



Women in Sport and Physical Activity Journal

Assessing the effect of COVID-19 lockdown on perceived barriers and facilitators to physical activity amongst Women in Southeast England.

Journal:	<i>Women in Sport and Physical Activity Journal</i>
Manuscript ID	WSPAJ.2023-0067
Manuscript Type:	Article
Keywords:	motivation, exercise, gender

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Manuscripts

Key points

- Our study found that women who valued activity before lockdown, found new ways to be active during and post-lockdown, with social activity being a significant facilitator.
- Time continues to be a major barrier to activity for women, and many women aim to maintain new habits acquired over lockdown, such as online classes.
- Fitness industries and governments should aim to facilitate additional at-home options and increased flexibility at gyms, such as women-only sessions and a wider variety of class times.

For Peer Review

1 **Abstract**

2 **Background:** The COVID-19 pandemic resulted in restricting daily physical activity (PA). Women's PA
3 levels have been disproportionately negatively affected by the pandemic, compared to men. It is
4 important to determine how women's PA has changed over the pandemic, and if new barriers to PA
5 participation exist since the release of restrictions. **Aims:** To assess how women in southeast England
6 changed their activity during- and post-pandemic, including how barriers and facilitators to activity
7 have changed. **Methods:** 330 females completed the first online questionnaire (during lockdown), and
8 139 completed the post-lockdown questionnaire. Questionnaires were designed from the General
9 Practice- and International Physical- Activity Questionnaires. Participants self-reported PA, and
10 barriers and facilitators to exercise. Eighteen females then participated in online semi-structured focus
11 groups. Descriptive and inferential statistical analysis was used for questionnaire data, and focus
12 group transcriptions were thematically analysed. **Results:** Most females maintained PA levels
13 throughout the pandemic. Significant barriers to activity were lack of access to equipment/space, time
14 to exercise, social groups, finances, legal restrictions, safety concerns, gender, and child-care.
15 Similarly, significant facilitators were identified during- and post-lockdown for access to equipment,
16 finances, having more time to exercise, and exercising with a social group. Participants both expressed
17 desires to return to pre-lockdown PA habits, but also maintain new ones created. **Conclusion:** It is
18 evident that the pandemic affected and changed the barriers and facilitators to female PA
19 participation. Governments and industries in the sector should focus on providing services that
20 address these changing habits to improve activity levels in women.

21

22 **Keywords**

23 Motivation, exercise, female, sedentary, pandemic

24

25 **Introduction**

26 **COVID-19 pandemic**

27 In March 2020, a global pandemic of the COVID-19 respiratory virus forced governments across the
28 world to restrict the free movement of the public. In England, this involved instructions to “stay at
29 home” and to reduce contact with other people as much as possible (GOV.UK, 2021). This naturally
30 included closure of gyms, pools, and leisure centres and cessation of all group activity, as well as
31 schools. Only essential activities, such as food shopping or exercising outdoors once a day within
32 household groups were permitted, with potential fines for those who left their homes unnecessarily.
33 People were able to attend gyms within their own social bubble from April 12th 2021 in the England,
34 but free use of gyms, leisure centres, and group exercise was not permitted until 17th May 2021
35 (GOV.UK, 2021).

36 **Activity in women**

37 Regular physical activity (PA) is well known to reduce the risk of premature death from chronic
38 diseases, such as heart disease, hypertension, and diabetes (Booth et al., 2012; LaCroix et al., 2019).
39 There are also numerous other benefits, such as improved mental health, decreased anxiety and
40 improved social groups (Doré et al., 2016). Despite these benefits however, women repeatedly report
41 significantly lower activity levels than men (Sport England, 2021). Campaigns such as ‘This Girl Can’
42 have been highly successful in improving activity in women since its creation in 2015 and has resulted
43 in a steady increase in female participation in sport (Sport England, 2021). Yet, in 2019, 25% of women
44 were failing to exercise more than 30 minutes per week and only 61% of women were meeting the
45 government guidelines of 150 minutes of exercise per week (Sport England, 2021).

46 The recent Covid-19 pandemic and government lockdown restrictions have raised further issues for
47 women’s activity levels, with women being disproportionately negatively affected by the lockdown
48 (Women in Sport, 2021). In addition to extra childcare responsibilities associated with home-
49 schooling, women make up 77% of the roles within the National Health Service. Approximately 25%
50 of women were concerned that getting back into physical activity would be difficult, while 32%

51 reported being less active due to caring responsibilities (Women in Sport, 2021). Common barriers
52 before the pandemic were lack of time, self-consciousness, and lack of enjoyment (Moreno &
53 Johnston, 2014), and women with young children finding it particularly difficult to be active (Mackay
54 et al., 2011).

55 Women from minority ethnic groups, particularly Black and Asian women, consistently show lower
56 activity (52.1 and 46.6% are physically active, respectively), than their white counterparts (61-65.6%)
57 are physically active (GOV.UK, 2022). The pandemic has disproportionately negatively affected these
58 groups, with early data suggesting activity levels in minority groups decreased 4% more than white
59 women in England (GOV.UK, 2022). Southeast England (including the East, East Midlands, South East
60 and London) has the largest range of ethnicities and socioeconomic groups in England. London is the
61 most densely populated area in England and demonstrates the highest ethnic diversity, yet the
62 southeast regions of England outside of London have the highest proportion of white ethnic groups.
63 Moreover, south-eastern regions returned some of the highest response rates of all assessed regions
64 on the most recent Active Lives Survey (Sport England, 2023) (South East England having the highest
65 response, East, East Midlands and London having the third, fourth and seventh highest response rates
66 respectively), with all of these areas seeing a significant increase in PA (>150 minutes p/week) in the
67 last 12 months (Sport England, 2022). It was considered that this area would allow assessment of the
68 widest variety of the population.

69 Several years of restrictions forced activity habits to change in England. Whilst exercise facilities and
70 restrictions on being outdoors have changed, other barriers to activity may have been removed as a
71 result of staying at home. As the population still continues to return to normal life again, it is important
72 to assess how women have altered their activity during lockdowns, and how this behaviour will
73 influence activity moving forward out of the pandemic. The primary aim of this project is to assess
74 how women in southeast England changed their activity during and after lockdown restrictions were
75 released (May 2021), including how barriers and facilitators to activity have changed as a result of the
76 pandemic.

77 **Materials and Methods**

78 An explanatory sequential mixed-methods design was carried out to assess the changes in activity
79 and the perceived barriers and facilitators to being active during and after a national lockdown in the
80 UK.

81 **Sample**

82 539 women aged 18 or over living in southeast England (London, Hampshire, Kent, Essex, Berkshire,
83 Buckinghamshire, Sussex, or Oxfordshire) completed the surveys (Lockdown survey, $n=382$. Post
84 lockdown survey, $n=157$). Participants were recruited using convenience and snowball sampling using
85 social media (Twitter, Instagram and Facebook). Of those that completed the survey, 18 volunteered
86 to participate in the focus groups. The study received institutional ethical approval. All participants
87 provided online informed consent before completing the survey and further verbally confirmed
88 consent before the focus groups.

89 **Procedure**

90 *Quantitative Measures*

91 This study used the online survey platform *Qualtrics* to collect quantitative data. Two surveys with
92 nearly identical questions were asked at two time points during the Covid-19 pandemic lockdown. The
93 Lockdown Survey was completed between 22nd March and 11th April 2021, when leisure centres were
94 closed and social distancing restrictions were in place. The Post-Lockdown survey was completed
95 between May 24th and 23rd July 2021, when gyms and exercise classes had reopened. Out of 539
96 women who started the surveys, 469 surveys were completed and used for analysis (Lockdown survey,
97 $n=330$. Post-Lockdown survey, $n=139$). 70 surveys were excluded for not being complete or for not
98 providing consent. The average completion time for the survey was 6 minutes 30 seconds and was
99 available online using a link. It could be completed on mobile phones or computers. Contact details of
100 the research team were provided throughout.

101 ***** INSERT TABLE 1. Participant characteristics. *****

102 *Survey 1: Lockdown Survey*

103 Participants read and provided informed consent. All participants confirmed they were over 18 years
104 old, female, and living in one of the counties being assessed. They also provided their age category,
105 ethnicity, employment status, education status, and location (urban vs rural location, see table 1).

106 *Activity level*

107 The General Practice Activity Questionnaire was used to determine overall activity levels. Participants
108 were asked how many hours (None, Less than one hour, Between 1 and 3 hours, 3 hours or more)
109 they engaged in various activities (physical exercise, cycling, walking, housework/childcare,
110 gardening/DIY) in the last week per day. If participants stated they took part in physical activity, they
111 were asked if their exercising consisted of free body exercise (resistance training) or aerobic exercise
112 and whether they used equipment or not. These questions were inspired by the Adult physical activity
113 questionnaire but were shortened into the current format to increase compliance from the
114 participants (Centre for Health Statistics, 1975). Part of the International Physical Activity
115 Questionnaire was used to determine time spent sitting on a typical weekday and weekend (almost
116 all the time, most of the time, about half the time, sometimes, never) and to estimate a value in hours
117 that were spent sitting.

118 *Barriers and facilitators to activity*

119 Participants were asked to select what they considered as a barrier to being active during the
120 lockdown restrictions between 5th January and April 12th. The options were: Lack of access to
121 equipment/space, Religion/culture, family values on physical activity, financial reasons, current laws
122 (e.g. lockdown restrictions), safety concerns (e.g. spreading COVID-19), other safety concerns (e.g.
123 training in the dark), knowledge, not having time to exercise, gender, poor mental health (e.g. lack of
124 motivation), poor physical health, being unable to exercise with a social group and 'other', with a free
125 text option (Farah et al., 2021). The same questions were then asked about factors that made it easier
126 to be active during lockdown: access to equipment/space, Religion/culture, family values on physical
127 activity, financial reasons (free or affordable online activities), current laws (e.g. making efforts to be
128 active because of restrictions), knowledge, having more time to exercise, gender, good mental health

129 (e.g. feeling motivated), good physical health, being able to exercise with one other person and
130 'other', with a free text option.

131 *Survey 2: Post-Lockdown survey*

132 The same survey was published on 24th May, 1 week after the lifting of lockdown restrictions and social
133 distancing. Gyms, leisure centres, and pools reopened and indoor group exercise and team sport were
134 allowed to continue.

135 Additional questions were included in the second survey to fully understand the changes in activity.
136 Participants were asked what activities they had taken part in between 12th April and 17th May (when
137 some restrictions were lifted, such as indoor gyms but only within a social bubble and outdoor team
138 sport). Possible answers were: outdoor team sport, outdoor swimming, outdoor exercise classes,
139 indoor gyms, my usual exercising at home, walking and/or running outdoors, other (with free text
140 option) and "I didn't do any activity". Participants were also asked if they would continue to train at
141 home, go back to the gyms/facilities or continue to do a combination of both. If they stated they would
142 continue training at home, they were then asked why. Options were: it's cheaper, it's more
143 convenient/flexible, it's safer, it's easier, I have more privacy, I feel less pressure to be fit/look a certain
144 way.

145 *Qualitative Measures – Focus Groups*

146 Of those who completed the survey, the option to provide contact details for focus groups was added.
147 Of these, 18 women volunteered to take part in a focus group to discuss their results and opinions
148 further. Four focus groups with up to five participants in each were held between 17th and 31st August
149 2021 and were led by a member of the research team with experience of running focus groups. Each
150 focus group was arranged online via Zoom and was stopped at 45 minutes or until no new information
151 was provided, whichever came first. The focus groups followed a semi-structured informal format
152 using themes drawn from the questionnaire analysis, with probing statements used throughout. At
153 the beginning of the focus group, participants were reminded their answers would be anonymised,
154 that the researchers remained impartial and that there were no right or wrong answers.

155 **Statistical Analysis**

156 *Qualitative analysis*

157 All focus groups were recorded and transcribed verbatim by the Zoom transcribing function. The
158 transcriptions were read independently by two researchers who completed a thematic analysis of the
159 transcripts. Member checking was completed and all participants confirmed the responses were
160 accurate.

161 *Quantitative analysis*

162 Descriptive statistical analysis was used using Microsoft Excel to determine overall patterns in the
163 survey data. Chi square analysis was used to determine associations between survey 1 and 2
164 quantitative results, using SPSS (IBM Corp. Released 2021. IBM SPSS Statistics for Windows, Version
165 28.0. Armonk, NY: IBM Corp).

167 **Results**

168 **Quantitative data**

169 Descriptive and inferential statistics were run to assess outcomes against all demographic variables
170 measured and none were significant or noteworthy. All relevant analysis is explained below.

171 *Types of Physical Activity*

172 The type and amount of activity remained the same between lockdown and post-lockdown, with most
173 women maintaining PA levels throughout and after lockdown. A chi-square analysis revealed no
174 significant associations ($p>0.05$) for any activities between during- and post-lockdown (Table 2). When
175 assessing some of the key descriptive statistics, walking was the most popular activity, with only 5%
176 and 3% of participants reporting doing no walking at all during lockdown and post lockdown,
177 respectively. Cycling, housework/childcare, and Gardening/DIY remained consistent at both time
178 points. Overall, participants doing more than 1 hour of physical activity per day increased post
179 lockdown from 50% to 59%. Participants doing no physical activity at all decreased from 27% to 20%
180 post-lockdown.

181 Participants most commonly exercised without equipment (such as running outdoors, exercise classes
182 at home, etc) compared to this exercising with equipment. This pattern is reflected in other types of
183 activity, with use of equipment and weights increasing in popularity post-lockdown (Figure 1).

184 *****INSERT TABLE 2. Types and duration of activity during and post-lockdown reported by**
185 **participants (%)*****

186

187 *****INSERT FIGURE 1 HERE. Percentage of types of activity.*****

188 *Barriers to activity*

189 Chi square analysis revealed significant associations ($p < 0.05$) between the during- and post-lockdown
190 responses for lack of access to equipment or space to exercise, lack of time to exercise, lack of social
191 groups, financial reasons, legal restrictions, safety concerns, sex-related issues and childcare/caring
192 responsibilities (Table 3). For financial reasons, lack of time and sex-related issues (i.e. female-only
193 spaces), a higher percentage post-lockdown found these to be barriers to participation. Conversely
194 for lack of access to equipment and space, legal restrictions (i.e. lockdown restrictions), safety
195 concerns (i.e. training in the dark), social groups and childcare/caring responsibilities, a higher
196 percentage during-lockdown found these to be barriers to participation.

197 This can further be demonstrated by looking at the key descriptives of these statistics (Table 3). For
198 lack of access to equipment or space, 64% reported this a barrier during-lockdown, dropping to 13%
199 post-lockdown. During-lockdown, 38% of participants reported they could not be active due to the
200 lockdown restriction laws in place, dropping to 17% post-lockdown. 30% reported not having time to
201 exercise, which increased to 46% post-lockdown. Safety concerns of training (such as training outdoors
202 in the dark) decreased from 23% during-lockdown to 7% post-lockdown, and similarly a lack of social
203 group decreased from 25% during-lockdown to 12% post-lockdown.

204 *****INSERT TABLE 3 HERE. Perceived barriers to PA.*****

205 *Facilitators to activity*

206 Chi square analysis revealed significant associations ($p < 0.05$) between the during- and post-lockdown
207 responses for access to equipment or space to exercise, time to exercise, exercising with social groups,
208 and financial reasons (Table 4). For access to equipment and space to exercise and exercising with
209 friend/a social group, a higher percentage post-lockdown found these to be facilitators to
210 participation. Conversely for financial reasons and time to exercise, a higher percentage during-
211 lockdown found these to be facilitators to participation.

212 This can further be demonstrated by looking at the key descriptives of these statistics (see table 4).
213 Only 19% of participants reported that having access to space or equipment facilitated their activity
214 levels during-lockdown, which then increased to 37% post-lockdown. Similarly, for social groups, 26%
215 of participants reported being able to exercise with a social group was a facilitator during-lockdown,
216 which increased to 39% post-lockdown. 42% reported that lockdown gave them more time to be
217 active, and this dropped to 24% after restrictions were lifted. Similarly, for financial reasons, 18%
218 reported this to be a facilitator during-lockdown, dropping to 7% post-lockdown.

219 ***INSERT TABLE 4 HERE. PERCEIVED FACILITATORS TO EXERCISE***

220 *Training habits post lockdown*

221 42% of participants stated that they would continue to exercise completely from home, using their
222 current routine from lockdown. 34% said they would continue with their current routine at home but
223 would also return to the gym/local exercise facilities. Only 24% were going to completely return to
224 training using local facilities. Some key reasons for continuing to train at home rather than return to
225 the gym was convenience/flexibility (68%) and that it is cheaper (45%), easier (26%) and more private
226 (25%).

227 **Qualitative data**

228 **Pre-lockdown themes**

229 Before the first lockdown in England in March 2020, it was commonly reported that participants were
230 more active due to their main activities taking place at a gym:

231 *“So before lockdown was attending regular gym three to four times a week doing resistance training*
232 *weights”.*

233 Participants reported more active lifestyles, due to active commuting and more active jobs:

234 *“I was commuting, I would do about a 15 minute walk to the station and then I do like that in central*
235 *London... that instead of getting the tube I'd walk about half an hour. And then every lunch at our lunch*
236 *obviously I'd make sure I went out to eat quickly and I always go for most of my walk around central”*

237 *“And before lockdown I was almost 10,000 steps a day so in it was easier when before like the time*
238 *because you're going into work and walking around the campus”.*

239 **Lockdown themes**

240 During lockdown, all participants changed their physical activity habits with a variety of activity types
241 chosen. See table 5 for details of new activities reported. One main reason for the change in activity
242 was the lack of access to facilities and equipment:

243 *“used to go to a swimming pool regularly three times a week”.*

244 Although all participants tried to remain active throughout lockdown, a decline in the amount of
245 activity was a common theme. This was due to several themes that are presented in table 6.

246 **Post-lockdown themes**

247 Since lockdown has been easing in England from June 2021 onwards, it was commonly reported that
248 participants were eager to return to their old physical activity habits, with one main theme of returning
249 to the gym. See table 7 which highlights the themes reported for this return to the gym. Whilst the
250 majority reported returning to previous habits it was also reported that some activities/habits created
251 in lockdown will be kept:

252 *“Pools were closed, so I started open water swimming before the pools reopened last summer and I*
253 *started doing that, which I've continued”.*

254 Those who have continued working from home reported that they have continued the online classes
255 due to time:

256 *“Even when we came out a lockdown I tried going back to the gym but I couldn't fit all in I was too tired*
257 *to do those classes online and do go to the gym and so we've kept it up we're just walking and exercises*
258 *online.”*

259 Tables 8 and 9 report common themes of motivators and barriers towards physical activity,
260 respectively.

261 *****INSERT TABLES 5-9 HERE*****

262 **Discussion**

263 This study aimed to determine how the COVID-19 lockdown in the UK influenced women's perceptions
264 of physical activity and to determine how different variables were a barrier or facilitator to being
265 active. Overall findings suggest that there were no differences in the levels of activity and types of
266 activity from during to post-lockdown, however, there were a change in the types of activities that
267 women were participating in and physical activity habits. The majority of women would either
268 completely or partly continue with their activity at home, rather than return to the local facilities, due
269 to convenience, cost, and privacy.

270 **Physical Activity**

271 Physical activity remained consistent over time, with the types of activity remaining the same. Walking
272 remained very popular regardless of lockdown restrictions being in place. Physical exercise (such as
273 gym, running, classes, etc) was also popular during lockdown and increased further after the
274 lockdown, suggesting that many women wanted to return to their pre-lockdown routines. This pattern
275 has also been seen in Belgium, where most people (men and women) reported remaining as active
276 during lockdown as they had been before or after (Symons et al., 2021). However, in a Canadian study,
277 37.3% of women became more active during lockdown and 34.6% became less active (Nienhuis &

278 Lesser, 2020). It was suggested this was due to how women perceived the changing barriers to being
279 active, for example, with those with children under 15 having increased difficulty in finding time to
280 be active whereas others found increased time during lockdown. Sedentary behaviour remained the
281 same during and after lockdown, despite people being encouraged to return to the workplace post-
282 lockdown. This may be due to many businesses adapting to flexible working practices.

283 **Values of remaining active**

284 Women who reported being active before lockdown appear to have maintained this activity
285 throughout- and post- lockdown. Many values that women held regarding activity remained the same
286 or were accentuated during lockdown coinciding with research from (Nienhuis & Lesser, 2020), who
287 reported that women who enjoyed activity pre-lockdown were continuously more active throughout
288 lockdowns, and were consequently more intrinsically motivated to be active, than men. The social
289 aspect of activity was a primary theme that was raised and this was considered more important during
290 distancing. The option of streaming online live classes with their current personal trainers was valued
291 highly and resulted in maintaining or making new friendships. Social support is a reoccurring theme
292 found in other studies; it is regularly reported that women who reduced their activity or who became
293 unmotivated to be active were due to loss of these social groups. This is particularly apparent in
294 middle-aged women; in women aged 45-55 years old (Lum & Simpson, 2021) and those who already
295 belonged to a fitness community before lockdown (Carter & Alexander, 2021). Our findings support
296 this by showing that those who managed to maintain the social aspect of activity, albeit online, were
297 more motivated to remain active. This is further shown by the perceived barriers and facilitators
298 reported by participants, with chi square revealing significant associations for the social aspects as
299 both a barrier and facilitator during and post-lockdown. During-lockdown, more women found being
300 unable to exercise without a social group a barrier, and post-lockdown, more women found being able
301 to exercise with a social group to be a facilitator.

302 The planned, timetabled nature of reported online live sessions during-lockdown also provided
303 structure to many participants who were now spending the vast majority of their day at home.

304 Maintaining a healthy weight and body image was noted as a key theme as to why women were active
305 and this effect was emphasised by the perceived increased sedentary behaviour associated with stay-
306 at-home restrictions. Women using activity to maintain or achieve a certain body image is a well-
307 established correlation, with more activity being strongly associated with higher self-esteem (Ball et
308 al., 2000; Nienhuis & Lesser, 2020).

309 Outdoor exercise, such as walking became very popular, mainly due to participants making additional
310 effort to be outside for a "*daily dose of sunshine*". Figure 2 reveals the increased popularity of exercise
311 without weights and without equipment post-lockdown, suggesting some women continued to
312 exercise outdoors and without equipment due to maintenance of new habits, further supporting the
313 findings from (Nienhuis & Lesser, 2020). Furthermore, women who meet the activity guidelines are
314 highly likely to experience less depressive and anxiety symptoms and have a better overall quality of
315 life (Lum & Simpson, 2021; Nienhuis & Lesser, 2020).

316 Some participants even bought their own equipment and weights to use at home. A study in Canada
317 reported that women who enjoyed activity were continuously more active throughout lockdowns and
318 were consequently more intrinsically motivated and increased perceived pressure to be active, than
319 men. This is in agreement with our findings that women who were already active and had exercising
320 routines were good at sustaining this despite the changing conditions (Nienhuis & Lesser, 2020)
321 Women who meet the activity guidelines are highly likely to experience less depressive and anxiety
322 symptoms and have a better overall quality of life (Lum & Simpson, 2021; Nienhuis & Lesser, 2020)

323 **Perceived facilitators to exercise and how activity was easier during lockdown**

324 Some participants reported that it was easier to be active during lockdown, mainly due to having more
325 time in the day. More participants found time to be a barrier to exercise post-lockdown than during,
326 and 87% of women did not report time being a barrier to activity during lockdowns (Farah et al., 2021).
327 Finances were also revealed to be a key facilitator to PA during-lockdown, and this is likely due to
328 more women exercising from home or outdoors without equipment. Baruth et al., (2014) found that
329 the high cost of gym memberships was a key barrier to individuals participating in PA, and with

330 lockdown restrictions leading to most people “freezing” gym memberships, money was no longer a
331 barrier to those who were finding ways to be active during-lockdown.

332 **Perceived barriers and how activity was harder during lockdown, and what has changed**

333 Despite the majority of participants maintaining their activity during lockdown, there was a shift in
334 barriers to exercise. Being unable to exercise without a social group was reported as a key barrier to
335 exercise by participants. Although many participants expressed their enjoyment for online classes
336 during-lockdown, which allowed for this social element to an extent, it is clear that in this study
337 females value face-to-face contact when exercising. This is further supported by the theme of access
338 to space, equipment and facilities, with chi square revealing more women finding this to be a facilitator
339 post-lockdown. (Farah et al., 2021)that many during lockdown did not see “the home” as a suitable
340 exercise location, so returning to gyms and leisure centres provided more suitable spaces for exercise
341 for participants. In addition, those exercising at home found distractions at home made it difficult to
342 train. This included pressures of housework and other people sharing the exercising space etc. This is
343 evidenced by 58% of participants reporting they wanted to return to the gym or exercise locations to
344 some capacity. Therefore, although gyms elicit more costs to exercise, it also allows for more face-to-
345 face contact with individuals, and more suitable spaces.

346 Some key themes from the focus groups revealed that some women had a fear of leaving the house
347 during-lockdown, due to the restrictions and risks of catching COVID-19. Lack of motivation and
348 structure were major barriers that made it difficult to be active. Many participants reported struggling
349 with laziness and difficulties to make themselves be active, particularly due to the lack of structure in
350 their day. This has been seen in women across cultures, with laziness and fatigue negativity affecting
351 activity levels in over half the women asked in Brazil (Farah et al., 2021). The darker nights, colder
352 temperature, and wetter weather of the winter lockdown were reported to be a barrier in focus
353 groups, with participants stating they did not feel comfortable walking outside in the dark. Participants
354 considered the risks of walking at night to be worse as a female. Excessive screen time was also

355 discussed as a problem, with participants wanting to avoid watching a class online, having spent all
356 day working and socialising online.

357 **Future changes to activity**

358 42% of the sample stated that they would not return to the gym and would continue to exercise
359 completely from home and 52% stated they would return to the gym in some capacity (34%
360 combination of exercising from home and gym, 24% wholly returning to the gym). The main reasons
361 for wanting to continue to exercise from home were the added convenience and flexibility of training
362 from home, as well as cost efficiencies. This aligns with other findings, that use of technology at home
363 allows flexibility whilst maintaining social aspects of activity (Nienhuis & Lesser, 2020). Many
364 participants reported that they would continue to do an activity they had discovered during the
365 lockdown, such as walking or swimming outdoors.

366 For those wanting to return to pre-lockdown PA habits, key facilitators for this were being able to
367 return to 'normal', to be able to socialise in classes again and to have access to equipment again.
368 Participants felt that their motivation was higher in the gym, that they worked harder and enjoyed it
369 more, and they considered training in the gym to be quicker and more efficient than training at home.
370 Financial contracts, such as gym memberships also provided a reason to remain active and attend the
371 gym regularly. These varied responses highlight the importance of an individual approach to PA in
372 women and the range of options that must be considered to promote PA.

373 **Remaining barriers, implications, and future direction**

374 The findings of this study show that the COVID-19 pandemic and associated restrictions have affected
375 women differently. The social aspects of exercise are repeatedly identified as one of the most
376 important factors in women's activity levels, and perhaps explains why many want to return to their
377 pre-pandemic routines. Meanwhile, many women continue to exercise from home, whether
378 increasing their walking or completing online exercise sessions. Results also revealed that more
379 women found sex-related issues to be a barrier post-lockdown. The phenomenon of intimidation of
380 women in exercising spaces, sometimes termed "gymtimidation" (Turnock, 2021) can include gender

381 segregation of weights areas, intimidation and harassment of women and scrutiny of the physical
382 appearance of women (Turnock, 2021), further highlighting the issues faced by women considering
383 returning to gyms. It is these points, social, safe and convenient exercise, that need more focus from
384 government and the fitness industry.

385 Industries in this field may decide to continue their online provisions, to support individuals who would
386 prefer to continue exercising from home. For those who now regularly attend gyms and classes,
387 scheduling is an important factor. Industries in the field could look at running restricted group
388 sessions, offering more 1-1 opportunities for females or female-identifying individuals, or considering
389 the time in which sessions are run (i.e. not too late in the evenings). This should be in addition to
390 encouraging group activity, as before the pandemic.

391 This study has demonstrated that time and motivation remain an issue for women, and this is more
392 so in women who do not enjoy exercise. Those who do enjoy it are more likely to find time to do this.
393 The results from this study would suggest that two key points could help improve activity in women
394 as we are still recovering post-lockdown; increasing exposure to new and different (and more
395 enjoyable activities) and increasing access to safe, group activity. The social aspect of activity appears
396 to be a dominant facilitating factor to improving and maintaining activity in women. Women typically
397 have less social support when it comes to finding time to be active; partners and families do not
398 facilitate time for women to be active, as much as men (Edwards & Sackett, 2016). Industries and
399 services within the sector can look to increase group sessions and activities, or promote group sessions
400 of "bring along a friend" to encourage these women to exercise more whilst having a common
401 support.

402 **Conclusion**

403 The COVID-19 pandemic and associated social restrictions has changed the way women perceive
404 activity, as well as barriers to being active. Time, motivation and access to social groups are key
405 barriers to women being active during- and post- lockdown restrictions. Since lockdown was released,
406 more women are choosing to be active from home either alone or using online services, and the main

407 reason for returning to the gym is for the social aspect and facilities they provide. Governments and
408 industries in the sector should focus providing services that address these changing habits to improve
409 activity levels in women.

410

411 **Acknowledgments**

412 We would like to thank the women who took time to complete the surveys and who participated in
413 the focus groups to discuss their thoughts.

414 **Author Contributions**

415 Conceptualisation, X.X, X.X, X.X. Investigation, X.X, X.X, X.X. Focus groups, X.X, X.X, X.X. Writing, X.X,
416 X.X. Reviews and editing, X.X, X.X, X.X, X.X. Supervision, X.X. All authors have read and agreed to the
417 published version of the manuscript.

418 **Conflicts of Interest**

419 The authors declare no conflict of interest.

420

421 **References**

422 Ball, K., Crawford, D., & Owen, N. (2000). Too fat to exercise? Obesity as a barrier to physical activity.

423 *Australian and New Zealand Journal of Public Health*, 24(3), 331–333.

424 <https://doi.org/10.1111/J.1467-842X.2000.TB01579.X>

425 Booth, F., Roberts, C., & Laye, M. (2012). Lack of exercise is a major cause of chronic diseases.

426 *Comprehensive Physiology*, 2(2), 1143–1211. <https://doi.org/10.1002/CPHY.C110025>

427 Carter, A., & Alexander, A. C. (2021). 'It's a Whole Different Atmosphere': A Qualitative Examination

428 *of Social Support as a Facilitator of Exercise During the COVID-19 Pandemic*. 22(5), 622–630.

429 <https://doi.org/10.1177/15248399211013005>

430 Center for Health Statistics, N. (1975). *Adult Physical Activity Questions on the National Health*

431 *Interview Survey*. http://www.cdc.gov/nchs/nhis/physical_activity/pa_guide.htm.

- 432 Doré, I., O'Loughlin, J., Beauchamp, G., Martineau, G., & Fournier, L. (2016). Volume and social
433 context of physical activity in association with mental health, anxiety and depression among
434 youth. *Preventive Medicine*, *91*, 344–350. <https://doi.org/10.1016/J.YPMED.2016.09.006>
- 435 Edwards, E. S., & Sackett, S. C. (2016). Psychosocial Variables Related to Why Women are Less Active
436 than Men and Related Health Implications. *Clinical Medicine Insights. Women's Health*, *9*(Suppl
437 1), 47. <https://doi.org/10.4137/CMWH.S34668>
- 438 Farah, B. Q., do Prado, W. L., Malik, N., Lofrano-Prado, M. C., de Melo, P. H., Botero, J. P., Cucato, G.
439 G., de Almeida Correia, M., & Ritti-Dias, R. M. (2021). Barriers to physical activity during the
440 COVID-19 pandemic in adults: a cross-sectional study. *Sport Sciences for Health* *2021 17:2*,
441 *17*(2), 441–447. <https://doi.org/10.1007/S11332-020-00724-5>
- 442 GOV.UK. (2021). *Coronavirus (COVID-19): guidance and support - GOV.UK*.
443 <https://www.gov.uk/coronavirus>
- 444 GOV.UK. (2022). *Physical activity - GOV.UK*. Physical Activity - GOV.UK Ethnicity Facts and Figures.
445 [https://www.ethnicity-facts-figures.service.gov.uk/health/diet-and-exercise/physical-](https://www.ethnicity-facts-figures.service.gov.uk/health/diet-and-exercise/physical-activity/latest)
446 [activity/latest](https://www.ethnicity-facts-figures.service.gov.uk/health/diet-and-exercise/physical-activity/latest)
- 447 LaCroix, A. Z., Bellettiere, J., Rillamas-Sun, E., Di, C., Evenson, K. R., Lewis, C. E., Buchner, D. M.,
448 Stefanick, M. L., Lee, I.-M., Rosenberg, D. E., LaMonte, M. J., & (WHI), for the W. H. I. (2019).
449 Association of Light Physical Activity Measured by Accelerometry and Incidence of Coronary
450 Heart Disease and Cardiovascular Disease in Older Women. *JAMA Network Open*, *2*(3),
451 e190419–e190419. <https://doi.org/10.1001/JAMANETWORKOPEN.2019.0419>
- 452 Lum, K., & Simpson, E. (2021). *The impact of physical activity on psychological well-being in women*
453 *aged 45-55 years during the Covid pandemic: A mixed-methods investigation*. Elsevier .
454 [https://reader.elsevier.com/reader/sd/pii/S0378512221001468?token=1900AA6A4D01287D60](https://reader.elsevier.com/reader/sd/pii/S0378512221001468?token=1900AA6A4D01287D60E16ED5D11967D3890082F5D1C2B169E1EC417883850213B0546E5A765A4BE1805A49C1C044C)
455 [E16ED5D11967D3890082F5D1C2B169E1EC417883850213B0546E5A765A4BE1805A49C1C044C](https://reader.elsevier.com/reader/sd/pii/S0378512221001468?token=1900AA6A4D01287D60E16ED5D11967D3890082F5D1C2B169E1EC417883850213B0546E5A765A4BE1805A49C1C044C)
456 [A59&originRegion=eu-west-1&originCreation=20211027112332](https://reader.elsevier.com/reader/sd/pii/S0378512221001468?token=1900AA6A4D01287D60E16ED5D11967D3890082F5D1C2B169E1EC417883850213B0546E5A765A4BE1805A49C1C044CA59&originRegion=eu-west-1&originCreation=20211027112332)

- 457 Mackay, L. M., Schofield, G. M., & Oliver, M. (2011). Measuring Physical Activity and Sedentary
458 Behaviors in Women with Young Children: A Systematic Review.
459 [Http://Dx.Doi.Org/10.1080/03630242.2011.574794](http://Dx.Doi.Org/10.1080/03630242.2011.574794), 51(4), 400–421.
460 <https://doi.org/10.1080/03630242.2011.574794>
- 461 Moreno, J. P., & Johnston, C. A. (2014). Barriers to Physical Activity in Women:
462 [Http://Dx.Doi.Org/10.1177/1559827614521954](http://Dx.Doi.Org/10.1177/1559827614521954), 8(3), 164–166.
463 <https://doi.org/10.1177/1559827614521954>
- 464 Nienhuis, C. P., & Lesser, I. A. (2020). The Impact of COVID-19 on Women’s Physical Activity Behavior
465 and Mental Well-Being. *International Journal of Environmental Research and Public Health*
466 2020, Vol. 17, Page 9036, 17(23), 9036. <https://doi.org/10.3390/IJERPH17239036>
- 467 Sport England. (2021). *Gender: Sport England*. [https://www.sportengland.org/know-your-](https://www.sportengland.org/know-your-audience/demographic-knowledge/gender)
468 [audience/demographic-knowledge/gender](https://www.sportengland.org/know-your-audience/demographic-knowledge/gender)
- 469 Sport England. (2023). *Active Lives Adult Survey November 2021-22 Report*. [https://sportengland-](https://sportengland-production-files.s3.eu-west-2.amazonaws.com/s3fs-public/2023-04/Active%20Lives%20Adult%20Survey%20November%202021-22%20Report.pdf?VersionId=ln4PN2X02DZ1LF18btgaj5KFHx0Mio9o)
470 [production-files.s3.eu-west-2.amazonaws.com/s3fs-public/2023-](https://sportengland-production-files.s3.eu-west-2.amazonaws.com/s3fs-public/2023-04/Active%20Lives%20Adult%20Survey%20November%202021-22%20Report.pdf?VersionId=ln4PN2X02DZ1LF18btgaj5KFHx0Mio9o)
471 [04/Active%20Lives%20Adult%20Survey%20November%202021-](https://sportengland-production-files.s3.eu-west-2.amazonaws.com/s3fs-public/2023-04/Active%20Lives%20Adult%20Survey%20November%202021-22%20Report.pdf?VersionId=ln4PN2X02DZ1LF18btgaj5KFHx0Mio9o)
472 [22%20Report.pdf?VersionId=ln4PN2X02DZ1LF18btgaj5KFHx0Mio9o](https://sportengland-production-files.s3.eu-west-2.amazonaws.com/s3fs-public/2023-04/Active%20Lives%20Adult%20Survey%20November%202021-22%20Report.pdf?VersionId=ln4PN2X02DZ1LF18btgaj5KFHx0Mio9o)
- 473 Symons, M., Cunha, C. M., Poels, K., Vandebosch, H., Dens, N., & Cutello, C. A. (2021). Physical
474 Activity during the First Lockdown of the COVID-19 Pandemic: Investigating the Reliance on
475 Digital Technologies, Perceived Benefits, Barriers and the Impact of Affect. *International*
476 *Journal of Environmental Research and Public Health* 2021, Vol. 18, Page 5555, 18(11), 5555.
477 <https://doi.org/10.3390/IJERPH18115555>
- 478 Turnock, L. A. (2021). ‘There’s a difference between tolerance and acceptance’: Exploring women’s
479 experiences of barriers to access in UK gyms. *Wellbeing, Space and Society*.
480 <https://doi.org/10.1016/j.wss.2021.100049>
- 481 Women in Sport. (2021). *Women In Sport*. <https://www.womeninsport.org/>

Table 1. Participant characteristics. All results were self-reported.

<i>Demographic</i>	<i>N</i>	<i>%</i>	<i>N</i>	<i>%</i>
	<i>Survey 1</i>		<i>Survey 2</i>	
<i>Area</i>				
Rural or countryside	12	3.7	9	6.6
A village	58	17.7	25	18.2
A town	115	35	43	31.4
A suburban area	68	20.7	29	21.2
An inner city area	71	21.6	27	19.7
Mixture/moved around	2	0.6	1	0.7
<i>Age</i>				
18-24	62	18.9	20	14.6
25-34	116	35.4	42	30.7
35-44	64	19.5	35	25.5
45-54	50	15.2	36	26.3
55-64	24	7.3	7	18.9
65-74	7	2.1	5	3.6
75-84	0	0	0	0
85 or older	0	0	0	0
<i>Ethnicity</i>				
White	294	89.6	124	90.5
Mixed/multiple ethnic groups	8	2.4	7	5.1
Asian/Asian British	8	2.4	3	2.2
Black African/Caribbean/black British	9	2.7	1	0.7
Chinese	0	0	0	0
Arab	0	0	0	0
Other	3	0.9	0	0
Prefer not to say	1	0.3	1	0.7

Table 2. Types and duration of activity during and post-lockdown reported by participants (%)

		<i>None (%)</i>	<i>Less than one hour (%)</i>	<i>1-3 hours (%)</i>	<i>3 hours or more (%)</i>	<i>Chi Square Value (p<0.05)</i>
Physical exercise such as jogging, aerobics or workouts at home	During	27	23	33	17	0.335
	Post	20	21	39	20	
Cycling, for work, shopping or leisure	During	73	14	10	3	0.085
	Post	77	10	8	5	
Walking, for work, shopping or leisure.	During	5	22	42	31	0.666
	Post	3	24	40	33	
Housework/Childcare	During	11	29	35	25	0.308
	Post	13	30	27	30	
Gardening/DIY	During	57	24	16	3	0.109
	Post	53	20	19	8	

*denotes significance at 0.05 level

Table 3. Perceived barriers to PA reported by participants for during and post-lockdown (%)

		Yes (%)	Chi Square Value (p<0.05)
Lack of access to equipment/space to exercise	During	39.9	<0.001*
	Post	15.3	
Religion/Culture	During	0	N/A
	Post	0	
Family/community values on physical activity	During	2.4	0.223
	Post	0.7	
Financial reasons	During	5.5	<0.001*
	Post	16.1	
Current laws (e.g. lockdown restrictions)	During	38.4	<0.001*
	Post	16.8	
Safety concerns (risk of catching/spreading COVID-19)	During	14.6	0.433
	Post	17.5	
Other safety concerns (e.g. training in the dark)	During	22.6	<0.001*
	Post	6.6	
Knowledge (e.g. not knowing how to train)	During	9.1	0.517
	Post	7.3	
Not having time to exercise	During	32.6	0.010
	Post	45.3	
Sex (e.g. female-only exercise classes/online classes)	During	0.6	<0.001*
	Post	7.3	
Poor mental health	During	18.3	0.564
	Post	16.1	
Poor physical health or fitness	During	13.4	0.587
	Post	15.3	
Being unable to exercise with a social group	During	25	0.001*
	Post	11.7	
Childcare or other caring responsibilities	During	16.8	<0.001*
	Post	0	
Other	During	16.2	0.534
	Post	13.9	

*denotes significance at 0.05 level

For Peer Review

Table 4. Perceived barriers to PA reported by participants for during and post-lockdown (%)

		Yes (%)	Chi Square Value (p<0.05)
Access to equipment/space to exercise	During	19.2	<0.001*
	Post	37.2	
Religion/Culture	During	0	N/A
	Post	0	
Family/community values on physical activity	During	11.6	0.494
	Post	13.9	
Financial reasons	During	18	0.003
	Post	7.3	
Lockdown restrictions (e.g. making effort to exercise because of restrictions)	During	27.1	0.397
	Post	23.4	
Knowledge (e.g. you feel confident to exercise)	During	26.5	0.084
	Post	19	
Having more time to exercise	During	41.8	<0.001*
	Post	24.1	
Sex (e.g. female-only exercise classes/online classes)	During	3	0.325
	Post	1.5	
Good mental health	During	22.3	0.932
	Post	21.9	
Good physical health or fitness	During	26.2	0.518
	Post	23.4	
Being able to exercise with a social group	During	26.2	0.007*
	Post	38.7	
Other	During	13.4	0.611

Post 11.7

*denotes significance at 0.05 level

For Peer Review

Table 5. A list of new activities that have been reported due to lockdown in England from March 2020.

<i>New activity</i>	<i>Quote</i>
<i>Online classes</i>	For me things have changed, I attended online sessions (live) which involves lots of jumping and plyometric and then some banding because it completely dramatically changed to what I regularly do.
<i>Pre-recorded online classes</i>	During lockdown, well I did a lot with you didn't I, lots of workouts at home, which actually was quite fun and I quite enjoyed that. We did quite a lot of Combat and Attack and some Barre and things.
<i>Home exercises</i>	And I started buying so much equipment with any offers that I saw one pilot in in my house so I'd have everything there, so I don't have to go anywhere I knew I could do it, so I just did it at home.
<i>Walking</i>	I try to do something every day and I think I'm walking definitely a lot more, that was a result of the lockdown.
<i>Cycling</i>	...and a bit of cycling, I mean when you're only allowed out for one hour per day.
<i>Running</i>	...and then kind of did a few sporadic runs so I'd say about like three runs a month or something.

Table 6. A list of reasons for a decrease in the volume of physical activity as a result of lockdown in England from March 2020.

<i>Reason for decrease in volume of activity</i>	<i>Quote</i>
<i>Fear</i>	Two weeks of being at home they didn't want to leave the House at all due to fear, so that was also very challenging.
<i>Home distractions</i>	Too many distractions at home.
<i>Working environment</i>	You know, going to departments, or whatever, sorting things out, you know just is much harder when you're at home on a computer for 16 months.
<i>Structure</i>	Really struggled with that the lack of structure and then, especially in the second lockdown just really struggled to motivate myself.
<i>Weather</i>	When it's cold and it's raining and dark, like, the last thing you want to do is go for a walk, like, obviously you're restricted to go outside when the weather is really rubbish. And I think, for me personally I don't know how comfortable I would feel going for a walk by myself, if it was really, you know, late, or in winter, even if it's really dark.
<i>Motivation</i>	You probably don't work as hard perhaps, as you don't have to because there is no one pushing you as much.

Table 7. Common themes reported for reasons to return to the gym once lockdown restrictions were eased in England.

<i>Theme</i>	<i>Quote</i>
<i>Back to 'normal'</i>	I'm back at the gym three times a week and I'm happy with that
<i>Equipment</i>	Being able to go and do proper strength, training, because I haven't got that equipment at home so that's kind of barrier.
<i>Social</i>	I enjoy the gym more because of the social aspect of being with other people.
<i>Efficient</i>	You just do everything efficiently, very quickly, and you don't over use your joints.
<i>Real life</i>	And then, after lockdown my summer classes started backup, which is extremely good, I hadn't realized how much better, it was like really to get back to doing it in real life, and obviously it's easier to walk you know do things now.

Table 8. Common themes reported as motivation for physical activity.

<i>Motivator theme</i>	<i>Quote</i>
<i>Mental health</i>	I can manage my stress
<i>Social</i>	... by joining classes I've actually met and I made new friends.
<i>Priority</i>	Because exercise is important to me.
<i>Physical health (weight)</i>	I find it very difficult to lose weight and I probably have the gene that makes it difficult to lose weight.
<i>Body image</i>	But I massively love my food and so exercise for me was vanity, because if I didn't exercise, then I would get put on weight.
<i>Memberships/contracts</i>	Personally, for me, having a membership, something helps me go and have a membership to a class that I go to with friends two or three times a week so.
<i>Structure</i>	Having the structure of the club sessions like when they could start again made a huge difference to me.
<i>Green exercise</i>	Daily dose of sunshine, as I called it, because I realized that everything in exercising inside is all well and good, but I need to get out into the light as well, so made a point of doing that.

Table 9. Common themes reported as barriers towards physical activity.

<i>Barrier themes</i>	<i>Quote</i>
<i>Home distractions</i>	Although I dedicate one space for physical activity and try to remove all the distractions , it's still challenging. People enter the space...disturbing you.
<i>Work</i>	But yeah that's a main barrier and work, sometimes I'm working.
<i>Laziness</i>	And what stops me in general is just laziness...like me and my sisters have just never been huge exercisers.
<i>Environment</i>	I think winter was a lot harder and what are locked down and just generally because you just it couldn't go out and it was dark and so forth, they felt a bit more trapped in.
<i>Screen time</i>	I had a lot of problems with my eyes as well from zoom and looking at the screen so much, and to do exercise with something that got me out of using a computer now we.
<i>Sex</i>	As a female...I particularly massively progress but there's places I wouldn't walk when it's dark and the night-time.

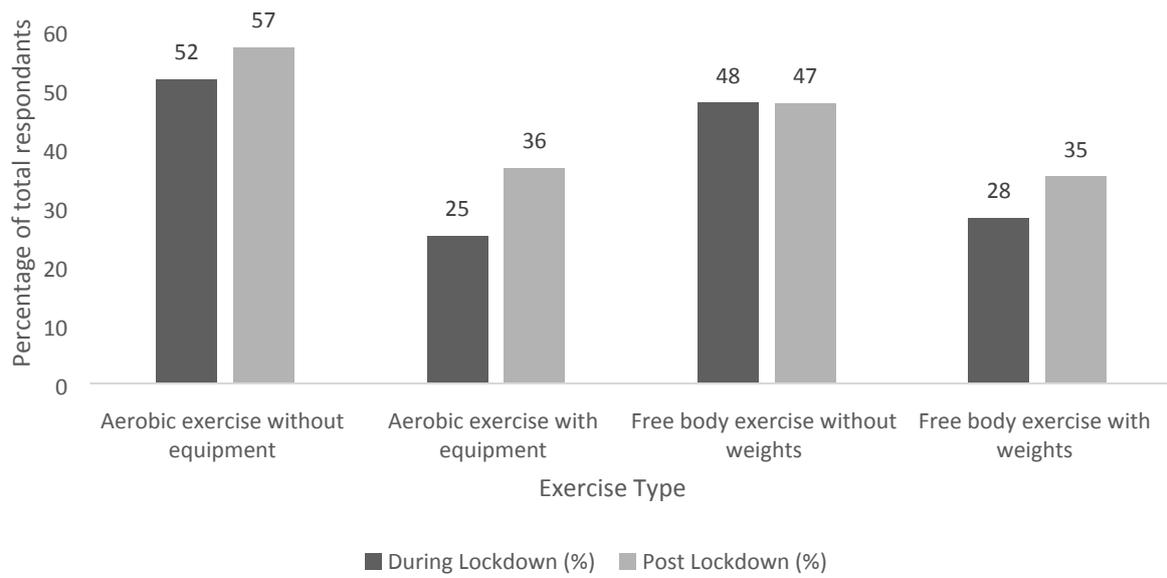


Figure 1. Percentages of types of activity (including the use of or lack of equipment) during and post-lockdown selected by participants