 2020, the WHO declared the COVID-19 outbreak a global pandemic. As of 17 April 2020 (10:00 Central European Time), more than 2 160 170 cases have been diagnosed globally, with over 68 976 fatalities.[11] On 23 March 2020 the UK government released social distancing guidance to reduce the risk of transmission. This guidance was implemented for an initial 3-week period, with the guidance extended for a further 3 weeks on 16 April 2020. It should also be noted here that prior to the mass guidance, the UK public who were at high risk for serious complications if they contracted COVID-19, lived with someone who was at high risk for serious complications if they contracted

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Table 1 Sample characteristics (overall and by physical activity status)

Characteristics	Category	Overall (n=911)	Sufficient physical activity per day		Effect size*	P value†
			No (n=228)	Yes (n=683)		
Sex	Male	36.0	37.3	35.6	0.02	0.688
	Female	64.0	62.7	64.4		
Age (years)	18–34	31.3	40.8	28.1	0.19	<0.001
	35–64	50.4	53.1	49.5		
	≥65	18.3	6.1	22.4		
Marital status	Single/separated/divorced/widowed	44.8	55.7	41.2	0.13	<0.001
	Married/in a domestic partnership	55.2	44.3	58.8		
Employment	No	41.3	35.5	43.2	0.07	0.050
	Yes	58.7	64.5	56.8		
Annual household income	<£15 000	14.8	22.7	12.1	0.14	0.002
	£15 000–<£25 000	18.4	16.9	18.9		
	£25 000–<£40 000	22.8	17.3	24.6		
	£40 000–<£60 000	20.9	21.8	20.6		
	≥£60 000	23.2	21.3	23.8		
Region	England	77.3	81.1	76.1	0.07	0.259
	Northern Ireland	19.3	17.2	19.9		
	Scotland	2.3	0.9	2.8		
	Wales	1.1	0.9	1.2		
Current smoking	No	88.2	86.3	88.8	0.03	0.377
	Yes	11.8	13.7	11.2		
Current alcohol consumption	No	32.7	37.2	31.2	0.06	0.114
	Yes	67.3	62.8	68.8		
Level of physical activity per day when not social distancing (in minutes)	Mean (SD)	166.2 (167.7)	107.8 (145.0)	185.7 (170.3)	0.47	<0.001
Number of chronic physical conditions	Mean (SD)	1.8 (2.1)	1.7 (2.1)	1.8 (2.1)	0.04	0.559
Number of chronic psychiatric conditions	Mean (SD)	0.6 (0.9)	0.9 (1.0)	0.6 (0.8)	0.33	<0.001
Any physical symptom experienced during social distancing	No	73.9	57.4	79.5	0.22	<0.001
	Yes	26.1	42.6	20.5		
Number of days of social distancing	Mean (SD)	9.1 (6.9)	8.3 (4.2)	9.4 (7.6)	0.16	0.007

Participants were asked how much time in minutes they spend on an average day in moderate-to-vigorous physical activity when self-isolating. The WHO recommendations on physical activity levels per week (ie, at least 150 min of moderate physical activity and/or 75 min of vigorous physical activity in adults aged ≥18 years) were further used to distinguish participants with and those without sufficient physical activity per day (ie, approximately 21 min of moderate physical activity and/or 11 min of vigorous physical activity).
Values are percentages unless otherwise stated.
*Effect size was calculated using phi coefficient for categorical variables with two categories, Cramer's V for categorical variables with more than two categories, and Cohen's d for continuous variables.
†P values were based on χ^2 tests for categorical variables and on t-tests for continuous variables.

COVID-19, and the elderly were encouraged to engage in social distancing.

This scenario is certainly a key life event that may have had an impact on population levels of physical activity. Moreover, social distancing guidance may influence physical activity in different ways dependent on age, sex, chronic conditions, socioeconomic status and marital status—all of which have been shown to be associated with physical activity during non-pandemic times.[9 12–15]

Therefore, the aim of the present study was to examine the levels of physical activity during the UK COVID-19 social distancing guidance and investigate how such levels vary by sociodemographic, behavioural, clinical and contextual factors.

METHODS

This paper presents preplanned interim analysis of data from a cross-sectional epidemiological study, administered through an online survey. The study was launched on 17 March 2020, 17 days after the first case of COVID-19 was diagnosed in the UK.

Participants were recruited through social media and through national media outlets. Adults aged 18 years and over, currently residing in the UK and observing social

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distancing due to COVID-19 were eligible to participate. Participants were directed to a data-encrypted website where they indicated their consent to participate after reading an information sheet. Before completing the survey participants were asked if they were currently observing social distancing and were over 18 years of age. If the participant's response was affirmative to both questions, the participant was asked to complete the survey.

Dependent variable

Participants were asked the following: (1) 'How much time on an average day have you spent in vigorous activity since social distancing?' and (2) 'How much time on an average day have you spent in moderate activity since social distancing?' Responses were reported in hours and minutes. Physical activity when social distancing was included in the analyses as a dichotomous (sufficient physical activity per day: yes or no) and a continuous (number of minutes of moderate-to-vigorous physical activity per day) variable. Following the WHO recommendations on physical activity levels per week,[7] sufficient physical activity per day was defined as approximately 21 min of moderate physical activity and/or 11 min of vigorous physical activity per day.

Independent variables

Demographic data were collected, including sex (male or female), age (in 10-year age bands), marital status (single/separated/divorced/widowed or married/in a domestic partnership), employment (yes or no) and annual household income (ie, <£15 000, £15 000–<£25 000, £25 000–<£40 000, £40 000–<£60 000, ≥£60 000). Participants were also asked to indicate which of the four main UK countries they lived in. Behavioural factors included current smoking status (yes or no), current alcohol consumption (yes or no) and usual levels of moderate-to-vigorous physical activity per day during non-pandemic times (when not self-isolating). Participants were also asked to report chronic physical conditions. Finally, participants were asked if they had experienced any physical symptoms of COVID-19 during social distancing and the number of days they had been social distancing.

Statistical analyses

Sample characteristics were compared between participants who met and did not meet the physical activity guidelines using χ^2 tests for categorical variables and t-tests for continuous variables. The mean number of minutes of moderate-to-vigorous physical activity per day when social distancing was further compared between male and female participants using t-test, while it was compared between adults aged 18–34 years, those aged 35–64 years and those aged ≥65 years using analysis of variance. Effect sizes were estimated using phi coefficients for categorical variables with two categories, Cramer's V for categorical variables with more than two categories, and Cohen's d for continuous variables. The relationship between defined factors and physical activity during social distancing was studied in logistic (dichotomous physical activity variable; sufficient physical activity per day: yes or no) and linear regression models (continuous physical activity variable; number of minutes of moderate-to-vigorous physical activity per day). Results from the logistic regression analysis are presented as ORs and 95% CIs, while beta coefficients with associated 95% CIs are displayed for the linear regression analysis. The level of statistical significance was set at p<0.05. The statistical analysis was performed with R V.3.6.2 (The R Foundation).

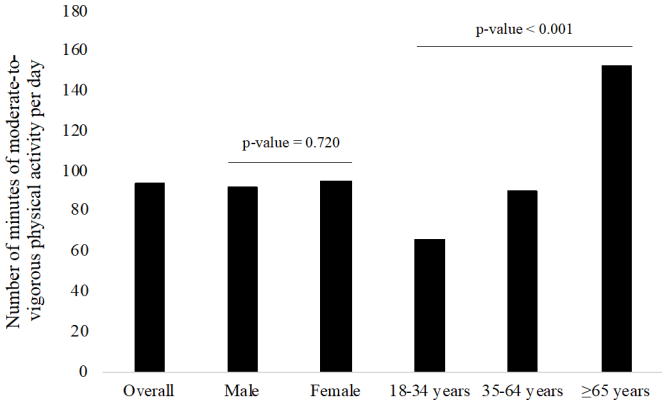


Figure 1 Number of minutes of moderate-to-vigorous physical activity per day during social distancing in the overall sample and in sex and age groups. Participants were asked how much time in minutes they spend on an average day in moderate-to-vigorous physical activity when social distancing. The number of minutes of moderate-to-vigorous physical activity per day was compared between male and female participants using t-test, while it was compared between the three age groups using analysis of variance.

RESULTS

Nine hundred and eleven adults were included in this cross-sectional study (64.0% were women and 50.4% of the participants were aged 35–64 years; table 1). Overall, 75.0% of participants had sufficient physical activity during social distancing. The mean (SD) number of minutes of moderate-to-vigorous physical activity per day when social distancing was 94.0 (119.1), and significantly increased from 65.8 (77.7) in the age group 18–34 years to 152.9 (146.3) in the age group ≥65 years (figure 1). The logistic regression analysis showed that sufficient physical activity during social distancing was significantly associated with sex (reference: male; female: OR=1.60, 95% CI 1.10 to 2.33), age (reference: 18–34 years; ≥65 years: OR=4.11, 95% CI 2.01 to 8.92), annual household income (reference: <£15 000; £15 000–<£25 000: OR=2.03, 95% CI 1.11 to 3.76; £25 000–<£40 000: OR=3.16, 95% CI 1.68 to 6.04; £40 000–<£60 000: OR=2.27, 95% CI 1.19 to 4.34; ≥£60 000: OR=2.11, 95% CI 1.09 to 4.09), level of physical activity per day when not social distancing (OR=1.00 (per 1 min increase), 95% CI 1.00 to 1.01), and any physical symptom experienced during social distancing (reference: no; yes: OR=0.31, 95% CI 0.21 to 0.46; table 2). Similar findings were found in linear regression analyses.

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Table 2 Factors associated with physical activity in social distancing adults during the SARS-CoV-2 pandemic in 2020 in the UK

		Sufficient physical activity per day (dichotomous variable; logistic regression)			Level of physical activity per day (continuous variable; linear regression)		
Characteristics	**Category**	**OR**	**95% CI**	**P value**	**β**	**95% CI**	**P value**
Sex	Male	Reference					
	Female	**1.60**	**1.10 to 2.33**	**0.015**	**16.45**	**0.50 to 32.00**	**0.041**
Age (years)	18–34	Reference					
	35–64	1.44	0.94 to 2.20	0.091	**28.09**	**9.54 to 47.03**	**0.003**
	≥65	**4.11**	**2.01 to 8.92**	**<0.001**	**71.70**	**46.23 to 98.13**	**<0.001**
Marital status	Single/separated /divorced /widowed	Reference					
	Married/ in a domestic partnership	1.38	0.92 to 2.06	0.119	4.48	−12.28 to 21.37	0.601
Employment	No	Reference					
	Yes	0.85	0.55 to 1.33	0.485	**−21.67**	**−40.27 to 3.37**	**0.021**
Annual household income	<£15 000	Reference					
	£15 000–<£25 000	**2.03**	**1.11 to 3.76**	**0.023**	**35.88**	**9.04 to 62.66**	**0.009**
	£25 000–<£40 000	**3.16**	**1.68 to 6.04**	**<0.001**	23.26	−3.20 to 50.01	0.087
	£40 000–<£60 000	**2.27**	**1.19 to 4.34**	**0.013**	27.40	−0.74 to 55.29	0.055
	≥£60 000	**2.11**	**1.09 to 4.09**	**0.026**	**31.24**	**2.71 to 59.59**	**0.031**
Region	England	Reference					
	Northern Ireland	1.22	0.77 to 1.97	0.411	10.95	−8.04 to 30.07	0.260
	Scotland	3.42	0.84 to 23.35	0.128	−1.37	−52.46 to 50.02	0.958
	Wales	1.64	0.33 to 12.32	0.576	35.10	−31.49 to 102.06	0.302
Current smoking	No	Reference					
	Yes	1.16	0.68 to 2.02	0.599	7.92	−15.29 to 31.47	0.506
Current alcohol consumption	No	Reference					
	Yes	1.23	0.85 to 1.79	0.273	−11.99	−28.22 to 4.12	0.146
Level of physical activity per day when not social distancing	Per 1 min increase	**1.00**	**1.00 to 1.01**	**<0.001**	**0.26**	**0.22 to 0.30**	**<0.001**
Number of chronic physical conditions	Per one-condition increase	0.96	0.87 to 1.06	0.427	−4.02	−8.66 to 0.05	0.053
Number of chronic psychiatric conditions	Per one-condition increase	0.82	0.67 to 1.00	0.052	−3.70	−12.69 to 5.03	0.414
Any physical symptom experienced during social distancing	No	Reference					
	Yes	**0.31**	**0.21 to 0.46**	**<0.001**	**−25.53**	**−42.46 to −7.99**	**0.004**
Number of days of social distancing	Per 1-day increase	1.03	0.99 to 1.07	0.162	−0.18	−1.28 to 0.93	0.756

Participants were asked how much time in minutes they spend on an average day in moderate-to-vigorous physical activity when self-isolating. The WHO recommendations on physical activity levels per week (ie, at least 150 min of moderate physical activity and/or 75 min of vigorous physical activity in adults aged ≥18 years) were further used to distinguish participants with and those without sufficient physical activity per day (ie, approximately 21 min of moderate physical activity and/or 11 min of vigorous physical activity). Physical activity was also included in the analyses as a continuous variable and corresponded to the number of minutes of moderate-to-vigorous physical activity per day.
The association between defined factors (ie, sex, age, marital status, employment, annual household income, region, current smoking, current alcohol consumption, level of physical activity per day when not self-isolating, number of chronic physical conditions, number of chronic psychiatric conditions, any physical symptom experienced during social distancing and number of days of social distancing) and physical activity was studied using logistic (dichotomous physical activity variable) and linear regression (continuous physical activity variable) models.
All significant associations are reported in bold text.
SARS-CoV-2, severe acute respiratory syndrome coronavirus 2.

DISCUSSION

The present study found that a total of 75% of the participants met the physical activity guidelines during UK COVID-19 social distancing. Moreover, women, older adults, those with higher annual household income and those not experiencing physical COVID-19 symptoms were significantly likely to be more physically active.

Previous studies have identified that approximately 58%–66% of the UK adult population meet physical activity guidelines,[8] whereas the present study found that this level was at 75% during social distancing. During COVID-19 social distancing the UK public may have experienced an increase in discretionary time and thus may be using this additional discretionary time to be physically active.

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Second, one of the key reasons that one may leave their home grounds during COVID-19 social distancing is to partake in one form of exercise daily for 60 min.

Interestingly higher levels of physical activity were observed in older adults and in women. These findings contradict the literature during non-pandemic times where the younger and men are observed to have higher levels of physical activity.[8 9]

Findings must be interpreted in light of the study limitations. First, participants were asked to self-report their physical activity level and thus potentially introducing self-reporting bias into the findings. The present survey did not report the domain of physical activity, only overall levels. However, social distancing legislation in the UK meant that individuals were not permitted to go to their place of work and the behaviour recorded would most likely be leisure time physical activity for which physical activity guidelines are based on. Finally, when comparing the present sample with recent UK population estimates, women (64.0% vs 50.6%) and adults aged 18–34 years (31.3% vs 19.7% (20–34 years in the comparison database, strictly speaking)) are over-represented.[16] Moreover, it is indeed known that online surveys may not yield generalisable, epidemiological samples, but given the nature of restrictions in place on personal contacts there are few options to collect this type of data.

The present findings suggest that during COVID-19, social distancing interventions should focus on increasing physical activity levels among younger adults, men and those with low annual household income. It should be noted in the present sample that women and younger adults are over-represented.

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REFERENCES

1 Caspersen CJ, Powell KE, Christenson GM. Physical activity, exercise, and physical fitness: definitions and distinctions for health-related research. *Public Health Rep* 1985;100:126–31.
2 Cunningham C, O' Sullivan R, Caserotti P, *et al*. Consequences of physical inactivity in older adults: a systematic review of reviews and meta-analyses. *Scand J Med Sci Sports* 2020;30:816–27.
3 Warburton DER, Bredin SSD. Health benefits of physical activity: a systematic review of current systematic reviews. *Curr Opin Cardiol* 2017;32:541–56.
4 Schuch FB, Vancampfort D, Firth J, *et al*. Physical activity and incident depression: a meta-analysis of prospective cohort studies. *Am J Psychiatry* 2018;175:631–48.
5 Mok A, Khaw K-T, Luben R, *et al*. Physical activity trajectories and mortality: population based cohort study. *BMJ* 2019;365:l2323.
6 Nieman DC, Wentz LM. The compelling link between physical activity and the body's defense system. *J Sport Health Sci* 2019;8:201–17.
7 World Health Organisation. Global strategy on diet physical activity and health, 2020. Available: https://www.who.int/dietphysicalactivity/factsheet_recommendations/en/
8 National Health Service. Household survey shows more men than women meet physical activity guidelines, 2020. Available: https://digital.nhs.uk/news-and-events/news-archive/2017-news-archive/household-survey-shows-more-men-than-women-meet-physical-activity-guidelines
9 Smith L, Gardner B, Fisher A, *et al*. Patterns and correlates of physical activity behaviour over 10 years in older adults: prospective analyses from the English longitudinal study of ageing. *BMJ Open* 2015;5:e007423.
10 Allender S, Hutchinson L, Foster C. Life-change events and participation in physical activity: a systematic review. *Health Promot Int* 2008;23:160–72.
11 Johns Hopkins University & Meicine. Coronavirus resource centre, 2020. Available: https://coronavirus.jhu.edu/map.html
12 Azevedo MR, Araújo CLP, Reichert FF, *et al*. Gender differences in leisure-time physical activity. *Int J Public Health* 2007;52:8–15.
13 Barker J, Byrne S. Physical activity of UK adults with chronic disease: cross-sectional analysis of accelerometer-measured physical activity in 96 706 UK Biobank participants. *Int J Epidemiol* 2019:dyy294.
14 O'Donoghue G, Kennedy A, Puggina A, *et al*. Socio-economic determinants of physical activity across the life course: A "DEterminants of DIet and Physical ACtivity" (DEDIPAC) umbrella literature review. *PLoS One* 2018;13:e0190737.
15 Pettee KK, Brach JS, Kriska AM, *et al*. Influence of marital status on physical activity levels among older adults. *Med Sci Sports Exerc* 2006;38:541–6.
16 Office for National Statistics. Estimates of the population for the UK, England and Wales, Scotland and Northern Ireland, 2020. Available: https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/datasets/populationestimatesforukenglandandwalesscotlandandnorthernireland [Accessed 20 Jun 2020].

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