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Physical activity type and duration in disabled and non-disabled adults

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A B S T R A C T

Background: Disabled people are more likely to be physically inactive than non-disabled people, yet limited research has explored the types of physical activities that disabled people participate in.
Objectives: This study describes the types of physical activities that disabled people participate in, and compares activity frequency and duration to non-disabled people.
Methods: Using cross-sectional data from the 2018/19 Sport England Active Lives survey, participants were categorised into three groups (disability – substantial effect on daily activities; disability – non-substantial effect on daily activities; no disability), and activity types were grouped into 17 categories including athletic, leisure, and swimming. Chi-squared tests and multivariable linear regression were used to compare participation in each activity category across the sub-groups.
Results: Of 158,995 participants, 18% (n=29,057) had a disability that had a substantial effect on daily activities, 21% (n=33,004) had a disability with a non-substantial effect on daily activities, and 61% (n=96,934) had no disability. Leisure was the most frequently reported activity type and of longest duration (median (interquartile range) mins/day: disability – substantial effect on daily activities: 315 (120–700); disability – non-substantial effect on daily activities: 390 (180–750); no disability: 375 (165–750)). Whilst activity duration was typically higher among people with no disability, artistic activities and swimming were higher for people with a disability that had a substantial effect on daily activities.
Conclusions: Activity choices were similar among sub-groups, however participation rates and activity duration were typically lower among disabled people. Reducing inequalities in physical activity participation will require improved access, opportunities, and support.

1. Introduction

There is clear evidence that being physically active reduces the risk of noncommunicable diseases (NCDs), including heart disease, stroke, diabetes, and certain types of cancer.[1] However, more than a quarter of the world's adult population are insufficiently active.[2] Consequently, an estimated 500 million people are expected to develop NCDs attributable to physical inactivity between 2020 and 2030, at an estimated annual cost of US$27 billion to health care systems.[3]

Maintaining a physically active lifestyle is particularly important for people with chronic conditions and disabilities. In addition to improving symptoms and management of chronic conditions,[4] psychological benefits include enhanced self-esteem and self-perceptions, as well as improvements in mood and energy.[5,6] However, disabled people are more likely to be physically inactive than non-disabled people,[7] and report barriers to physical activity over and above those faced by the non-disabled population. For example, Rimmer et al.[8] identified barriers related to the built and natural environment as well as equipment-related barriers, such as insufficient space between gym machines for wheelchair access. Disabled people also report a lack of opportunity to be physically active and feel less likely than non-disabled people that they can be as active as they would like.[9]

Physical activity promotion is an important component of public health policy.[10] To inform physical activity-related policy for disabled people, it is valuable to understand the types of physical activity that disabled people do and do not participate in, for how long and in what context. This will help with the identification of gaps in provision and inform specific areas for development. The limited available evidence indicates that walking is one of the most common activities in disabled adults.[11] Gymnastics and swimming have also been reported to be among the most common activities undertaken by young adults with developmental disabilities, due to their assistance with rehabilitation and physical therapy.[12] Of those less commonly undertaken, Hollis et al.[11] found using an exercise bike, weightlifting, and swimming were carried out by just over 2% of adults with a mobility disability. However, their research focused on individuals with a serious difficulty walking or climbing stairs, thus the findings may not be generalisable to individuals with a mild or moderate mobility disability, or other types of disability.

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Further evidence on the activity choices of disabled people would enable better understanding of where the greatest inequities in access exist, and could help to inform future investment of resources and actions to support participation among this population. Therefore, the aims of this study were to describe the types of physical activities that disabled adults participate in and to compare activity frequency and duration to those without a disability.

To note, we use the term 'disabled people' throughout the paper, as this is typically preferred among the UK disability community (where the authors are based),[13] however we acknowledge that other terminologies (such as 'people with disabilities') are preferred by some individuals, groups and organisations.

2. Methods

2.1. Data source

This study involved secondary analysis of the 2018/19 Sport England Active Lives cross-sectional survey.[14] Households were randomly selected to participate using the Address File, a UK address database upheld by Royal Mail.[15] In total, 702,781 addresses were sent an invitation letter between November 16, 2018 and November 15, 2019. Initial invitations included details of how to complete an online version of the Active Lives survey. For non-responding addresses, a follow-up letter was sent 1–2 weeks later, with a further reminder another 1–2 weeks later with a paper survey also included. A final reminder was sent after a further two weeks. Up to two participants aged 16 years or older from each household could complete the survey. Participants were subsequently identified as completing either the online or paper version of the survey. There were two versions of the online survey, with slight variation in content. The item pertaining to club membership was only asked in one version of the online survey and was not asked in the paper survey, thus analyses on this topic are limited to those who completed the relevant online survey.

2.2. Measures

2.2.1. Disability

Participants were asked "Do you have any physical or mental health conditions or illnesses that have lasted or are expected to last 12 months or more?" Response options were 'yes', 'no' and 'prefer not to say'. If participants responded 'yes', they were asked "Do these physical or mental health conditions or illnesses have a substantial effect on your ability to do normal daily activities?", with response options 'yes', 'no' and 'prefer not to say'. If participants responded 'yes' to this second question, they were coded as having a disability that had a substantial effect on daily activities. If participants responded 'no', they were coded as having a disability with a non-substantial effect on daily activities. Participants were categorised into one of three mutually exclusive groups: (1) disability – substantial effect on daily activities; (2) disability – non-substantial effect on daily activities; (3) no disability.

2.2.2. Activity assessment

All participants reported whether they had taken part in 173 types of physical activity over two timeframes: (1) previous 12 months; and (2) previous four weeks. For ease of reporting, activities were grouped into 17 mutually exclusive categories: athletic; artistic; combat; cycle; equestrianism; field and strike; fitness; gym equipment/machine; invasion; leisure; motorsports; net/wall; outdoor/adventure; swimming; target; water sports; and other. The composition of each activity group is described in Supplementary File 1.

For activities undertaken in the past 12 months, all participants reported whether they carried out the activity indoors or outdoors. Additional classification was undertaken by the authors to group activities as individual, team-based, or both. A sub-sample of participants (as described above) additionally reported whether they were a member of a club or organisation for each activity reported in the previous year.

For activities undertaken in the last four weeks, participants were additionally asked to indicate frequency (number of days in the past four weeks) and duration of each episode (free-text hours/minutes).

2.2.3. Analysis

We were interested in the adult population only, therefore participants aged 16–18 years were removed prior to analysis. Participant characteristics, activity duration, activity type (including classification by individual, team and both), activity setting (indoor or outdoor), and club membership (yes/no) are presented as frequencies and percentages, stratified by disability status. Activity duration is reported as median and interquartile range (IQR) as the data were not normally distributed. Chi-squared tests were used to compare demographic characteristics between analytical subsamples (disability – substantial effect on daily activities, disability – non-substantial effect on daily activities, and no disability), and between those included and excluded from the analysis. A chi-squared test was also used to compare the proportion of participants reporting participation in each activity type (including classification as individual, team or both), activity setting, and club membership between analytical subsamples. Multivariable linear regression was used to compare weekly activity duration between the analytical subsamples. Regression diagnostics were reviewed and assumptions for the use of linear regression were met. Models were adjusted for age (19–34, 35–54, 55–74, 75+ years), sex (male, female, other), ethnicity (White British, White other, South Asian, Black, Chinese, Mixed, Other ethnic group), and education (Level 4 or above - for example, higher education/degree level; I Level 3 and equivalents - for example, A level, NVQ level 3; Level 2 and equivalents - for example, GCSE grade A*-C or 4–9, NVQ level 2; and Level 1 and below - for example, GCSE below level C or 4). All analyses were conducted using Stata 17.[16]

3. Results

As shown in Fig. 1, from 702,781 invited households 176,260 people aged 19 or over completed an online or paper-based survey. Due to missingness of covariate and disability data, 17,265 participants were removed, resulting in an analytical sample of 158,995 participants. Of our analytical sample, 55% were female (n=88073) and 48% were aged 55 years or older (n=76808). In total, 29057 (18%) participants had a disability that had a substantial effect on daily activities, 33004 (21%) had a disability with a non-substantial effect on daily activities, and 96934 (61%) had no disability. Demographic information for the analytical sample is displayed in Table 1. Among the three groups, participants with a disability that had a substantial or non-substantial effect on daily activities were generally older ($p<0.01$) and more likely to be white-British ($p<0.01$). Participants with a disability that had a substantial effect on daily activities were more likely to be female ($p<0.01$) and less likely have a qualification at level 4 or above ($p<0.01$). Based on available data, participants excluded from the analyses were more likely to be 35–54yrs ($p<0.01$), female ($p<0.01$), non-white British ($p<0.01$), and have a qualification lower than level 4 ($p<0.01$), compared to those included within the analytical sample.

3.1. Frequency of activity type

Activity participation over the previous 12 months, stratified by disability status, is presented in Table 2. For all studied groups, participants took part in more indoor than outdoor activities, and individual-based activities were more common than team-based. 'Leisure' activities, which included walking and gardening, was the most commonly reported activity type. For all other activities, less than 40% of participants reported participation in the past 12 months. For the whole analytical sample, activity participation ranged from 1% (motorsports) to 98% (leisure). In the majority of cases, between group differences in

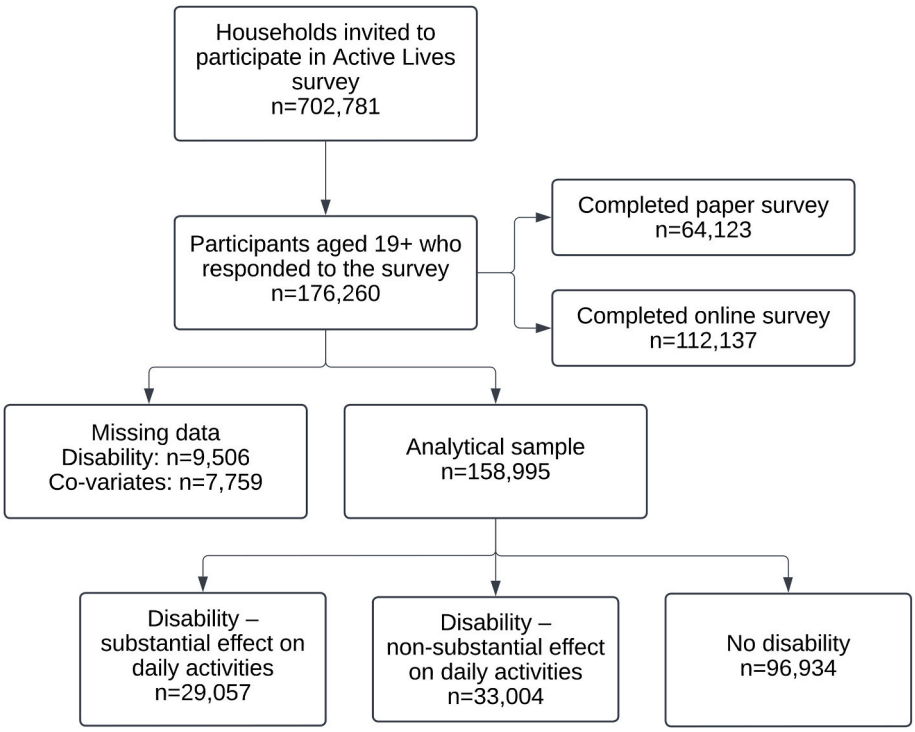

Fig. 1. Flow chart for selection of the analytical sample.

Table 1
Participant characteristics.

	Analytical sample N=158,995 n (%)		Disability – substantial effect on daily activities N=29,057 n (%)		Disability – non-substantial effect on daily activities N=33,004 n (%)		No disability N=96,934 n (%)		*P for difference*[a]
Age									p < 0.01
19-34	28,137	(17.7)	3563	(12.3)	3616	(11.0)	20,958	(21.6)	
35-54	54,050	(34.0)	7513	(25.9)	8991	(27.2)	37,546	(38.7)	
55-74	61,884	(38.9)	12,629	(43.5)	16,177	(49.0)	33,078	(34.1)	
75+	14,924	(9.4)	5352	(18.4)	4220	(12.8)	5352	(5.5)	
Sex									p < 0.01
Male	70,711	(44.5)	11,731	(40.4)	15,469	(46.9)	43,511	(44.9)	
Female	88,073	(55.4)	17,239	(59.3)	17,504	(53.0)	53,330	(55.0)	
Other	211	(0.1)	87	(0.3)	31	(0.1)	93	(0.1)	
Ethnicity									p < 0.01
White British	137,910	(86.7)	26,305	(90.5)	30,183	(91.5)	81,422	(84.0)	
White other	8841	(5.6)	1118	(3.8)	1304	(4.0)	6419	(6.6)	
South Asian	6285	(4.0)	747	(2.6)	668	(2.0)	4870	(5.0)	
Black	2086	(1.3)	268	(0.9)	301	(0.9)	1517	(1.6)	
Chinese	885	(0.6)	68	(0.2)	93	(0.3)	724	(0.7)	
Mixed	1835	(1.2)	344	(1.2)	269	(0.8)	1222	(1.3)	
Other ethnic group	1153	(0.7)	207	(0.7)	186	(0.6)	760	(0.8)	
Education									p < 0.01
Level 4 or above	84,322	(53.0)	11,641	(40.1)	18,434	(55.9)	54,247	(56.0)	
Level 3 and equivalents	23,993	(15.1)	4250	(14.6)	4432	(13.4)	15,311	(15.8)	
Level 2 and equivalents	26,677	(16.8)	5514	(19.0)	5201	(15.8)	15,962	(16.5)	
Level 1 and below	3468	(2.2)	938	(3.2)	691	(2.1)	1839	(1.9)	
Another type of qualification	7965	(5.0)	2109	(7.3)	1852	(5.6)	4004	(4.1)	
No qualification	12,570	(7.9)	4605	(15.8)	2394	(7.3)	5571	(5.7)	

[a] Chi-square test for difference in demographic characteristics between limiting disability, non-limiting disability, and no disability sub-groups.

activity participation were significant at $p<0.05$, with those with a disability that had a substantial effect on daily activities having lower participation than the other two groups.

3.2. The 10 most frequent activities undertaken

Table 3 presents frequencies for the ten most commonly reported activities undertaken in the previous 12 months. Across all three groups, 'walking for leisure' (leisure), 'walking for travel' (leisure) and 'gardening' (leisure) were the most frequently reported individual activities undertaken. In those with a disability that had a substantial effect on daily activities, participants frequently undertook leisure and gym-based activities, including using an exercise bike (11%; gym equipment/machine) and swimming (11%; swimming). The top ten activities were largely similar across the three sub-samples, with the addition of 'running or jogging' (23%; athletic) and 'free weights' (17%;

Table 2
Activity types undertaken over the past 12 months, by disability status (n, %).

	Disability – substantial effect on daily activities N=29,057 n (%)		Disability – non-substantial effect on daily activities N=33,004 n (%)		No disability N=96,934 n (%)	
Athletic	2087	(7.2)*	5118	(15.5)*	22,735	(23.5)
Artistic	3890	(13.4)*	6445	(19.5)*	19,465	(20.1)
Combat	922	(3.2)*	1403	(4.3)*	3753	(3.9)
Cycle	722	(2.5)*	1638	(5.0)*	7649	(7.9)
Equestrianism	606	(2.1)*	890	(2.7)	2579	(2.7)
Field and strike	420	(1.4) *	798	(2.4) *	3748	(3.9)
Fitness	6983	(24.0) *	11,952	(36.2) *	36,589	(37.7)
Gym equipment/machine	5765	(19.8) *	9701	(29.4) *	31,169	(32.2)
Invasion	1173	(4.0) *	2275	(6.9) *	11,064	(11.4)
Leisure	25,006	(86.1) *	32,288	(97.8) *	94,285	(97.3)
Motorsports	221	(0.8) *	379	(1.1) *	1782	(1.8)
Net/wall	1687	(5.8) *	3786	(11.5) *	14,685	(15.1)
Outdoor/adventure	4123	(14.2) *	9616	(29.1) *	32,433	(33.5)
Swimming	3633	(12.5) *	6571	(19.9) *	24,027	(24.8)
Target	3542	(12.2) *	6679	(20.2) *	21,764	(22.5)
Water sports	1497	(5.2) *	2888	(8.8) *	10,112	(10.4)
Other	427	(1.5) *	711	(2.2) *	3800	(3.9)
Indoor	2226	(7.7) *	4478	(13.6) *	16,080	(16.6)
Outdoor	1193	(4.1) *	2953	(8.9) *	10,910	(11.3)
Individual	25,645	(88.3) *	32,537	(98.6)	95,417	(98.4)
Team	1357	(4.7) *	2595	(7.9) *	12,421	(12.8)
Both	4165	(14.3) *	7888	(23.9) *	25,961	(26.8)

N may exceed sample size, and cumulative percentages may exceed 100 as participants could report participation in multiple activities.
*p value <0.05, difference in activity type compared to participants with no disability.

gym equipment/machine) for the no disability sample.

3.3. Activity duration

Table 4 presents weekly duration for each of the 17 activity groupings, based on those who reported undertaking the activity in the last four weeks. Compared to participants with no disability, activity duration was lower for participants with a disability that had a substantial or non-substantial effect on daily activities across fitness and net/wall activities (such as badminton and tennis). For participants with a disability that had a substantial effect on daily activities, the duration of artistic activities and swimming activities was higher compared to participants with no disability. The highest median duration of activity across all three samples was for leisure activity (disability – substantial effect on daily activities: 315 (120–700); disability – non-substantial effect on daily activities: 390 (180–750); no disability: 375 (165–750), mins/week).

3.4. Club membership

Table 5 presents frequencies and percentages of participants who reported to be a member of a club or organisation for each activity type reported in the previous year. This question was only asked to a subsample of participants, as described above (n=8221 disability – substantial effect on daily activities; n=9633 disability – non-substantial effect on daily activities; n=34230 no disability). Overall, club or organisation membership was lowest in those with a disability that had a substantial effect on daily activities (n=1890, 23% disability – substantial effect on daily activities; n=3756, 39% disability – non-substantial effect on daily activities; n=13692, 40% no disability). For all groups, the largest membership was for fitness, which included activities such as pilates, dance, and weight-based and water-based

Table 3
The ten most frequently reported activities undertaken in the previous 12 months.

Disability – substantial effect on daily activities N=29,057 n (%)			Disability – non-substantial effect on daily activities N=33,004 n (%)			No disability N=96,934 n (%)		
Walking for leisure *Leisure*	19,068	(65.6)	Walking for leisure *Leisure*	28,441	(86.2)	Walking for leisure *Leisure*	82,289	(84.9)
Gardening *Leisure*	17,125	(58.9)	Gardening *Leisure*	24,678	(74.8)	Gardening *Leisure*	67,525	(69.7)
Walking for travel *Leisure*	13,516	(46.5)	Walking for travel *Leisure*	19,704	(59.7)	Walking for travel *Leisure*	58,806	(60.7)
Exercise bike *Gym equipment/machine*	3159	(10.9)	Cycling for leisure *Leisure*	5617	(17.0)	Cycling for leisure *Leisure*	22,688	(23.4)
Dancing (other) *Artistic*	3149	(10.8)	Hill or mountain walking or hiking *Outdoor/adventure*	5550	(16.8)	Running or jogging *Athletic*	22,629	(23.3)
Swimming – indoors *Swimming*	3151	(10.8)	Swimming – indoors *Swimming*	5465	(16.6)	Hill or mountain walking or hiking *Outdoor/adventure*	20,409	(21.1)
Body weight exercises *Gym equipment/machine*	2783	(9.6)	Body weight exercises *Gym equipment/machine*	5407	(16.4)	Swimming – indoors *Swimming*	20,248	(20.9)
Other exercise machine *Gym equipment/machine*	2752	(9.5)	Dancing (other) *Artistic*	5194	(15.7)	Body weight exercises *Gym equipment/machine*	19,119	(19.7)
Cycling for leisure *Leisure*	2714	(9.3)	Exercise bike *Gym equipment/machine*	5113	(15.5)	Treadmill *Gym equipment/machine*	18,100	(18.7)
Treadmill *Gym equipment/machine*	2665	(9.2)	Treadmill *Gym equipment/machine*	5093	(15.4)	Free weights *Gym equipment/machine*	16,239	(16.8)

Table 4
Descriptive statistics (minutes/week) and between-group differences in activity duration for those who reported participation in the previous four weeks.

	Disability – substantial effect on daily activities					Disability – non-substantial effect on daily activities					No disability		
	n	Median	(IQR)	β	(95 % CI)	n	Median	(IQR)	β	(95 % CI)	n	Median	(IQR)
Athletic	1174	60	(22.5120)	−2	(-9,5)	3327	60	(30,120)	**−7**	**(-11,-2)**	15,305	60	(30,120)
Artistic	1948	60	(30,135)	**14**	**(3,24)**	3274	60	(30,120)	−3	(-11,6)	9786	60	(30,120)
Combat	428	60	(30,120)	10	(-16,36)	749	60	(40,120)	−1	(-22,20)	1907	60	(30,150)
Cycle	350	120	(60,300)	18	(-14,50)	856	120	(60,270)	−20	(-42,1)	4007	120	(60,270)
Equestrianism	189	180	(60,450)	−95	(-193,4)	335	210	(68,480)	**−104**	**(-183,-25)**	1024	240	(90,566)
Field and strike	111	90	(30,240)	−26	(-113,62)	207	60	(23,280)	−7	(-74,60)	1085	90	(30,360)
Fitness	4477	140	(70,300)	**−36**	**(-47,-24)**	8872	165	(90,300)	**−25**	**(-34,-16)**	27,904	180	(90,350)
Gym equipment/ machine	3018	60	(28,158)	−5	(-15,4)	5449	60	(30,150)	−1	(-9,6)	17,716	60	(30,150)
Invasion	504	103	(40,225)	17	(-13,46)	1108	90	(45,180)	−20	(-41,1)	5722	113	(45,225)
Leisure	21,679	315	(120,700)	**−35**	**(-44,-25)**	30,178	390	(180,750)	−5	(-14,3)	87,269	375	(165,750)
Motorsports	28	60	(15,135)	6	(-112,123)	46	34	(15,90)	120	(27,213)	213	45	(15,150)
Net/wall	666	120	(60,240)	**−10**	**(-11,-9)**	1828	130	(60,315)	**−3**	**(-4,-2)**	6735	120	(60,270)
Outdoor/adventure	1723	180	(90,405)	−15.4	(-41,11)	4283	188	(90,450)	**−35**	**(-53,-17)**	14,098	210	(90,450)
Swimming	1495	60	(30,120)	**7**	**(1,14)**	2883	45	(23,95)	−4	(-9,2)	10,781	45	(23,90)
Target	1399	150	(45,480)	**−53**	**(-81,-24)**	3087	225	(60,600)	−19	(-40,2)	9431	135	(30,473)
Water sports	280	60	(30,233)	**50**	**(7,92)**	686	60	(30,180)	18	(-12,48)	2398	60	(30,150)
Other	62	30	(15,45)	−9	(-48,29)	103	30	(15,50)	−7	(-38,23)	630	30	(15,60)

Bold text indicates a significant difference ($p<0.05$), in activity duration compared to participants with no disability.
IQR, inter-quartile range; 95% CI, 95% confidence interval.

Table 5
Club membership, by disability classification.

	Disability – substantial effect on daily activities N=8221 n (%)		Disability – non-substantial effect on daily activities N=9633 n (%)		No disability N=34,230 n (%)	
Athletic	101	(1.2)[a]	295	(3.1)[a]	1372	(4.0)
Artistic	47	(0.6)[a]	96	(1.0)	342	(1.0)
Combat	76	(0.9)[a]	155	(1.6)	535	(1.6)
Cycle	102	(1.2)[a]	204	(2.1)[a]	965	(2.8)
Equestrianism	23	(0.3)	35	(0.4)	139	(0.4)
Field and strike	36	(0.4)[a]	62	(0.6)[a]	411	(1.2)
Fitness[b]	1082	(13.2)[a]	2140	(22.2)[a]	8310	(24.3)
Invasion	130	(1.6)[a]	298	(3.1)[a]	1566	(4.6)
Leisure	268	(3.3)[a]	564	(5.9)	1994	(5.8)
Motorsports	17	(0.2)	16	(0.2)	86	(0.3)
Net/wall	153	(1.9)[a]	386	(4.0)	1396	(4.1)
Outdoor/adventure	70	(0.9)[a]	184	(1.9)[a]	798	(2.3)
Swimming	21	(0.3)	27	(0.3)	108	(0.3)
Target	220	(2.7)[a]	511	(5.3)[a]	1377	(4.0)
Water sports	50	(0.6)[a]	135	(1.4)[a]	382	(1.1)
Other	21	(0.3)[a]	21	(0.2)[a]	160	(0.5)

[a] p value <0.05, difference in activity membership compared to participants with no disability.
[b] This also includes gym equipment/machine.

exercise classes. For all activity types except motorsports, membership was lowest in those with a disability that had a substantial effect on daily activities. Participants with no disability were significantly more likely to be club members compared to participants with a disability that had a substantial effect on daily activities; the only exceptions were equestrianism, motorsports and swimming.

4. Discussion

The purpose of this study was to describe the types of physical activities that disabled people participate in and to compare activity frequency and duration to people without a disability. We found that activity types were largely similar in disabled and non-disabled people, however participation rates and duration were typically lower among disabled people, particularly for those with a disability that had a substantial effect on daily activities.

Leisure activities, such as walking and gardening, were the most common activity type across all three participant groups, as well as the activity type that individuals spent the greatest amount of time doing. However, engagement and duration were lower for disabled people compared to non-disabled people. Walking and gardening have been consistently found to be among the most common activities undertaken by adults,[17–19] including those with a mobility impairment.[11,20] Walking is a common form of activity for medical professionals to prescribe, as it requires no specialist skills or facilities.[21] In addition, walking, as with gardening and other leisure activities, is adaptable to lifestyles and can be undertaken at a convenient time for each individual. Walking has been shown to have many benefits for disabled people, including the management of certain health conditions and improvements in well-being and pain management.[22–24] Gardening is also associated with a range of health benefits, including reduced risk of depression and improved cognitive function.[25] Although these activities are both popular among disabled people and health enhancing, the lower participation rates suggest a need for continued efforts to enhance access and participation levels. For example, activity supportive infrastructure, such as pavements and curb cuts, are often lacking or not maintained, meaning there is an environmental disincentive to walk even amongst those able to do so.[26] Improvements to infrastructure (such as pavement surfaces) and increased provision of community-based initiatives (such as communal gardening projects) would provide greater opportunities and support for disabled people to engage in physical activity.[8]

In this study, the only activity types for which reported duration was highest in those with a disability were swimming and artistic activities, such as dancing and gymnastics. Artistic activities are an accessible activity for people with different impairments and have been shown to have many benefits including improved social inclusion and self-esteem.[27,28] Swimming also has many benefits for disabled people including reductions in joint pain and functional limitations,[29] and is a common recommendation of physical therapy. In this study, although time spent in artistic activities and swimming was higher among people with a disability that had a substantial effect on daily activities, the proportion of people taking part in artistic activities and swimming was lower than that of non-disabled people (artistic activities: 13% of participants with a disability that had a substantial effect on daily activities compared to 20% of non-disabled participants; swimming: 13% of participants with a disability that had a substantial effect on daily activities compared to 25% of non-disabled participants). This suggests that whilst uptake of these activities is relatively low compared to non-disabled people, they are a valuable source of activity for those who

do them. A lack of appropriate facilities, information about suitable classes, and instructor knowledge, can restrict a disabled person's ability to participate in activities such as swimming[30] and artistic activities.[31] Addressing the barriers to these activities, as well as other facility-based activities, would support access and uptake.

Of the sub-sample of participants who reported on club membership, 23% of participants with a disability that had a substantial effect on daily activities and 39% of participants with a disability with a non-substantial effect on daily activities were members, compared to 40% of participants with no disability. Existing research is limited, but these values are higher than those reported in a study in Northern Ireland, where 11% of disabled people were a member of a sports club, compared to 23% of non-disabled people.[32] Variation in question formatting and the proportion of participants who were asked if they were members of a sports club may account for some of the differences observed in percentages across studies, though the overarching trend is the same. Sports clubs provide an opportunity for social integration; however, this is only possible if clubs[33] and national governing bodies[34] provide appropriate provision for disabled people. We encourage sport governing bodies to enhance the availability and quality of training opportunities to support the development of inclusive coaches. We encourage sports clubs to improve the marketing of activities that cater for disabled people, as well as increasing the number of accessible opportunities. Carty et al.[35] emphasised the need to advance disability inclusion, not as a niche and distinct area, but through universal design and mainstreaming. Consultation with disabled people will be important in shaping the provision of physical activity opportunities, including the types of activities and sessions provided, as well as addressing preferences for distinct versus integrated activities.

4.1. Research/policy implications

To support participation in physical activity among disabled people, action is needed across multiple levels - from policy to practice, and across a range of sectors, including sport, health, urban design and transport. France is an example where disability inclusion is being addressed through a wide range of strategies. Between 2012 and 2015 France established an additional 400 sports clubs for disabled people and an additional 18500 disabled people became active sports club members.[36] This has also risen in more recent years, with Pierre et al.[37] in 2019 reporting 26% of clubs to have had an increase in uptake of members with disabilities over the previous three years. France has been supporting the promotion of physical activity among disabled people through the National Unit for Resources on Sport and Disabilities within the Ministry for Sports, which funds employment of dedicated disability sport professionals in disability sport federations, and subsidised employment provided through the French Disabled Sports Federation, the Federation for Adapted Sport, and the French Paralympic Sport Committee.[36] It also publishes an online guide which lists sports clubs that provide activities and facilities suitable for disabled people. The approach taken in France provides a useful case study and may serve as a model for other countries to follow.

4.2. Strengths and limitations

Strengths of this study include the use of data from a large nationally representative sample, which included a comprehensive assessment of activity participation and participants' disability status - something which is often omitted in epidemiological studies and surveillance.[38] However, this study is based on self-reported measures of physical activity which have not been formally tested for their psychometric properties. In addition, this study did not explore differences in physical activity preferences and levels by health condition or impairment type. Previous work has shown that physical activity levels differ between and within people with the same health condition, influenced by the nature and extent of impairment.[39] Collecting more comprehensive data on health conditions in large scale physical activity surveys would facilitate a detailed analysis of physical activity preferences in people with different conditions; this is an important area for future research. Additionally, the analyses involved conducting multiple hypothesis tests. We recognize the possibility of an increased risk of type 1 error for null associations; however, we chose not to adjust for multiple comparisons, as advised by Rothman.[40]

5. Conclusion

Activity choices were largely similar among disabled and non-disabled participants, but participation rates and activity duration were generally lower in those with a disability. There is a clear need to reduce inequalities in physical activity participation in disabled people by improving access, opportunities, and support. This could be facilitated through qualitative research with disabled people to understand the barriers and facilitators to participation, and co-production of strategies and actions to better support disabled people to be active.

CRediT authorship contribution statement

Shelby Carr: Writing – review & editing, Writing – original draft, Visualization, Methodology, Formal analysis, Data curation, Conceptualization. **Andrew J. Atkin:** Writing – review & editing, Methodology, Conceptualization. **Karen Milton:** Writing – review & editing, Methodology, Conceptualization.

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Appendix A. Supplementary data

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References

1. World Health Organization. *WHO Guidelines on Physical Activity and Sedentary Behaviour*. 2020.
2. Guthold R, Stevens GA, Riley LM, Bull FC. Worldwide trends in insufficient physical activity from 2001 to 2016: a pooled analysis of 358 population-based surveys with 1·9 million participants. *Lancet Global Health*. 2018;6(10):1077–1086.
3. Santos AC, Willumsen J, Meheus F, Ilbawi A, Bull FC. The cost of inaction on physical inactivity to public health-care systems: a population-attributable fraction analysis. *Lancet Global Health*. 2023;11(1):e32–e39. https://doi.org/10.1016/S2214-109X(22)00464-8.
4. Anderson E, Durstine JL. Physical activity, exercise, and chronic diseases: a brief review. *Sports Medicine and Health Science*. 2019;1(1):3–10. https://doi.org/10.1016/j.smhs.2019.08.006.
5. Knapen J, Vancampfort D, Moriën Y, Marchal Y. Exercise therapy improves both mental and physical health in patients with major depression. *Disabil Rehabil*. 2015;37(16). https://doi.org/10.3109/09638288.2014.972579.

6. Saunders DH, Sanderson M, Hayes S, et al. Physical fitness training for stroke patients. *Cochrane Database Syst Rev*. 2020;2020(3). https://doi.org/10.1002/14651858.CD003316.pub7.
7. Sport England. Active Lives adult survey november 2020-21 report. https://sportengland-production-files.s3.eu-west-2.amazonaws.com/s3fs-public/2022-04/Active LivesAdultSurveyNovember20-21Report.pdf?VersionId=nPU_v3jFjwG8o_xnv62FcKOdEiVmRWCb; 2022.
8. Rimmer JH, Riley B, Wang E, Rauworth A, Jurkowski J. Physical activity participation among persons with disabilities: barriers and facilitators. *Am J Prev Med*. 2004;26(5):419–425. https://doi.org/10.1016/j.amepre.2004.02.002.
9. Activity Alliance. *Activity Alliance Annual Disability and Activity Survey (June 2022)*. 2022.
10. Van Der Ploeg HP, Van Der Beek AJ, Van Der Woude LHV, Van Mechelen W. Physical activity for people with a disability: a conceptual model. *Sports Med*. 2004;34(10). https://doi.org/10.2165/00007256-200434100-00002.
11. Hollis NTD, Zhang QC, Cyrus AC, Courtney-Long E, Watson K, Carroll DD. Physical activity types among US adults with mobility disability, Behavioral Risk Factor Surveillance System. *Disability and Health Journal*. 2017;13(3). https://doi.org/10.1016/j.dhjo.2020.100888, 2020.
12. Badia M, Orgaz MB, Verdugo MÁ, Ullán AM. Patterns and determinants of leisure participation of youth and adults with developmental disabilities. *J Intellect Disabil Res*. 2013;57(4). https://doi.org/10.1111/j.1365-2788.2012.01539.x.
13. Smith B, Wightman L. Promoting physical activity to disabled people: messengers, messages, guidelines and communication formats. *Disabil Rehabil*. 2019. https://doi.org/10.1080/09638288.2019.1679896. Published online.
14. Ipsos MORI. Active Lives Survey 2018/2019 Year 4 Technical Report.
15. Royal Mail. https://www.royalmail.com.
16. StataCorp. *Stata Statistical Software: Release 17*. 2021. Published online.
17. Sport New Zealand. *Active NZ 2018 Spotlight on Disability Report*. 2018.
18. Ashe MC, Miller WC, Eng JJ, Noreau L. Older adults, chronic disease and leisure-time physical activity. *Gerontology*. 2009;55(1). https://doi.org/10.1159/000141518.
19. Dai S, Carroll DD, Watson KB, Paul P, Carlson SA, Fulton JE. Participation in types of physical activities among US adults–national health and nutrition examination survey 1999-2006. *J Phys Activ Health*. 2015;12. https://doi.org/10.1123/jpah.2015-0038.
20. Weikert M, Dlugonski D, Balantrapu S, Motl RW. Most common types of physical activity self-selected by people with multiple sclerosis. *International Journal of MS Care*. 2011;13(1). https://doi.org/10.7224/1537-2073-13.1.16.
21. Leijon ME, Bendtsen P, Nilsen P, Ekberg K, Ståhle A. Physical activity referrals in Swedish primary health care - prescriber and patient characteristics, reasons for prescriptions, and prescribed activities. *BMC Health Serv Res*. 2008;8. https://doi.org/10.1186/1472-6963-8-201.
22. Lee IM, Buchner DM. The importance of walking to public health. *Med Sci Sports Exerc*. 2008;40(7 suppl 1). https://doi.org/10.1249/MSS.0b013e31817c65d0.
23. Vanti C, Andreatta S, Borghi S, Guccione AA, Pillastrini P, Bertozzi L. The effectiveness of walking versus exercise on pain and function in chronic low back pain: a systematic review and meta-analysis of randomized trials. *Disabil Rehabil*. 2019;41(6). https://doi.org/10.1080/09638288.2017.1410730.
24. Selanon P, Chuangchai W. Walking activity increases physical abilities and subjective health in people with seven different types of disabilities. *Front Public Health*. 2023;11. https://doi.org/10.3389/fpubh.2023.1120926.
25. Soga M, Gaston KJ, Yamaura Y. Gardening is beneficial for health: a meta-analysis. *Prev Med Rep*. 2017;5. https://doi.org/10.1016/j.pmedr.2016.11.007.
26. Martin Ginis KA, Ma JK, Latimer-Cheung AE, Rimmer JH. A systematic review of review articles addressing factors related to physical activity participation among children and adults with physical disabilities. *Health Psychol Rev*. 2016;10(4):478–494. https://doi.org/10.1080/17437199.2016.1198240.
27. Mino-Roy J, St-Jean J, Lemus-Folgar O, et al. Effects of music, dance and drama therapies for people with an intellectual disability: a scoping review. *Br J Learn Disabil*. 2022;50(3). https://doi.org/10.1111/bld.12402.
28. Emmanouilidis S, Hackney ME, Slade SC, Heng H, Jazayeri D, Morris ME. Dance is an accessible physical activity for people with Parkinson's disease. *Parkinsons Dis*. 2021;2021. https://doi.org/10.1155/2021/7516504.
29. Alkatan M, Baker JR, Machin DR, et al. Improved function and reduced pain after swimming and cycling training in patients with osteoarthritis. *J Rheumatol*. 2016;43(3). https://doi.org/10.3899/jrheum.151110.
30. French D, Hainsworth J. There aren't any buses and the swimming pool is always cold!'': obstacles and opportunities in the provision of sport for disabled people. *Manag Leis*. 2001;6(1). https://doi.org/10.1080/13606710010026359.
31. Leahy A, Ferri D. Barriers and facilitators to cultural participation by people with disabilities: a narrative literature review. *Scand J Disabil Res*. 2022;24(1). https://doi.org/10.16993/sjdr.863.
32. Heron N, Kee F, Cupples ME, Tully MA. Correlates of sport participation in adults with long-standing illness or disability. *BMJ Open Sport & Exercise Medicine*. 2015;1(1). https://doi.org/10.1136/bmjsem-2015-000003.
33. Albrecht J, Elmose-Østerlund K, Klenk C, Nagel S. Sports clubs as a medium for integrating people with disabilities. *European Journal for Sport and Society*. 2019;16(2):88–110. https://doi.org/10.1080/16138171.2019.1607468.
34. Brown C, Pappous A, Sakis. "The legacy element . . . It just felt more woolly": exploring the reasons for the decline in people with disabilities' sport participation in England 5 Years after the London 2012 paralympic games. *J Sport Soc Issues*. 2018;42(5):343–368. https://doi.org/10.1177/0193723518781237.
35. Carty C, van der Ploeg HP, Biddle SJH, et al. The first global physical activity and sedentary behavior guidelines for people living with disability. *J Phys Activ Health*. 2021;18(1). https://doi.org/10.1123/jpah.2020-0629.
36. Commission E. *Mapping on Access to Sport for People with Disabilities: A Report to the European Commission*. 2018. https://doi.org/10.2766/061635.
37. Pierre J, Schut PO, Segay B. The role of sports clubs to integrate people with disabilities. *Managing Sport and Leisure*. 2022. https://doi.org/10.1080/23750472.2022.2135584. Published online.
38. Carr S, Atkin AJ, Jones AP, Pulsford R, Milton K. A scoping review of disability assessment in prospective and cross-sectional studies that included device-based measurement of physical activity. *J Phys Activ Health*. 2023:1–7. https://doi.org/10.1123/jpah.2023-0017. Published online.
39. Carr S, Atkin AJ, Jones AP, Milton K. The cross-sectional associations of chronic conditions and disability with self-reported physical activity among adults in England. *Prev Med*. 2023;177, 107754. https://doi.org/10.1016/j.ypmed.2023.107754.
40. Rothman KJ. No adjustments are needed for multiple comparisons. *Epidemiology*. 1990;1(1):43–46. https://doi.org/10.1097/00001648-199001000-00010.