

**Journal Article**

COVID-19 and vision impairment: Constraints negotiation, participation, and well-being during lockdown in the United Kingdom

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1 **Introduction**

2

3 In March 2020, the World Health Organisation (WHO) declared Coronavirus disease  
4 (Covid-19) a global pandemic. In response, the United Kingdom (UK) government  
5 introduced lockdown measures at the end of March 2020 (also known as a 'stay-at-  
6 home order'). These required people to isolate, meaning they should only leave home  
7 for food, health reasons or work (but only if unable to work from home). People were  
8 also required to adhere to social distancing (also called 'physical distancing'), meaning  
9 if they did leave home, they should stay at least 2-metres away from other people at all  
10 times. At the same time, the UK government identified 'clinically vulnerable' segments  
11 of the population, who were urged to maintain the strictest forms of isolation and social  
12 distancing and were able to access additional support (e.g. priority supermarket  
13 deliveries and other essential services).

14

15 People with vision impairment (PwVI) were not included as a clinically vulnerable  
16 population because vision impairment does not cause vulnerability to the virus. This  
17 was despite calls for a disability inclusive response to the crisis to prevent  
18 discrimination and health inequities and to maintain dignity (Armitage & Nellums,  
19 2020). Vision impairment charities, activists and academics argued that aspects of daily  
20 life for PwVI do in fact increase their vulnerability to Covid-19 (Boyle et al. 2020;

21 Crossland 2020; RNIB 2020). For instance: PwVI often require closer or more tactile  
22 engagement with surfaces, objects and people (e.g. to read braille, hold objects closer to  
23 their face, use a magnifier or smartphone application to read labels, and seek assistance  
24 in shops and on public transport); the highly visual nature of social distancing measures  
25 like the 2-metre rule pose challenges for PwVI, as they cannot easily judge distance or  
26 see the 2-metre marking barriers and signage, essentially limiting the agency of PwVI  
27 and countering the purpose of the Equality Act to promote equal opportunities and  
28 reduce social prejudices (Solomon et al., 2020); and there is evidence to suggest that  
29 PwVI are at greater risk from the effects of isolation (e.g. on loneliness) compared to  
30 the general population (Burholt et al., 2017; Hodge & Eccles, 2013). In April 2020, the  
31 British Broadcasting Corporation (BBC) began reporting a number of these challenges  
32 in their series “Coronavirus: Being Blind During the Pandemic”. Despite such efforts,  
33 government measures and their implementation failed to recognise the challenges faced  
34 by PwVI (Goggin & Ellis, 2020).

35

36 The vulnerabilities of PwVI, in association with the measures introduced, raised  
37 concerns about how the lockdown affected this group’s ability to maintain active,  
38 independent lives, and the subsequent impact that this has on wellbeing. In response,  
39 this paper uses Constraints Negotiation Theory (CNT), which is introduced in the  
40 following sub-section, to examine the effect of the lockdown on participation and

41 wellbeing of PwVI. The research was addressed via an online survey of PwVI in the  
42 UK. The survey was undertaken towards the end of the initial UK lockdown and as the  
43 first round of easing was occurring in some parts of the UK. Six hundred and thirty-nine  
44 complete responses were analysed using partial least squares structural equation  
45 modelling (PLS-SEM). As such, this study responds to a call for data on the impacts of  
46 Covid-19 on people with disability (Reed et al., 2020).

47

#### 48 *Theory and hypotheses*

49

50 CNT has an extensive history of theorisation, modelling and construct development,  
51 especially within the field of leisure studies to understand factors affecting leisure  
52 participation and the extent to which they can be negotiated (Crawford et al., 1991;  
53 Hawkins et al., 1999; Jackson et al., 1993). A growing body of literature has expanded  
54 beyond the field of leisure studies including to disability studies (Burns & Graefe, 2007;  
55 Crawford & Stodolska, 2008; Henderson et al., 1995; Loucks-Atkinson & Mannell,  
56 2007; Lyu et al., 2013; Ma & Ma, 2014; McKercher & Darcy, 2018; Park &  
57 Chowdhury, 2018).

58

59 In the literature, a constraint is generally considered to be any factor that acts as a  
60 perceived or actual barrier or hindrance to participation in an activity. This typically

61 includes interpersonal constraints based on social interactions and personal  
62 relationships, which are relevant to this study given that isolation and social distancing  
63 measures aimed to reduce contact between people; and intrapersonal constraints related  
64 to psychological states, which are also relevant to this study given the potential impact  
65 of interpersonal constraints on people's mental condition. While both constraints  
66 potentially affect participation directly, they may also be hierarchical and navigated  
67 sequentially, whereby interpersonal constraints have a negative effect on participation  
68 because of their positive effect on intrapersonal constraints (a mediating effect). Thus,  
69 the following hypotheses are proposed:

70

71 H1. Interpersonal constraints have a significant positive direct effect on intrapersonal  
72 constraints.

73 H2. Interpersonal constraints have a significant negative direct effect on participation.

74 H3. Intrapersonal constraints have a significant negative direct effect on participation.

75 H4. Intrapersonal constraints have a significant mediating effect on the relationship  
76 between interpersonal constraints and participation.

77

78 It is argued that participation is not dependent on the absence of constraints but on  
79 negotiation through them (Jackson et al., 1993; Loucks-Atkinson & Mannell, 2007; Lyu  
80 et al., 2013). Indeed, while the lockdown presented a number of constraints to

81 participation, there were opportunities to negotiate them, and a key dimension to  
82 negotiating constraints rests in an individual's ability to adapt, with or without support.  
83 For instance, all non-essential workers were expected to work from home during the  
84 lockdown, which requires some adaptation for many people. Similarly, individuals were  
85 not supposed to be visiting friends or relatives from outside their own household, but  
86 they could adapt by interacting online. They could also shop for essential items online  
87 and have them delivered to their home instead of going shopping in person, and exercise  
88 at home or in less crowded areas to reduce the likelihood of coming into close contact  
89 with others. It means that under a higher level of adapting activities, the negative effect  
90 of interpersonal constraints on participation will be weaker, while under a lower level of  
91 adapting activities, the negative effect will be stronger (a moderating effect). Thus, the  
92 following hypotheses are proposed:

93

94 H5. Adapting activities has a significant positive direct effect on participation.

95 H6. Adapting activities has a significant moderating effect on the relationship between  
96 interpersonal constraints and participation.

97

98 It has been well-established in disabilities literature that the ability to participate is  
99 essential for wellbeing (Beekman et al., 2002; Freedman et al., 2012; Schwanen &  
100 Ziegler, 2011). However, wellbeing has rarely been included in studies on constraints

101 negotiation despite the fact that it extends this body of literature and provides a more  
102 holistic picture of the role of participation and negotiation of constraints on quality of  
103 life (see Ma, 2008 for an exception). Wellbeing pertains to people's subjective  
104 evaluations of their lives (Diener, 2009) and is relevant to this study because in addition  
105 to being affected by participation, wellbeing may also be affected by intrapersonal  
106 constraints, for instance, due to concerns about how the virus may affect one's own  
107 health. Indeed, the lockdown brought about immediate concerns regarding wellbeing for  
108 everyone in society, but particularly for those reliant on support in their daily lives (Son  
109 et al., 2020). Those that are able to negotiate constraints to maintain or increase  
110 participation are expected to have greater levels of wellbeing. In addition, intrapersonal  
111 constraints may have a negative effect on wellbeing because of their negative effect on  
112 participation (a mediating effect). Hence, the following hypotheses are proposed:

113

114 H7. Intrapersonal constraints have a significant negative direct effect on wellbeing.

115 H8. Participation has a significant positive direct effect on wellbeing.

116 H9. Participation has a significant mediating effect on the relationship between  
117 intrapersonal constraints and wellbeing.

118

119 The theoretical model for this study is illustrated in Figure 1.

120

121 [FIGURE 1 NEAR HERE]

122

123 The ability to negotiate constraints has been conceptually related to the 'hierarchy of  
124 social privilege' from its earliest development (Crawford et al., 1991). This was  
125 originally related to social class, with the assumption that income and education have an  
126 indirect effect on the perception and experience of constraints, and subsequently affect  
127 participation. However, this has been investigated further amongst adults with cognitive  
128 impairment, finding direct effects influenced by social relationships and society, as  
129 opposed to factors associated with higher social privilege (Hawkins et al., 1999).  
130 Additional literature presents a more nuanced picture, suggesting varying degrees of  
131 constraint and participation, for instance, based on gender (Henderson et al., 1995). As  
132 such, seven conditions or 'respondent characteristics' are included in this study as  
133 control variables: gender, age, income, household composition, severity of vision  
134 impairment, guide dog ownership and underlying health problems specific to Covid-19.  
135 This study examines the effect of these conditions on participation as an outcome of the  
136 constraint's negotiation process.

137

138 **Methods**

139

140 The survey was developed in collaboration with The Guide Dogs for the Blind  
141 Association (referred to hereafter as 'Guide Dogs') – a charity that supports PwVI in the  
142 UK by providing guide dogs, mobility and other rehabilitation services. Ethical  
143 approval was granted by Nottingham University Business School Research Ethics  
144 Committee on 29 April 2020. Key constructs were needed for the analysis and are  
145 described as follows (see also Table 1 for specific wording of the questions and items  
146 used to create each construct):

147

148 *Interpersonal constraints (INTE)*. In CNT, these are typically associated with social  
149 interactions and personal relationships. In the context of this study, they are likely to be  
150 associated with the need to isolate and comply with social distancing measures.

151 Therefore, items were included regarding concern about contact with others (INTE1);  
152 frustration with the behaviour of others (INTE2); concern about the wellbeing of loved  
153 ones (INTE3); and concern about how one's own actions may affect others (INTE4).

154

155 *Intrapersonal constraints (INTR)*. In CNT, these are typically associated with  
156 psychological attributes that interact with activity preferences, therefore acting as  
157 determinants of (dis)interest in participation. In this study, the focus is on psychological  
158 states related to reduced motivation (INTR1); concern for one's own health (INTR2);

159 increased worry (INTR3); and possible confusion about what one should be doing  
160 (INTR4).

161

162 *Participation (PART)*. According to WHO (2001), participation refers to a person's  
163 involvement in a life situation such as employment, education or relationships. Items  
164 were used in this study to measure five categories of participation: physical  
165 independence (PART1); keeping in touch with others (PART2); exercise, hobbies or  
166 other leisure activities (PART3); work, study or regular volunteering (PART4); and  
167 mobility (PART5). These five categories appear in multiple disability studies on  
168 participation (Perenboom & Chorus, 2003).

169

170 *Negotiation (ADAP)*. The lockdown aimed to reduce 'normal' approaches to  
171 participation for most of the population. However, negotiation of constraints through  
172 adapting activities is expected to be central to maintaining participation. It means that  
173 constraints are not simply barriers, but also opportunities for thinking differently.  
174 Adapted activities was measured using a single item: '[During the Covid-19 lockdown]  
175 I have been adapting my regular activities so that I can keep doing them'.

176

177 *Wellbeing (WELL)*. As a broad concept, wellbeing can be measured using a diverse  
178 range of subjective items, for instance, related to a person's state of mind, health,

179 resilience, efficacy, relationships and access to resources. This study used items adapted  
180 from previous studies such as Huppert et al. (2009) that measure wellbeing according to  
181 overall state of mind (WELL1), satisfaction with life (WELL2), optimism about the  
182 future (WELL3), and quality of sleep (WELL4).

183

184 [TABLE 1 NEAR HERE]

185

186 *Control variables.* Respondent characteristics were included as control variables (coded  
187 1 for 'Yes' and 0 for 'No'). The variables were: female gender (FEM), aged 70+ (70+),  
188 household income of less than £25,000 (INC), live alone (LIV), severe vision  
189 impairment (SEV), guide dog owner (GDO), and underlying health problems specific to  
190 Covid-19 (UHP).

191

192 Online survey platform Qualtrics was used for the survey. An initial version of the  
193 survey was created using question formats deemed as being accessible to respondents  
194 who use third-party screen readers, as is common for PwVI. This was tested by Guide  
195 Dogs and resulted in suggestions to improve accessibility. After implementing these, a  
196 pilot survey was conducted with four PwVI. Feedback highlighted challenges associated  
197 with questions in profile matrix format when using some screen readers, which added  
198 significantly to the time and effort needed to complete the survey. As a result, profile

199 matrices were replaced by multiple-choice questions to ensure access via all screen  
200 readers.

201

202 An invitation for PwVI to participate in the survey, including a link to it, was emailed  
203 by Guide Dogs to their members on 19th May 2020 and to a list of carers on 22nd May  
204 2020. Also, on 22nd May 2020, Visionary – an organisation that represents sight loss  
205 charities in the UK – sent the survey invitation by email to their members. Recipients  
206 were given an option to complete the survey by telephone and sixteen people chose this  
207 option. The survey closed on 7th June 2020 at which time 937 complete responses had  
208 been received. As PLS-SEM is used for the analysis to investigate relationships  
209 between key constructs, only those that provided valid responses to all the items in  
210 Table 1 were included in the analysis. This provided a final sample of 639 responses.  
211 Those without valid responses to sample characteristics were still included in the  
212 analysis, meaning that N varied for those variables (Table 2), and mean replacement  
213 was used for missing values in the analysis.

214

215 [TABLE 2 NEAR HERE]

216

217 **Results**

218

219 *Descriptive results*

220

221 Descriptive statistics for each item are listed in Table 3. In terms of interpersonal  
222 constraints, respondents were particularly concerned for their loved ones (INTE3, mean  
223 4.5). On average, respondents 'tended to agree' about being more concerned for their  
224 own health (INTR2, mean 3.7) and more worried about everything (INTR3, mean 3.5).  
225 However, they 'neither agreed nor disagreed' about being less motivated to do things in  
226 daily life (INTR1, mean 3.2) and about feeling more confused by what they should be  
227 doing (INTR4, mean 2.8).

228

229 In terms of participation, mobility was most affected during lockdown with respondents  
230 being 'much less active' compared to before it (PART5, mean 1.3). The low standard  
231 deviation of 0.731 shows that reduced mobility was widespread among the sample.  
232 Indeed, 83% of respondents were 'much less active'. A further 7% were 'slightly less  
233 active'. The second most affected type of participation was work, study and  
234 volunteering (PART4, mean 2.1), and this is followed by exercise, hobbies and other  
235 leisure activities (PART3, mean 2.4). However, activity levels stayed 'about the same'  
236 for physical independence (PART1, mean 2.5) and keeping in touch with others  
237 (PART2, mean 2.7). Respondents 'neither agreed nor disagreed' that they adapted  
238 activities during lockdown (ADAP, mean 3.2) although there was some degree of

239 variation in responses with a standard deviation of 1.206. Indeed, 49% of respondents  
240 agreed, while 31% disagreed, 20% neither agreed nor disagreed.

241

242 With regards to wellbeing, items regarding quality of sleep (WELL4) and optimism  
243 about the future (WELL3) both had the lowest mean score of 2.7. Items regarding state  
244 of mind (WELL1) and overall satisfaction with life (WELL2) both had the highest mean  
245 score of 3.0. There was a fair degree of variation in responses for individual items and  
246 therefore people's wellbeing. For instance, 52% of respondents disagreed about being  
247 satisfied with their life overall (WELL2), 31% agreed, and 17% neither agreed nor  
248 disagreed.

249

250 [TABLE 3 NEAR HERE]

251

252 *Measurement model results*

253

254 A reflective model was used to test the hypotheses (Figure 2). Several steps are  
255 recommended to assess reflective models created using SEM-PLS (Hair et al., 2019).  
256 The first is to examine the loading values of individual items, which should exceed 0.7.  
257 Loadings of 0.4 to 0.7 can be retained if convergent validity is achieved with a  
258 recommended Average Variance Explained (AVE) of more than 0.5 (Hair et al., 2014).

259 Three items in Table 3 (INTE4, INTR4 and PART5) were removed despite having  
260 loadings of 0.4 to 0.7 because doing so improved AVE. As can be seen in Figure 2,  
261 PART2 and PART4 have loadings below 0.7. Removing them did not improve AVE so  
262 they were retained. The next step was to examine internal consistency reliability.  
263 Composite reliability (CR) is recommended where a value of 0.6 to 0.9 is considered  
264 satisfactory (Hair et al., 2019). Thresholds for AVE and CR are met (Table 4).  
265 Cronbach's Alpha ( $\alpha$ ) can also be used and assumes similar thresholds to composite  
266 reliability. A third step was to assess discriminant validity, which is the extent to which  
267 latent constructs are distinct from one another (Hair et al., 2017). The Heterotrait-  
268 monotrait (HTMT) ratio is generally considered to be the best approach (Henseler et al.,  
269 2015). Values of less than 0.85 are recommended (Hair et al., 2019). All of the values in  
270 this study were 0.68 or below (Table 4) meaning discriminant validity is accepted.  
271  
272 The structural model was then estimated using the PLS algorithm in SmartPLS.  
273 Collinearity was examined to ensure that it does not bias the regression results. This  
274 was assessed using Variance Inflation Factors (VIFs) for inner model paths, which  
275 should have values of less than five, although collinearity can also occur at lower values  
276 of three to five (Hair et al., 2019). Inner VIF values ranged from 1.00 to 1.37 (Table 4)  
277 meaning collinearity was not a problem. Regarding model fit, the standardised root

278 mean residual (SRMR) of 0.065 is within the recommended threshold of 0.08 (Henseler  
279 et al., 2016).

280

281 [FIGURE 2 NEAR HERE]

282 [TABLE 4 NEAR HERE]

283

284 *Structural model results*

285

286 The significance of path coefficients and  $f^2$  effect sizes (an alternative to path  
287 coefficients that show how the removal of a predictor construct affects an endogenous  
288 construct's  $R^2$  value) was determined using Bootstrapping with 5000 bootstrap re-  
289 samples (Table 5). H1-9 are accepted although H2 has a positive effect (a negative  
290 effect was expected). The result means that the more concerned PwVI have been about  
291 social interactions and relationships, the more active they have been during the  
292 lockdown. There is anecdotal evidence of this for the population more generally. For  
293 instance, with people doing more chores at home including gardening and home  
294 maintenance. Wellbeing of loved ones is an item of interpersonal constraints so  
295 increased concern may mean people, especially those that adapted (e.g. by using  
296 telephone or online communications) have had more contact than normal with loved  
297 ones during the lockdown. Similarly, there may have been increased levels of

298 productivity of people working or studying from home instead of needing to commute  
299 to/from work or study, and from attending meetings or classes online versus attending  
300 in person. People have also been keen to get their daily exercise in, or to be more active  
301 with their hobbies or leisure activities or take up new ones. Some have done more  
302 shopping to stockpile certain items such as toilet roll and rice.

303

304 Interpersonal constraints had a moderate positive effect on intrapersonal constraints  
305 (H1). Intrapersonal constraints subsequently affected participation (H3) and wellbeing  
306 (H7). Participation also affected wellbeing (H5) and was affected by one's ability to  
307 adapt (H8). While intrapersonal constraints affected participation, the effect of  
308 interpersonal constraints (H2) falls short of the threshold for a weak effect (0.01).  
309 Interestingly though, INTE-PART is fully mediated by INTR (H4) meaning that  
310 interpersonal constraints (through intrapersonal constraints) affected participation. The  
311 other specific indirect effect hypothesised is INTR-PART-WELL (H9). This effect is  
312 significant but weak (-0.045, p 0.003).

313

314 One specific indirect effect that was not hypothesised but is worth mentioning is the  
315 mediating effect of intrapersonal constraints on the relationship between interpersonal  
316 constraints and wellbeing (0.152, p 0.000) meaning that interpersonal constraints  
317 through intrapersonal constraints affected wellbeing. Although not shown in Figure 2,

318 the path INTE-WELL was checked and found to have a path coefficient of 0.033 (p  
319 0.504). As the direct effect was not significant but the indirect effect was, it can be  
320 concluded that intrapersonal constraints had a full mediating effect on the relationship  
321 between interpersonal constraints and wellbeing.

322

323 [TABLE 5 NEAR HERE]

324

325 The moderation effect of adapted activities on interpersonal constraints and  
326 participation (H6) is illustrated in Figure 3. The red line shows the relationship between  
327 interpersonal constraints and participation when adapted activities was lower (with a  
328 value of one below the standard deviation). It shows that as interpersonal constraints  
329 increased, so did participation, but only slightly. The blue line represents an average  
330 level of adapted activities while the green line represents a higher level (with a value of  
331 one above the standard deviation). Under a higher level of adapted activities, the  
332 positive relationship between interpersonal constraints and participation was much  
333 stronger.

334

335 The mobility item (PART5) was excluded from the participation construct because it  
336 had a weak loading. Figure 3 shows the moderating effect of adapted activities on the  
337 relationship between interpersonal constraints and each individual component of

338 participation (as well as the excluded mobility item PART5) where it can be seen that  
339 increased interpersonal constraints (at mean levels of adapted activities) resulted in  
340 increased participation for all but PART5. Greater levels of adapted activities  
341 strengthened the relationships in a positive way (although the rate of increase for  
342 PART2 remains about the same), except for with PART5, which had a weaker negative  
343 relationship. Mobility has therefore been negatively affected and more difficult to  
344 overcome through adapted activities during lockdown compared to other components of  
345 participation.

346

347 [FIGURE 3 NEAR HERE]

348

349 Regarding the control variables (Table 5), all but one of them (live alone, LIV) were  
350 found to have a significant direct effect on participation. However, household income of  
351 less than £25,000 (INC), guide dog ownership (GDO), and underlying health problems  
352 specific to Covid-19 (UHP) were the only ones to meet the  $f^2$  threshold of 0.02 for a  
353 direct effect – all of the effects being negative. The others: severe vision impairment  
354 (SEV), aged 70+ (70+), and female gender (FEM) had  $f^2$  values of less than 0.02.

355

356 **Discussion**

357

358 In support of previous studies (Jackson et al., 1993; Loucks-Atkinson & Mannell, 2007;  
359 Lyu et al., 2013), this study finds that participation is enhanced by the ability to  
360 negotiate constraints. In particular, it finds that adapting activities to reduce and  
361 overcome interpersonal constraints associated with isolation and social distancing  
362 increases participation among PwVI. There is anecdotal evidence of people being more  
363 active during the lockdown as a result of adapting their activities to the situation, and  
364 the findings of this study provide empirical support for this among PwVI. One  
365 exception is with mobility, which was not included as a component of participation but  
366 is shown, post-hoc, to be more difficult for PwVI to overcome through adaptation  
367 during the lockdown.

368

369 The findings emphasise the importance of support and intervention strategies that allow  
370 PwVI to adapt their daily activities to the lockdown situation in order to avoid reduced  
371 levels of participation and wellbeing. Technological solutions may feature heavily here,  
372 especially those that can help PwVI to navigate and comply with requirements for social  
373 distancing but also to reduce contact with surfaces that may carry the virus. For  
374 instance, smartphone applications can potentially assist with navigation or can connect  
375 to other devices via Bluetooth or the Internet to facilitate touchless solutions (e.g. for  
376 mobile payments or to access information via scannable QR codes). Smartphone  
377 applications but also other solutions such as sonar equipped smart canes also have the

378 possibility of alerting PwVI (e.g. via vibrations) if they get within a certain distance of  
379 another person or object, therefore helping to support requirements for social distancing.

380

381 Governments and/or charities should also assess the need for campaigns to increase  
382 awareness among service providers and the general public of the challenges faced by  
383 PwVI during Covid-19, and how to assist them to overcome those challenges. Similarly,  
384 campaigns might also focus on equipping PwVI with the skills needed to adapt to a  
385 world where social distancing and touchless services might be the new normal.

386

387 Wellbeing is scarcely covered in CNT literature. In the findings of this study, wellbeing  
388 was negatively affected by intrapersonal constraints and positively affected by  
389 participation, emphasising the impact that psychological state and the ability to lead  
390 independent and active lives had on the wellbeing of PwVI during the lockdown. The  
391 findings support literature on the importance of participation for wellbeing among  
392 people with disabilities (Beekman et al., 2002; Freedman et al., 2012; Schwanen &  
393 Ziegler, 2011), and on the negative effect that Covid-19 has had on the participation and  
394 wellbeing of vulnerable populations (Son et al., 2020). This further emphasises the need  
395 for support and intervention strategies that allow PwVI to adapt. However, governments  
396 and/or charities need to assess if mental health services are sufficient enough for PwVI  
397 who are less able to adapt and who's wellbeing may be affected as a result.

398

399 The findings also contribute to theory on the hierarchy of social privilege (Crawford et  
400 al., 1991), demonstrating the effect of income on participation. This is a particular  
401 concern given the high proportion of PwVI that have a low household income. For  
402 instance, in a survey of guide dog owners in the UK, 60% of respondents reported a  
403 total annual household income of £25,000 or less (Rickly et al., 2019). The figure is  
404 53% for respondents to this survey, which includes PwVI that do not own a guide dog.

405

406 The findings also recognise the effect of other conditions that are either specific to  
407 PwVI or to the pandemic and have therefore not been considered in previous CNT  
408 studies. In particular, PwVI that own a guide dog or have underlying health problems  
409 specific to Covid-19 experienced significantly lower levels of participation during the  
410 lockdown. The finding regarding guide dog ownership is interesting and warrants  
411 further investigation because it is not immediately clear why PwVI that own a guide  
412 dog would have significantly lower levels of participation. One explanation could be  
413 that owners are concerned about their dog's lack of training to deal with social  
414 distancing requirements and are therefore less confident to venture out with their dog.  
415 This would have significant implications for the training of guide dogs (or  
416 encouragement to use alternative aids such as a cane) as a mechanism for enabling  
417 PwVI to better negotiate constraints to participation.

418

419 Regarding underlying health problems, vision impairment is often co-morbid. In a  
420 survey of guide dog owners in the UK, 41% of respondents claimed to have an  
421 additional disability or medical condition to vision impairment (Rickly et al., 2019),  
422 while in this survey, 35% of respondents have underlying health problems that make  
423 them specifically vulnerable to Covid-19. Co-morbidity has been shown to increase the  
424 risk of Covid-19 infection (Boyle et al., 2020; McLean et al., 2014), and the high  
425 prevalence of co-morbidities specific to Covid-19 among PwVI means that they would  
426 be expected to be isolating for longer than the general population. People are negatively  
427 affected when experiencing isolation or perceived social isolation (i.e. experiencing  
428 reduced cognitive performance, accelerated cognitive decline and depression)  
429 (Andersson et al., 2015; Cacioppo & Hawkley, 2009), and there is evidence to suggest  
430 that PwVI are at greater risk from the effects of isolation compared to the general  
431 population (Hodge & Eccles, 2013). Disability in general has a significant indirect  
432 effect on loneliness (Burholt et al., 2017), further highlighting the risks associated with  
433 isolation and social distancing for PwVI. In addition, evidence suggests that increased  
434 levels of stress, shifts in nutrition patterns and reduced access to essential services (e.g.  
435 resulting from isolation and social distancing) can potentially interact with, and  
436 exacerbate, a range of disabilities or medical conditions (Kalantar-Zadeh & Moore,  
437 2020). As discussed earlier in the context of wellbeing, this emphasises the need to

438 assess if mental health services and health services more generally are sufficient enough  
439 for PwVI who may be more prone to loneliness or other health effects associated with  
440 isolation or social distancing. It also calls for those with co-morbidity to be prioritised  
441 for early access to a Covid-19 vaccine.

442

443 A limitation of this study is that it only surveys PwVI, so a comparison cannot be made  
444 of the impact the lockdown has had on PwVI compared to people with other disabilities,  
445 or to the population in general. This would be an interesting area of interest for further  
446 research. Also, the findings are limited to the UK. It would be interesting to compare  
447 lockdown effects on PwVI in other countries where lockdown measures but also  
448 support and intervention strategies for PwVI might have varied.

449

450 The survey for this study took place just as the UK was beginning to ease its initial  
451 lockdown measures, therefore representing the opinions of PwVI at a specific period-in-  
452 time. It would be worthwhile to conduct follow-up studies to investigate the effects of  
453 ongoing measures and also to investigate more long-term effects of the pandemic,  
454 including how the introduction and withdrawal of different measures impacts on PwVI.

455

456 It is arguably a normal human response to experience increased interpersonal  
457 constraints during a lockdown, and it is not necessarily a bad thing given the need to

458 limit people's movements and contact with others in order to reduce the spread of the  
459 virus. Some people will be better than others at negotiating constraints in order to cope  
460 with the situation. However, there will be a point at which there are more serious  
461 repercussions for one's psychological state and overall wellbeing, and additional  
462 support and intervention will be needed to reduce the likelihood of people reaching that  
463 threshold. In terms of further research, it would be interesting to investigate what that  
464 threshold is for PwVI, and how that threshold compares to the population more  
465 generally. There is also the need for a better understanding of what types of support and  
466 intervention are needed for PwVI, and what skills and resources are needed to enable  
467 PwVI to negotiate the constraints of future lockdowns or ongoing measures such as  
468 social distancing.

469

## 470 **Conclusion**

471

472 Overall, the findings of this study help raise awareness for the effect the lockdown has  
473 had on PwVI, while also responding to the call for more data on the impacts of Covid-  
474 19 on people with disability (Reed et al., 2020). The findings show that participation  
475 was particularly reduced during the lockdown for PwVI that have a low household  
476 income, own a guide dog, and have underlying health problems specific to Covid-19.  
477 This emphasises the importance of support and intervention strategies targeted at those

478 particular groups of PwVI, for instance, in terms of additional financial assistance,  
479 guide dog or cane training, mental or other health services, or early access to a Covid-19  
480 vaccine.

481

482 In addition, the findings show that negotiation can significantly reduce the negative  
483 effect of the lockdown on participation and wellbeing. This emphasises the importance  
484 of support and intervention strategies that allow PwVI to adapt their daily activities to  
485 the lockdown situation to increase participation and wellbeing, and to mitigate against  
486 the onset and negative effects of intrapersonal constraints, for instance, with the  
487 assistance of technological solutions or awareness campaigns targeted at PwVI, service  
488 providers or the general public.

489

490 More generally, the findings support calls for PwVI to be added to the list of clinically  
491 vulnerable populations in the event of future lockdowns, and also support calls for a  
492 more disability inclusive response to the Covid-19 crisis in general (Armitage &  
493 Nellums, 2020; Boyle et al., 2020).

494

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