







BMJ Open Snapshot of health-related behaviours in adults living with disabilities 1 year into the COVID-19 pandemic: a cross-sectional survey study

Syeda F Hussain ^{1,2}, Nikki Heinze ^{1,2}, Claire L Castle ^{1,2},
Lauren R Godier-McBard ³, Theofilos Kempapidis ^{1,2},
Renata S M Gomes ^{1,2,4}

To cite: Hussain SF, Heinze N, Castle CL, *et al.* Snapshot of health-related behaviours in adults living with disabilities 1 year into the COVID-19 pandemic: a cross-sectional survey study. *BMJ Open* 2022;**12**:e060512. doi:10.1136/bmjopen-2021-060512

► Prepublication history for this paper is available online. To view these files, please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2021-060512>).

SFH and NH are joint first authors.

Received 22 December 2021
Accepted 01 July 2022



© Author(s) (or their employer(s)) 2022. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

For numbered affiliations see end of article.

Correspondence to

Professor Renata S M Gomes;
renata.gomes@bravovictor.org

ABSTRACT

Objectives This survey aimed to assess the status of a range of health-related behaviours 1 year after the coronavirus outbreak was declared a pandemic in adults living with disabilities comparative with those with no disabilities.

Design This cross-sectional study reports findings from an online survey conducted in March 2021. Mann-Whitney U and χ^2 tests were used to compare a range of health behaviours including time spent self-isolating, smoking, alcohol consumption, exercise frequency and diet in adults with and without disabilities.

Setting A convenience sample of UK adults was recruited through the researchers' personal and professional networks including UK-based sight loss sector charities, social media platforms and professional forums.

Participants A total of 123 UK participants completed the survey.

Outcome measures COVID-19 diagnosis, time spent self-isolating, alcohol consumption frequency, exercise frequency, change in smoking habit and eating habits.

Results No significant differences were found in alcohol consumption, smoking, water intake, breakfast, or fruit and vegetable intake. There were statistically significant differences in the time spent self-isolating ($U=2061$, $p=0.001$), exercise frequency ($U=1171.5$, $p=0.005$) and the amount of food eaten ($\chi^2(2)=9.60$, $p=0.008$, Cramer's $V=0.281$). Although the majority in both groups reported exercising three to four times per week and eating what they should, those with disabilities were more likely to eat less than they should, not exercise at all and to have been self-isolating for over 6 months than participants with no disabilities.

Conclusions The data in this study present some key differences between the two groups, with those living with disabilities being more likely to report that they had been self-isolating for prolonged periods of time, not exercising at all, and not eating as much as they should. This raises concerns for the health and well-being of individuals with disabilities.

INTRODUCTION

In March 2020, the WHO declared the coronavirus outbreak a pandemic. In the same

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ The survey was conducted 1 year into the pandemic, after the third UK lockdown, allowing for a snapshot assessment of the effects of living through a year under pandemic circumstances.
- ⇒ This study contributes to a limited pool of research focusing on the experiences of adults with disabilities, a group expected to be disproportionately affected during this time.
- ⇒ This study assesses outcomes which tend to be overlooked in research involving adults with disabilities.
- ⇒ Recruitment via convenience sampling and small sample size mean that findings cannot be extrapolated to the general population.
- ⇒ This study would have benefited from observing the same outcome measures at another time point earlier in the pandemic or prior to the pandemic to assess how attitudes and behaviours may have changed.

month, COVID-19 cases began to surge, and the death toll started to rise in the UK. In response, the UK government put a range of measures in place to mitigate the spread of coronavirus including a push to work from home where possible, social distancing (keeping at least 2 m distance from others) and mask-wearing indoors. People at high risk of contracting coronavirus due to underlying health conditions were advised to shield, while people with COVID-19 symptoms (a new continuous cough, a high temperature and/or a loss of smell or taste) were required to self-isolate, and travellers coming from abroad were required to quarantine. All three measures required people to stay indoors and restrict contact with others. In addition, the UK government has implemented three national lockdowns to date, in March 2020, November 2020 and January 2021. These

required all but essential shops to shut, and people to stay at home and restrict their social contact except for essential purposes including food shopping, medical appointments and work where working from home was not possible.

These measures have resulted in disruption to daily activities, such as going to work, socialising and exercise routines, with many being left without adequate exercise equipment or space to exercise, and no longer commuting on foot or by bike. While people in the UK were allowed to exercise outdoors during all three lockdowns, this was restricted to once per day, with those advised to shield unable to exercise outside at all. Regular physical activity has been linked with reduced levels of stress, depression, anxiety and inflammation, ultimately contributing to better physiological and psychological health outcomes.¹ Research found that exercise frequency decreased between the first and second UK lockdowns, while sedentary activities, for example, working, watching TV and gaming, increased.² Levels of stress, anxiety or depression have all increased during the pandemic due to financial-related, employment-related, social-related and health-related concerns, and caring responsibilities.³⁻⁶ There is a risk that people may have used maladaptive coping mechanisms such as comfort eating, smoking, alcohol or drugs during this period,^{7,8} although the evidence is mixed. Some research has identified increased smoking,⁹ overeating and subsequent weight gain to cope with greater levels of stress and anxiety at this time. An English study¹⁰ found an increase in the prevalence of high-risk drinking, but no change in smoking prevalence, and increased rates of smoking cessation and attempts to quit during the first UK lockdown. In contrast, another UK study² found that smoking, alcohol consumption and eating habits remained largely the same between the first and third UK lockdowns. However, sustained changes in drinking alcohol and eating behaviours were found in a small proportion of participants.² A healthy, balanced diet may play a role in protecting against non-communicable diseases¹¹ and poor mental health.¹² An unhealthier diet adopted during lockdown, and reduced physical activity, were both independently linked to a greater negative mood score.¹³ The negative effects of smoking and alcohol on health are well known, with smoking increasing the risk of health conditions such as certain cancers, coronary heart disease and stroke,^{14,15} and heavy drinking being associated with obesity¹⁶ among other consequences.

Vulnerable populations such as those with disabilities may be at increased risk of the negative impacts of the pandemic.¹⁷ People with disabilities made up 60% of those who died from COVID-19 between January and November 2020, and they have been found to experience worse mental health outcomes than those without disabilities.¹⁸ Maintaining a healthy lifestyle and avoiding harmful health behaviours may, therefore, be particularly important in this group. However, existing evidence suggests that even before the pandemic, people living with disabilities were twice as likely to be physically

inactive as people without disability.¹⁹ In addition, disruption to shopping, food preparation and cooking already presented obstacles to a healthy diet for people living with visual impairment,²⁰ resulting in fewer nutrients being consumed in this group compared with age-matched controls,²¹ and a high incidence of malnourishment and obesity. During the pandemic, shielding and reliance on local services or volunteers, long queue times at shops, difficulty securing food delivery slots,²² and negative impacts on job retention and finances²³ may have further impacted access to food and exercise. Difficulties accessing groceries, medication and healthcare for non-coronavirus-related issues, as well as negative impacts on health, have been more prevalent among people with disabilities than those without disabilities.²⁴ Food insecurity at this time rose, especially in already vulnerable groups in the UK.²⁵ Existing COVID-19 research involving people with disabilities has mainly focused on impacts on access to medical care and exercise. To our knowledge, there are no studies assessing alcohol consumption, dietary changes and smoking during the pandemic in this population. Those with chronic health conditions often meet the definition of disability as set out by the Equality Act 2010.²⁶ There is evidence of a greater impact on harmful health behaviours in those with chronic health conditions during the pandemic. Increases in alcohol consumption and smoking in light smokers were more prevalent in those with chronic health conditions,²⁷ while decreases in alcohol consumption were more prevalent in heavy drinkers with no health conditions.²⁷

Existing research highlights that those living with disability may be at greater risk of negative impacts of COVID-19 on health and health-related behaviours than individuals with no disabilities.¹⁷ Considering the long-term negative physical and mental health outcomes associated with harmful health behaviours, it is important to determine the extent to which people living with disabilities have engaged in health-promoting and harmful health behaviours. This article provides a snapshot of a range of health behaviours including alcohol consumption, smoking, exercise and diet in a sample of UK adults living with disabilities compared with adults with no disabilities, approximately 1 year into the COVID-19 pandemic.

MATERIALS AND METHODS

This article draws on survey data collected as part of a longitudinal assessment of health and well-being in individuals with and without disabilities conducted between 1 April 2020 and 28 March 2021. The current article presents findings from the final survey conducted between 8 and 28 March 2021, approximately 1 year after the implementation of the first UK lockdown. The results were reported according to the Strengthening the Reporting of Observational Studies in Epidemiology cross-sectional reporting guidelines.²⁸ Findings relating to loneliness,²⁹

sleep³⁰ and anxiety³¹ in the same sample population are reported elsewhere.

Materials

An online survey was developed by the Research and Innovation Team at Blind Veterans UK (a UK-based charity providing support to veterans with sight loss), in collaboration with the University of Oxford, to collect information on current life circumstances, health and health-related behaviours, sleep and social well-being across several time points. The same questionnaire had been administered in previous rounds, however, changes to the layout and wording of questions had been made between each round to improve data quality, and a number of demographics and health questions had been removed to decrease participant burden. Due to these changes, a longitudinal comparison of health behaviours was not possible.

To make the survey accessible to participants with visual impairment, Microsoft Forms (Microsoft Corporation, Redmond, Washington, USA) was used to develop the survey. The platform has a range of accessibility features including colour contrast, high contrast settings and compatibility with screen readers to facilitate participation for those with vision-related disabilities. Reading of grid questions was made easier by splitting questions across individual pages so that participants were seeing only one question per page.

Measures

To assess for disability, participants were first asked if they considered themselves to have a disability, followed by a question listing 16 conditions, including visual impairment or blindness, acquired brain injury, a medical condition such as asthma, diabetes or epilepsy, disability affecting mobility, mental health issues and learning difficulties, which required a 'Yes', 'No' or 'Prefer not to say' response for each condition.

Single questions assessed COVID-19 diagnosis, current COVID-19 symptoms, self-isolation status, exercise frequency, alcohol consumption and change in smoking habits. Diet over the last 3 weeks was assessed with a set of questions asking participants to indicate if their diet had improved, worsened or stayed the same; if they had been eating what they should, more or less than they should; if they had been drinking enough water, more or less water than they should; if they had been eating fruit and vegetables at least two or more times a week; and if they had been eating breakfast daily or most days.

Sample

This article presents findings for a subsample of UK-based participants who completed the final survey in this survey series. The full sample consists of a convenience sample of adults aged 18 years and over recruited through the researchers' personal and professional networks, social media platforms and professional forums. Participants who had consented to be recontacted for follow-up

research and provided a valid email address were invited via email to take part in subsequent rounds of the survey. Responses to the first survey in this series were received from 22 different countries predominantly the UK (61.9%) and participants from nine different countries took part in the final survey, the majority based in the UK (76.9%). Frequencies for other countries were too small to enable cross-country comparisons. The timings and nature of containment measures varied substantially between countries and so the current article focuses on the UK subsample.

Procedure

Participants were able to access the survey by clicking a link embedded in the invitation. Participants were first provided with information about the study and their rights, before being asked to consent to take part in the research. At the start of each section, participants were able to choose if they wanted to answer or skip the section. For most questions, participants also had the option to select 'Prefer not to say'. While the preferred mode was online self-completion to reduce social desirability bias and the potentially sensitive nature of some questions, participants who contacted the research team with difficulties accessing the survey were offered the option of completing the survey with a researcher over the telephone. Only one participant selected this option.

Statistical analysis

Duplicates and non-responses were removed from the dataset before analysis. Responses were treated as missing if participants had missed relevant response options, selected 'Prefer not to say' or had skipped the section.

Subgroup analysis was carried out to compare participants who reported having one or more types of disability (≥ 1 disabilities) with participants who reported that they did not have a disability ('no disabilities').

Proportions and frequencies for all variables measured are presented in the respective tables to show spread of responses by subgroup. Proportions are presented for the total number of valid responses achieved for each question. The total number of valid responses (n) is reported in the tables. Differences between the groups were analysed using Mann-Whitney U and X^2 tests. The test statistics and p values are reported in the tables. Fisher's exact tests were conducted if X^2 test assumptions were violated, and respective p values are reported in tables instead.

Patient and public involvement

Patients and the public were not involved in the design of this study.

RESULTS

Participant characteristics

Table 1 provides a summary of participant characteristics. After removing one duplicate, two cases who did not consent to participating in this follow-up survey, and

Table 1 Sample characteristics of total survey sample

		% (n)
Gender	Female	55.7 (68)
	Male	44.3 (54)
Ethnicity	Asian	1.6 (2)
	Black/African/Caribbean	0.8 (1)
	Hispanic/Latino/Spanish origin	1.6 (2)
	Mixed/multiple ethnic groups	–
	White/other white	95.9 (117)
Age	18–25	0.8 (1)
	26–35	9.8 (12)
	36–45	14.8 (18)
	46–55	36.1 (44)
	56–65	24.6 (30)
	66–75	11.5 (14)
	76–85	2.5 (3)
	86+	–
Employment status	In paid employment	73.6 (89)
	I am employed but furloughed	1.7 (2)
	Retired	14.9 (18)
	Unemployed and not looking for work	7.4 (9)
	Unemployed but looking for work	2.5 (3)
Living status	I live on my own	23.8 (29)
	I live with others	76.2 (93)
Disability	No disability	68.0 (83)
	One or more disabilities	32.0 (39)
Type of disability*	Visual impairment or blindness	21.1 (26)
	Disability affecting mobility	16.3 (20)
	Mental health issues	13.8 (17)
	Medical condition (eg, asthma, diabetes or epilepsy)	12.2 (15)
	Hearing impairment or deafness	11.4 (14)
	Emotional/behavioural difficulties	5.7 (7)
	Being immunocompromised	4.1 (5)
	Learning difficulties	2.4 (3)
	Acquired brain injury	1.6 (2)
	Multiple sclerosis	1.6 (2)
	Profound complex disabilities	1.6 (2)
	Limb loss	0.8 (1)
	Dyslexia	0.8 (1)

Proportions are calculated for the number of participants who reported each condition out of the entire sample (n=123).

*Participants were able to report multiple disabilities.

37 surveys received from outside the UK, a total of 123 UK residents completed the survey. Participants were mostly white, female, aged 46–55 years, in paid employment and living with others. Approximately two-thirds of participants reported having no disabilities. One-third

Table 2 COVID-19 diagnosis, symptoms and time spent self-isolating by subgroup

		No disability % (n)	≥1 disabilities % (n)
Since the last COVID-19 pandemic survey, have you been diagnosed with COVID-19?*	n	83	39
	Yes	4.8 (4)	2.6 (1)
Do you currently have any of the following COVID-19 symptoms: a new, continuous cough, a high temperature, or a loss or change to your sense of smell and taste?†	n	83	39
	Yes	1.2 (1)	5.1 (2)
Please indicate for how long you have been self-isolating: By self-isolating we mean staying at home, except for urgent medical assistance, and not having any visitors.†	n	82	39
	Not self-isolating	80.5 (66)	53.8 (21)
	≤2 weeks	1.2 (1)	–
	2–4 weeks	–	–
	6–8 weeks	1.2 (1)	–
	8–12 weeks	1.2 (1)	–
	3–4 months	–	–
	4–5 months	1.2 (1)	–
≥6 months	14.6 (12)	46.2 (18)	
U=2061, p=0.001*			
Significant group differences are marked by an asterisk (*). *Between group analysis not conducted due to low prevalence. †Percentages are based on the total number of valid responses given (n) and exclude 'Prefer not to say' responses.			

reported having one or more disabilities, with a mean of 2.95 (SD=1.82) different types of disability and a maximum of eight types of disability being reported by one participant. The most commonly reported types of disability in this sample were visual impairment or blindness, disability affecting mobility and mental health difficulties.

COVID-19 and self-isolating

Table 2 shows that five people had been diagnosed with COVID-19, and three people reported having COVID-19 symptoms at the time of completing the survey.

There was a statistically significant difference in the time spent self-isolating between the '≥1 disabilities' group and the 'no disability' group, with not isolating being more likely among participants in the 'no disability' group. Just over 80% of participants with no disability reported that they were not self-isolating in March 2021 compared with around half of participants with ≥1 disabilities. In contrast, participants with ≥1 disabilities were more than three times more likely to report that they had been self-isolating for over 6 months at the time of the survey than those with no disabilities (46.2% and 14.6%, respectively).

Table 3 Smoking habit, alcohol and exercise frequencies by subgroup

		No disability % (n)	≥1 disabilities % (n)
Thinking about the time since you completed the last COVID-19 pandemic survey, which of the following statements best describes your smoking habits?	n	81	39
	I don't smoke	93.8 (76)	92.3 (36)
	Smoked less than usual	1.2 (1)	–
	Smoked the same	4.9 (4)	5.1 (2)
	Smoked more than usual	–	2.6 (1)
		U=1607, p=0.721	
Over the last 3 weeks, how often have you been drinking alcohol?	n	83	39
	I don't drink alcohol	32.5 (27)	46.2 (18)
	Once a week	18.1 (15)	12.8 (5)
	Only on weekends	22.9 (19)	17.9 (7)
	3–5 times a week	22.9 (19)	23.1 (9)
	Every day	3.6 (3)	–
		U=1410.5, p=0.235	
In the last 3 weeks, how often have you participated in some kind of exercise?	n	83	39
	3–4 times per week	67.5 (56)	46.2 (18)
	1–2 times per week	18.1 (15)	12.8 (5)
	Once per week	7.2 (6)	15.4 (6)
	Not at all	7.2 (6)	25.6 (10)
		U=1171.5, p=0.005*	

Significant group differences are marked by an asterisk (*). Percentages are based on the total number of valid responses given (n) and exclude 'Prefer not to say' responses.

Health behaviours

Prevalence of self-reported smoking was low in this sample (table 3). Over 90% of respondents in both groups were non-smokers, and there was no significant difference in smoking habits between the two groups.

There were also no statistically significant differences between the two groups in terms of alcohol consumption. Almost half of the respondents with '≥1 disabilities' reported that they did not drink alcohol at all (46.2%) compared with just one-third of those with no disabilities (32.5%). The prevalence of more frequent alcohol consumption was relatively similar in the two groups, with 23.1% of participants with ≥1 disabilities drinking alcohol at least three to five times a week compared with 26.5% of participants with no disabilities, including three who reported drinking alcohol every day.

In contrast, there was a statistically significant difference in exercise frequency between the two groups. Around a quarter (25.6%) of participants with disabilities reported that they had not exercised at all over the last 3 weeks compared with 7.2% of participants with no disabilities. This means that around three-quarters of participants with disabilities and over 90% of participants with no

Table 4 Dietary, eating and drinking habits by subgroup

		No disability % (n)	≥1 disabilities % (n)
I eat fruit and vegetables 2+ times a week	n	83	38
	Yes	95.2 (79)	86.8 (33)
	No	4.8 (4)	13.2 (5)
		p=0.137*	
I eat breakfast daily or most days	n	83	38
	Yes	79.5 (66)	71.1 (27)
	No	20.5 (17)	28.9 (11)
		χ ² (2, 121)=1.05, p=0.305, φ=−0.093	
Diet	n	83	39
	My diet has improved	27.7 (23)	15.4 (6)
	My diet has stayed the same	56.4 (47)	64.1 (25)
	My diet worsened	15.7 (13)	20.5 (8)
		χ ² (2, 122)=2.31, p=0.315, Cramer's V=0.138	
Diet habits	n	83	39
	I eat what I should	56.6 (47)	41.0 (16)
	I eat less than I should	4.8 (4)	23.1 (9)
	I eat more than I should	38.6 (32)	35.9 (14)
		χ ² (2, 122)=9.60, p=0.008*, Cramer's V=0.281	
Water intake	n	83	39
	Drinking enough	51.8 (43)	51.3 (20)
	Drinking less than I should	47.0 (39)	46.2 (18)
	Drinking more than I should	1.2 (1)	2.6 (1)
		p=0.860*	

Participants were asked to select all the statement/s which best describe them over the last 3 weeks. Significant group differences are marked by an asterisk (*). Percentages are based on the total number of valid responses given (n) and exclude 'Prefer not to say' responses. *Result of Fisher's exact test.

disabilities managed to do exercise at least once per week in the 3 weeks leading up to the survey. Encouragingly, a majority in both groups reported exercising three to four times a week but this was more common in participants with no disabilities (67.5% compared with 46.2% in participants with ≥1 disabilities). Only exercising once a week was selected by a greater proportion of those with disabilities (15.4%) compared with those without disabilities (7.2%).

Overall, the majority of participants reported a healthy diet which included eating fruit and vegetables at least twice a week and eating breakfast daily or on most days (table 4). Although not statistically significant, the



proportions reporting this were slightly higher among participants with no disabilities. There were also no statistically significant differences between the two groups in relation to changes in their diet and water intake. When asked about changes in their diets, a majority in both groups stated that their diet had remained the same. Participants with disabilities were slightly more likely to report that their diet had stayed the same or worsened than participants with no disabilities, while the latter group was slightly more likely to report improvements in their diet. Around half of the participants in each group reported drinking enough water and just under half reported not drinking enough. One person in each group reported drinking more water than they should. There was, however, a statistically significant difference between the two groups in the amount of food eaten over the 3 weeks leading up to the survey. While a majority in both groups reported eating what they should (56.6% of participants with no disabilities and 41.0% of those with disabilities), participants with disabilities were almost five times more likely to report that they were eating less than they should (23.1% vs 4.8% for those with no disability) and almost 40% in both groups reported eating more than they should.

DISCUSSION

Existing evidence suggests that prior to the pandemic, unhealthy behaviours were more prevalent in people with disabilities,^{19–21 32 33} and as a result there was concern that this group would be disproportionately affected by the pandemic.³⁴ This study provides a snapshot of a range of health-related behaviours in people with disabilities compared with people with no disabilities approximately 1 year into the COVID-19 pandemic. Notable group differences were found for exercise frequency, time spent self-isolating and the amount of food eaten.

Even before the pandemic, people with disabilities were more likely to be physically inactive than people with no disabilities (39.8% vs 20.5%).¹⁹ In contrast, 25.6% of participants in the current study reported not exercising at all in the 3 weeks before the study. This is perhaps unsurprising considering the impact of the pandemic on exercise. One Norwegian study reported that 66% of their participants with physical disabilities reported a decrease in exercise during the pandemic compared with pre-pandemic times.³⁵ While people with disabilities have been found to be more likely to report a negative impact of the pandemic on their ability to exercise due to health concerns and lack of exercise space,¹⁹ a decrease in physical activity (doing at least 30 min of physical activity five times a week) was found in both groups, from 26% to 23% between April and September 2020 among people with disabilities and from 36% to 31% among people with no disabilities. In contrast, 46.2% of participants with disabilities reported that they had participated in some kind of exercise at least three to four times a week in the current study. This is considerably higher and may relate

to the lower exercise frequency given in the response and to the fact that exercise was not defined in the current study, which may have resulted in different definitions of exercise for different participants. Reflecting existing evidence of a negative impact on physical activity during the pandemic in this group,^{19 36} participants with disabilities were around 3.5 times more likely to not exercise at all than participants with no disabilities. This may reflect challenges imposed by lockdown restrictions including disruption to public transport and reduced access to professional and social support for attending gyms,³⁶ and existing barriers to physical activity.^{19 37} The most common types of disability in this sample were visual impairment/blindness, disability affecting mobility and mental health conditions. Participants with impaired mobility were more likely to be physically inactive (no exercise at all) than those with visual impairment (n=9, 45.0% compared with n=3, 11.5%) and less likely to have participated in regular exercise (three to four times a week) (n=8, 40.0% compared with n=16, 61.5%). However, it must be noted that it was not possible to control for comorbidity in this study and some participants may have both types of disability. Severe visual impairment, fear of falling, inaccessible facilities and lack of inclusive environments are just a few factors known to minimise time spent exercising in those with visual impairment.^{38–40} Participants with mobility-related disabilities may be less likely to participate in frequent regular exercise compared with other impairments, such as hearing impairment.⁴¹ Encouragingly, at least three-quarters in both groups reported getting some form of exercise and a majority of participants in each group reported exercising three to four times a week. One year into the pandemic, this may suggest an adaptation to the restrictions on exercise imposed by the pandemic. It may also reflect the presence of participants recruited through contacts in the sight loss and military sectors. Members of the charity Blind Veterans UK, for example, were actively supported to participate in sports and recreational activities during the pandemic through remotely delivered exercise sessions.

Statistically significant group differences were also observed in the length of time participants had spent self-isolating. Participants with disabilities were around three times more likely to have been self-isolating for more than 6 months than those without disabilities. This is perhaps unsurprising given the increased risk of COVID-19-related complications for those living with a disability,¹⁷ and advice for vulnerable adults to shield during the pandemic. This is of concern due to the impact of self-isolating on mental health and experiences of loneliness.^{42 43} White and Van Der Boor⁴⁴ reported higher levels of anxiety and depression and lower well-being in UK adults who had been self-isolating before a lockdown; these adults reported feeling more isolated than usual during lockdown. However, findings reported in our previous article²⁹ indicated that isolation did not contribute to feelings of loneliness in this sample population. Over three-quarters of participants without disabilities indicated that they were not

self-isolating, compared with around half of participants with disabilities. This is despite stay-at-home orders having been implemented across the UK during December 2020/January 2021. There is evidence of differing attitudes towards dealing with the pandemic, with those with disabilities more likely to report having concerns about leaving home compared with those without disabilities.⁴⁵

There was a statistically significant group difference in the amount of food eaten but not for any of the other dietary indicators. Eating habits in this sample indicate that undereating was almost five times more likely in those with disabilities. Prior to the pandemic, associations had been drawn between disability and undernutrition.⁴⁶ Existing barriers to food preparation^{20 21} and additional challenges accessing food shopping during the pandemic²² may have contributed to the undereating reported in this group. However, in general, participants in both groups were adhering to healthy dietary habits with most eating breakfast and fruit and vegetables regularly and drinking enough water. While there was no statistically significant group difference in relation to changes in diet, those with disabilities were slightly more likely to state that their diet had worsened.

There were no statistically significant differences in alcohol consumption and changes in smoking between participants with and without disabilities. Over 90% of participants in both groups were non-smokers. This is higher than the prevalence of non-smokers reported by Fancourt *et al.*²⁷ The prevalence of smokers in both groups is also around half of that reported for the general population (13.8%) in Great Britain in the first quarter of 2020.⁴⁷ It is unclear if this reflects a mode effect, social desirability bias or a lower prevalence in this sample. To our knowledge, there is limited research exploring alcohol consumption and smoking among people with disabilities. Smoking was found to be more prevalent in UK adults with disabilities than those without disabilities prior to the pandemic,³³ and research from the UK found that people without chronic physical conditions were less likely to have increased from light to moderate smoking and more likely to have stopped smoking than those with chronic physical conditions during the pandemic.²⁷ Due to the small number of smokers in the current sample, comparisons cannot be drawn.

While the prevalence of more frequent drinking was similar in both groups, participants with disabilities were around 1.4 times more likely to be non-drinkers than participants with no disabilities. This reflects existing evidence from the USA which found a lower prevalence of alcohol abuse among people with disabilities prior to the pandemic.⁴⁸ But it contradicts evidence from another US study conducted in February/March 2021 which found higher levels of alcohol consumption before and during the pandemic in people with disabilities.⁴⁹ Results from a UK panel study carried out during the pandemic showed that 30% of participants reported not drinking alcohol.² This compares with the proportion of non-drinkers among participants with no disabilities in this study but

is lower than the proportion observed for participants with disabilities. The same panel also found that alcohol consumption remained stable during the pandemic, but an increase was found to be more likely for people with chronic health conditions than those without.²⁷ Changes in alcohol consumption were not explored in the current article. Considering early evidence of an increase in alcohol consumption in people with disabilities during the pandemic, future research may be required to monitor drinking behaviours among these individuals as the pandemic continues.

This study addresses the lack of data surrounding alcohol consumption, smoking and diet in UK adults with disabilities during the pandemic. There are some limitations of this study. First, the study used a convenience sample, meaning that findings cannot be extrapolated to the general population. Similarly, the use of a web-based survey could exclude members of certain subgroups. Additionally, findings may be more representative of our specific sample of participants who had been receiving support throughout the pandemic and not of people with disabilities in general. Second, there was no definition for exercise provided in the survey, meaning that the question was open to interpretation. Therefore, the responses are subject to individual definitions of exercise. To limit this, future studies should define exercise according to a certain length of time and/or intensity. Third, the sample consisted of considerably smaller numbers of respondents reporting disabilities than those without disabilities. While it is encouraging that there were few differences between our groups in terms of health behaviours, it must be noted that pre-pandemic results are not available. For example, participants who said that their diet had stayed the same may have been referring to the maintenance of an unhealthy diet. Existing studies have provided some longitudinal analysis, by either comparing responses at two time points during the pandemic,^{2 27} or making comparisons with pre-pandemic times. While data were collected at an earlier point in the pandemic, longitudinal analysis could not be carried out due to changes made to survey questions between surveys. Current results, therefore, cannot confirm whether the findings reflect the impact of the pandemic or not. This study instead attempts to quantify the behaviours being exhibited by those with and without disabilities following a full year of living with pandemic restrictions. Existing literature has so far only explored the impact on exercise and access to care. This report provides novel data on behaviours such as smoking, alcohol consumption and eating habits in people with disabilities.

Future studies should determine the long-term impact of having different types and numbers of disabilities during the pandemic. Similarly important is the inclusion of ethnic diversity of study participants. While the survey did include a question asking about participants' ethnicity, the majority of respondents in the already small-sized sample were white, so ethnicity-based comparisons could not be carried out. Given that there are known

differences in how the pandemic has affected different ethnic groups, further research would indeed be beneficial. Research may also seek to identify if barriers to participation in physical activity for people with disabilities were pre-existing or if lockdown posed additional challenges. Further exploration of the level and cause of under-eating in those with disabilities may also be valuable.

CONCLUSIONS

Despite concerns about the disproportionate impact of the COVID-19 pandemic on people with disabilities, this study offers a mixed picture. While those with disabilities fared significantly worse in terms of exercise frequency, time spent in self-isolation and food consumption, this study found no statistically significant differences in relation to smoking, changes in diet, water intake, fruit and vegetable and breakfast consumption, and alcohol consumption. Furthermore, participants with disabilities were more likely to be non-drinkers. Implications for clinical practice are that people living with a disability may benefit from additional support and guidance relating to diet and exercise as we transition through different phases of the ongoing pandemic.

Author affiliations

¹Research, BRAVO VICTOR, London, UK

²Research and Innovation, Blind Veterans UK, London, UK

³Veterans and Families Institute for Military Social Research, Anglia Ruskin University, Chelmsford, UK

⁴Northern Hub for Veterans and Military Families Research, Department of Nursing, Midwifery and Health, Faculty of Health and Life Sciences, Northumbria University, Newcastle upon Tyne, UK

Twitter Renata S M Gomes @renatasmgomes

Contributors Conceptualisation—RSMG, SFH and NH. Methodology—RSMG, TK, CLC, NH and SFH. Formal analysis—NH and LRG-M. Investigation—RSMG and NH. Resources—RSMG, TK, CLC, NH, SFH and LRG-M. Data curation—NH. Writing (original draft) preparation—SFH and NH. Writing (review and editing)—SFH, NH, CLC and LRG-M. Visualisation—SFH and NH. Project administration—RSMG. Funding acquisition—RSMG. Guarantor—RSMG. All authors have read and agreed to the published version of the manuscript.

Funding This work was supported by Blind Veterans UK.

Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not required.

Ethics approval This study involves human participants but in accordance with the local legislation and institutional requirements (the Medical Sciences Interdivisional Research Ethics Committee at the University of Oxford), ethical review and approval were not required for the study on human participants. Written and informed consent was provided by members of the public who agreed to participate in this study.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available upon reasonable request. Data are available upon reasonable request by contacting the corresponding author. The data are not publicly available because participants were not asked if they consented for their data to be shared outside of the research teams involved in this study.

Open access This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is

properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

ORCID iDs

Syeda F Hussain <http://orcid.org/0000-0001-9917-602X>

Nikki Heinze <http://orcid.org/0000-0003-4529-3460>

Claire L Castle <http://orcid.org/0000-0002-6643-0439>

Lauren R Godier-McBard <http://orcid.org/0000-0002-3742-6721>

Theofilos Kempapidis <http://orcid.org/0000-0001-5632-8986>

Renata S M Gomes <http://orcid.org/0000-0002-9197-8279>

REFERENCES

- Mikkelsen K, Stojanovska L, Polenakovic M, *et al*. Exercise and mental health. *Maturitas* 2017;106:48–56.
- Fancourt D, Bu F, Mak HW. Covid-19 social study results release 29, 2021. Available: https://www.covidsocialstudy.org/_files/ugd/3d9db5_59d1b940054440bbb52a72b6bd0b0a06.pdf [Accessed 3 Mar 2021].
- Khademian F, Delavari S, Koohjani Z, *et al*. An investigation of depression, anxiety, and stress and its relating factors during COVID-19 pandemic in Iran. *BMC Public Health* 2021;21:275.
- Nkire N, Mrklas K, Hrabok M, *et al*. COVID-19 pandemic: demographic predictors of self-isolation or self-quarantine and impact of isolation and quarantine on perceived stress, anxiety, and depression. *Front Psychiatry* 2021;12:553468.
- Posel D, Oyenubi A, Kollamparambil U. Job loss and mental health during the COVID-19 lockdown: evidence from South Africa. *PLoS One* 2021;16:e0249352.
- Rainero I, Bruni AC, Marra C, *et al*. The impact of COVID-19 quarantine on patients with dementia and family caregivers: a nationwide survey. *Front Aging Neurosci* 2020;12:625781.
- Coulthard H, Sharps M, Cunliffe L, *et al*. Eating in the lockdown during the Covid 19 pandemic; self-reported changes in eating behaviour, and associations with BMI, eating style, coping and health anxiety. *Appetite* 2021;161:105082.
- Herle M, Smith AD, Bu F, *et al*. Trajectories of eating behavior during COVID-19 lockdown: longitudinal analyses of 22,374 adults. *Clin Nutr ESPEN* 2021;42:158–65.
- Grogan S, Walker L, McChesney G, *et al*. How has COVID-19 lockdown impacted smoking? A thematic analysis of written accounts from UK smokers. *Psychol Health* 2022;37:17–33.
- Jackson SE, Garnett C, Shahab L, *et al*. Association of the COVID-19 lockdown with smoking, drinking and attempts to quit in England: an analysis of 2019–20 data. *Addiction* 2021;116:1233–44.
- Branca F, Lartey A, Oenema S, *et al*. Transforming the food system to fight non-communicable diseases. *BMJ* 2019;364:l296–29.
- Firth J, Gangwisch JE, Borsini A, *et al*. Food and mood: how do diet and nutrition affect mental wellbeing? *BMJ* 2020;369:m2440.
- Ingram J, Maciejewski G, Hand CJ. Changes in diet, sleep, and physical activity are associated with differences in negative mood during COVID-19 lockdown. *Front Psychol* 2020;11:588604.
- Gandini S, Botteri E, Iodice S, *et al*. Tobacco smoking and cancer: a meta-analysis. *Int J Cancer* 2008;122:155–64.
- Hackshaw A, Morris JK, Boniface S, *et al*. Low cigarette consumption and risk of coronary heart disease and stroke: meta-analysis of 141 cohort studies in 55 study reports. *BMJ* 2018;360:j5855.
- Traversy G, Chaput J-P. Alcohol consumption and obesity: an update. *Curr Obes Rep* 2015;4:122–30.
- Kuper H, Banks LM, Bright T, *et al*. Disability-inclusive COVID-19 response: what it is, why it is important and what we can learn from the United Kingdom's response. *Wellcome Open Res* 2020;5:79.
- Suleman M, Sonthalia S, Webb C. Unequal pandemic, fairer recovery. The COVID-19 impact inquiry report, 2021. Available: <https://www.health.org.uk/sites/default/files/uploads/publications/2021/HEAJ8932-COVID-Impact-210705.pdf> [Accessed 16 Dec 2021].
- Activity Alliance. The impact of COVID-19 on disabled people, 2020. Available: <https://www.activenotts.org.uk/uploads/activity-alliance-impact-of-covid-19-on-disabled-people-oct-2020.pdf?v=1605783441> [Accessed 19 Apr 2021].
- Jones N, Bartlett H. The impact of visual impairment on nutritional status: a systematic review. *Br J Vis Impair* 2018;36:17–30.
- Jones N, Bartlett HE. Comparison of the eating behaviour and dietary consumption in older adults with and without visual impairment. *Br J Nutr* 2020;123:712–20.
- UK Parliament. Unequal impact? Coronavirus, disability and access to services: full report. 2. Access to food, 2020. Available: <https://>

- publications.parliament.uk/pa/cm5801/cmselect/cmwomeq/1050/105005.htm [Accessed 19 Apr 2021].
- 23 Baraniuk C. Fears grow of nutritional crisis in lockdown UK. *BMJ* 2020;370:m3193.
 - 24 ONS. Coronavirus and the social impacts on disabled people in Great Britain September 2020, 2020. Available: [https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/disability/articles/coronavirusandthesocialimpactsondisabledpeopleingreatbritain/september2020#:~:text=Disabled%20people%20reported%20more%20frequently,too%20much%20time%20alone%20\(40%25](https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/disability/articles/coronavirusandthesocialimpactsondisabledpeopleingreatbritain/september2020#:~:text=Disabled%20people%20reported%20more%20frequently,too%20much%20time%20alone%20(40%25) [Accessed 30 Jul 2021].
 - 25 Connors CML, Canavan S. The lived experience of food insecurity under Covid-19. A bright harbour collective report for the food standards agency, 2020. Available: https://www.food.gov.uk/sites/default/files/media/document/fsa-food-insecurity-2020_-report-v5.pdf [Accessed 12 Jul 2021].
 - 26 UK Government. Equality act 2010, 2010. Available: <https://www.legislation.gov.uk/ukpga/2010/15/section/6> [Accessed 8 Dec 2021].
 - 27 Fancourt D, Bu F, Mak HW. Covid-19 social study. results release 33, 2021. Available: https://b6bdc03-332c-4ff9-8b9d-28f9c957493a.filesusr.com/ugd/3d9db5_9d55b4ff686744cdae69e72cd141ecfb.pdf [Accessed 12 Jul 2021].
 - 28 von Elm E, Altman DG, Egger M. The strengthening the reporting of observational studies in epidemiology (STROBE) statement: guidelines for reporting observational studies.
 - 29 Heinze N, Hussain SF, Castle CL, et al. The long-term impact of the COVID-19 pandemic on loneliness in people living with disability and visual impairment. *Front Public Health* 2021;9:738304.
 - 30 Heinze N, Hussain SF, Castle CL, et al. The impact of COVID-19 on sleep quality in people living with disabilities. *Front Psychol* 2021;12:786904.
 - 31 Heinze N, Castle CL, Hussain SF, et al. State anxiety in people living with disability and visual impairment during the COVID-19 pandemic. *Disabilities* 2022;2:235–46.
 - 32 SAMHSA. Substance use disorders in people with physical and sensory disabilities, 2011. Available: <https://store.samhsa.gov/sites/default/files/d7/priv/sma11-4648.pdf> [Accessed 16 Dec 2021].
 - 33 Emerson E. Smoking among adults with and without disabilities in the UK. *J Public Health* 2018;40:e502–9.
 - 34 Shakespeare T, Ndagire F, Seketi QE. Triple jeopardy: disabled people and the COVID-19 pandemic. *Lancet* 2021;397:1331–3.
 - 35 Bentzen M, Brurok B, Roeleveld K, et al. Changes in physical activity and basic psychological needs related to mental health among people with physical disability during the COVID-19 pandemic in Norway. *Disabil Health J* 2021;14:101126.
 - 36 de Boer DR, Hoekstra F, Huetink KIM, et al. Physical activity, sedentary behavior and well-being of adults with physical disabilities and/or chronic diseases during the first wave of the COVID-19 pandemic: a rapid review. *Int J Environ Res Public Health* 2021;18:6342.
 - 37 Rimmer JH, Riley B, Wang E, et al. Physical activity participation among persons with disabilities: barriers and facilitators. *Am J Prev Med* 2004;26:419–25.
 - 38 Phoenix C, Griffin M, Smith B. Physical activity among older people with sight loss: a qualitative research study to inform policy and practice. *Public Health* 2015;129:124–30.
 - 39 Starkoff BE, Lenz EK, Lieberman LJ, et al. Physical activity patterns of adults with visual impairments. *Br J Vis Impair* 2017;35:130–42.
 - 40 Sweeting J, Merom D, Astuti PAS, et al. Physical activity interventions for adults who are visually impaired: a systematic review and meta-analysis. *BMJ Open* 2020;10:e034036.
 - 41 CDC. Adults with disabilities, 2014. Available: <https://www.cdc.gov/vitalsigns/disabilities/> [Accessed 1 Sep 2021].
 - 42 Banerjee D, Rai M. Social isolation in Covid-19: the impact of loneliness. *Int J Soc Psychiatry* 2020;66:525–7.
 - 43 Killgore WDS, Cloonan SA, Taylor EC, et al. Mental health during the first weeks of the COVID-19 pandemic in the United States. *Front Psychiatry* 2021;12:561898.
 - 44 White RG, Van Der Boer C. Impact of the COVID-19 pandemic and initial period of lockdown on the mental health and well-being of adults in the UK. *BJPsych Open* 2020;6:e90.
 - 45 ONS. Coronavirus and the social impacts on disabled people in Great Britain: July 2020, 2020. Available: <https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/disability/articles/coronavirusandthesocialimpactsondisabledpeopleingreatbritain/july2020#disabled-peoples-concerns-during-the-coronavirus-pandemic> [Accessed 1 Sep 2021].
 - 46 UK Aid. Disability inclusion helpdesk report No. 6, 2019. Available: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/818123/query-6-disability-and-nutrition.pdf [Accessed 1 Sep 2021].
 - 47 ONS. Smoking prevalence in the UK and the impact of data collection changes: 2020, 2021. Available: <https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/drugusealcoholandsmoking/bulletins/smokingprevalenceintheukandtheimpactofdatacollectionchanges/2020> [Accessed 17 May 2022].
 - 48 Glazier RE, Kling RN. Recent trends in substance abuse among persons with disabilities compared to that of persons without disabilities. *Disabil Health J* 2013;6:107–15.
 - 49 Czeisler ME, Board A, Thierry JM. Mental health and substance use among adults with disabilities during the COVID-19 pandemic — United States, February–March 2021. *MMWR Morb Mortal Wkly Rep*;2021:1142–9.