

# Socio-demographic predictors of uptake of a virtual group weight management program during the COVID-19 pandemic

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1 **Abstract**

2 Background: The COVID-19 pandemic has had a significant adverse impact on the  
3 delivery of weight management programmes (WMPs), in order to ensure the safety of  
4 patients and healthcare professionals. Videoconferencing could provide safe remote  
5 access to group WMPs during the COVID-19 pandemic. The objectives of this study  
6 were to determine the uptake of a virtual group WMP and its predictors.

7

8 Materials and methods: All patients enrolled on a face-to-face group WMP, which  
9 constitutes part of a Tier 3 WMP delivered by the NHS, at the time of the COVID-19  
10 pandemic lockdown were invited to transfer to a virtual format of the group WMP.  
11 Baseline data included weight, BMI, age, gender, ethnicity and Index of Multiple  
12 Deprivation (IMD) quintile score. The outcomes were accept/decline transfer to the  
13 virtual group WMP. Logistic regression was performed to assess for predictors of  
14 uptake.

15

16 Results: 315 participants were included, of which 72.1% (n= 227) accepted. After  
17 adjusting for gender, deprivation and BMI; older patients (OR 0.966, [95% CI 0.944,  
18 0.989]; p=0.003) and Black, Asian and Minority Ethnicity (BAME) patients (OR 0.460  
19 [95% 0.248, 0.851]; p=0.023) were less likely to accept the virtual group WMP.

20

21 Conclusion: Strategies aimed at improving uptake of group WMP among BAME and  
22 older adult groups are needed, particularly considering the increased risk of severe  
23 COVID-19 in these two groups, and the links between obesity and poor COVID-19  
24 outcomes.

25 **Introduction**

26 The outbreak of novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-  
27 2) was declared a global pandemic by the World Health Organisation on 11 March  
28 2020 <sup>1</sup>. On the 23 March 2020, the United Kingdom (UK) government released  
29 guidelines on social distancing to reduce the spread of COVID-19 <sup>2</sup>.

30

31 A survey of UK adults <sup>3</sup> found that the COVID-19 lockdown has had a negative  
32 impact on eating and physical activity behaviours, with this impact being more  
33 pronounced among adults with a higher Body Mass Index (BMI). During the COVID-  
34 19 lockdown, a higher BMI was associated with lower levels of physical activity and  
35 dietary quality, and a greater reported frequency of overeating <sup>3</sup>.

36

37 Therefore, the COVID-19 pandemic may have had a disproportionately large and  
38 negative influence on weight-related behaviours among adults with a higher BMI.  
39 This, combined with the evidence that patients with obesity remain at an increased  
40 risk of severe COVID-19 leading to hospitalisation and mortality <sup>4-7</sup>, means that  
41 remote approaches to WMPs that were previously delivered face-to-face are urgently  
42 needed.

43

44 Weight management programmes (WMPs) for obesity management across the UK  
45 and internationally were reduced or suspended due to the mobilisation of outpatient  
46 and community healthcare professionals to the front-line. A survey commissioned by  
47 Public Health England revealed that 25% of adult weight management services in  
48 England reduced to a 'skeleton service' during the COVID-19 pandemic <sup>8</sup>.

49

50

51 One solution to enabling people with obesity to access group WMPs safely is via  
52 virtual videoconferencing. While some weight management services in England have  
53 adapted to providing some form of remote support, only 23% of adult weight  
54 management services report using virtual group support during the COVID-19  
55 pandemic <sup>8</sup>.

56

57 However, access to virtual group WMPs may be influenced by digital exclusion,  
58 defined as the lack of digital skills, lack of internet connectivity and/or lack of  
59 accessibility to assistive technology <sup>9</sup>. Digital exclusion has been a reality long before  
60 the COVID-19 pandemic whereby 22% of the UK population lack basic digital skills  
61 for everyday life <sup>10</sup>. Digital exclusion is most prominent among some  
62 sociodemographic groups; such as among adults aged ≥65 years old, minority ethnic  
63 groups and those not in employment <sup>11</sup>.

64

65 Most research to date has investigated the use of videoconferencing software for  
66 one-to-one weight management interventions and research published on the  
67 application of videoconferencing for remote participation in weight management in  
68 the group setting has been limited to a few studies <sup>12-18</sup>. The available evidence  
69 suggests that virtual group WMPs may be an effective means of allowing face-to-face  
70 group interaction, while overcoming barriers to access. However, none of these  
71 studies investigated the uptake of a videoconferencing group WMP intervention and  
72 were all published prior to the COVID-19 pandemic.

73

74 Hence, we conducted a study which aimed to assess the uptake of transfer from a  
75 face-to-face to a virtual group WMP during the COVID-19 pandemic. Our secondary  
76 aim was to investigate predictors of uptake of a virtual group WMP, including  
77 sociodemographic predictors.

78

## 79 **Materials and Methods**

80 Our centre is a Tier 3 medical WMP, for adults with obesity with a BMI  $\geq 40$  kg/m<sup>2</sup>, or  
81  $\geq 35$  kg/m<sup>2</sup> with comorbidities <sup>19</sup> situated in a tertiary centre in the UK. Our Tier 3  
82 WMP is multi-disciplinary including physicians, dietitians, specialist nurses and a  
83 clinical psychologist <sup>19</sup>. Our centre is located within the ethnically diverse city of  
84 Birmingham (UK), where 42.1% of residents identify as Black, Asian or Minority  
85 Ethnicity (BAME) <sup>20</sup>.

86

87 Within our Tier 3 WMP, we run a course of structured patient education and self-  
88 management group sessions, comprising of six one-hour sessions which run monthly  
89 over a 6-month period and are led by a Specialist Weight Management Dietitian and  
90 a Dietetic Assistant Practitioner. We have previously published the outcomes of our  
91 face-to-face group WMP <sup>21</sup>. Our face-to-face group WMP had a 56% completion rate  
92 with the majority (78.6%) achieving weight loss and nearly a third (32.3%) achieved a  
93  $\geq 5\%$  weight loss.

94

95 On the 13<sup>th</sup> March 2020, all face-to-face weight management clinics at our centre,  
96 including our group WMP, were suspended due to the COVID-19 pandemic. Hence,

97 we designed a virtual format of our group WMP using the real-time  
98 videoconferencing software 'VidyoConnect'<sup>22</sup>, which allows patients with obesity to  
99 attend the group WMP remotely.

100

101 We conducted a prospective cross-sectional study to determine the uptake of the  
102 virtual group WMP during the COVID-19 pandemic. All patients who were enrolled on  
103 the face-to-face format of the group WMP on 13<sup>th</sup> March 2020 were contacted via  
104 telephone and invited to transfer to the virtual group WMP.

105

106 Baseline data were collected from electronic patients records and included  
107 anthropometrics (weight and BMI), demographics (age, gender, ethnicity) and  
108 patients' home address postcodes, which were used to obtain Index of Multiple  
109 Deprivation (IMD) quintile scores using the English Indices of Deprivation (2019)  
110 dataset<sup>23</sup>. Outcome data included a binary outcome of acceptance or declination of  
111 transfer to the virtual group WMP and were asked an open-ended question about  
112 their reason for declination. Reasons for declination were then categorised as either  
113 barriers to access (i.e. lack of internet access or poor digital skills) or due to a  
114 personal preference to wait for face-to-face services to resume.

115

116 All analyses were performed using IBM SPSS Statistics 25.0. Data were presented  
117 as frequencies and mean ( $\pm$ SD). Differences between groups were assessed using  
118 the Independent Student's t-test and the chi-squared test for continuous and  
119 categorical variables, respectively. To assess for predictors of uptake of a virtual  
120 group WMP, binary logistic regression analysis (using the "Enter" method) was

121 performed. Logistic regression assumptions of multicollinearity were assessed and  
122 not violated. The dependent variable was accepting invitation to transfer to the virtual  
123 format. Independent variables included in the model were age, gender, ethnicity, BMI  
124 and IMD quintile. Variables were chosen for the model based upon epidemiological  
125 plausibility. A p-value of <0.05 was considered significant.

126

## 127 **Results**

128 A total of 330 patients were enrolled on the face-to-face group WMP at the time of  
129 the COVID-19 lockdown. After excluding participants who could not be contacted (n=  
130 15, 4.5%), 315 patients were invited to attend the virtual format and were included in  
131 the analyses. Overall, 27.9% (n= 88) declined and 72.1% (n= 227) accepted the  
132 invitation to transfer to the virtual group WMP. The most frequent reason for declining  
133 was lack of internet access and/or lack of digital skills (89.8%, n= 79), while 10.2%  
134 (n=9) patients declined as they only wished to partake in face-to-face sessions.

135

136 The baseline characteristics of patients who accepted transfer to the virtual group  
137 WMP versus those who declined are summarised in Table 1. Data on age, gender,  
138 weight, BMI and IMD quintile score were available for all patients, while ethnicity data  
139 were available for 86.3% (n= 272) of patients. Most patients were from postcodes  
140 associated with quintile 1 of IMD.

141

142 Patients who accepted the virtual group WMP were younger (mean -4.0 years, 95%  
143 CI -7.6 to -0.4; p=0.032) than those who declined. A greater proportion of those aged  
144 ≥60 year olds declined the virtual group WMP compared to other age groups: 48%

145 (n=23) of ≥60 year olds declined the virtual group WMP, compared to 22.8% (n=34)  
146 of 40-59 year olds and 26.3% (n=31) of <40 year olds (p=0.003). There were also  
147 significant differences in the uptake of the virtual group WMP by ethnicity, whereby  
148 35% (n=27) of all BAME patients compared to 22.8% (n=45) of all Caucasian  
149 patients declined uptake of the virtual group WMP (p=0.002). There was no statistical  
150 difference between genders, weight, BMI or level of deprivation of those who  
151 accepted compared with those who declined the virtual group WMP.

152  
153 A logistic regression was performed to ascertain the associations of age, gender,  
154 ethnicity, deprivation and BMI with acceptance of transfer to the virtual group WMP.  
155 The logistic regression model was statistically significant,  $\chi^2(4) = 18.427$ , p=0.018.  
156 Older age (OR 0.966, [95% CI 0.944, 0.989]; p=0.003) and identifying as BAME  
157 compared to Caucasian (OR 0.460 [95% CI 0.248, 0.851]; p=0.023) were associated  
158 with a decreased likelihood of uptake of the virtual group WMP (Table 2).

159

## 160 **Discussion**

161 To our knowledge this is the first study to examine the uptake of a virtual group WMP  
162 during the COVID-19 pandemic and found that the uptake was high, with nearly three  
163 quarters of patients with obesity transferring to the virtual group WMP.

164

165 However, the invitation to transfer to a virtual group WMP was declined by over a  
166 quarter of patients in our study. Our findings suggest that older patients and patients  
167 identifying as BAME were less likely to accept transfer to the virtual group WMP. This  
168 may provide evidence of inequity of access to virtual obesity treatments among

169 vulnerable patient groups, which is particularly worrisome considering that older age  
170 <sup>24-26</sup>, BAME <sup>27,28</sup> and obesity <sup>4-7</sup> are shown to increase risk of severe illness from  
171 COVID-19. ~~and its related mortality~~. Therefore, it would be important to explore this  
172 further in future research.

173

174 It is plausible that poorer uptake of a virtual group WMP may be attributed to digital  
175 exclusion. In the UK, digital exclusion is most prominent among adults aged ≥65  
176 years old, minority ethnic groups and those not in employment <sup>11</sup>. Most of our  
177 patients were living in quintile 1 IMD which is consistent with the data showing the  
178 association between obesity and social deprivation <sup>29,30</sup>. Despite that, the uptake of  
179 the virtual group WMP was high overall in our study. However, digital exclusion may  
180 explain our findings that patients who are older or identify as BAME are less likely to  
181 access a virtual group WMP. However, we did not have the data granularity to  
182 differentiate between patients who did not have physical access to the internet  
183 compared to those that do not have the digital skills to utilise the internet.

184

185 There is concern that the increasing use of digital health tools during the COVID-19  
186 pandemic might exacerbate health inequalities if patient are unable to use or access  
187 digital interventions <sup>31</sup>. Our data demonstrate a need to engage with people with  
188 obesity of older age and BAME communities in order to understand how we can  
189 improve the uptake of virtual group WMPs, including how we can enhance digital  
190 literacy skills to allow participation. Weight management services may benefit from  
191 being able to refer patients with poor digital literacy to 'Digital Health Champions' <sup>32</sup>,

192 who could engage with patients to learn basic digital skills; thereby enabling access  
193 to virtual group WMPs.

194

195 The main limitation of our study is that it is a single centre analysis. Our findings  
196 suggest that wider examinations of variations of virtual group WMP uptake by age  
197 and ethnicity need to be explored in larger multi-centre studies to confirm where  
198 there is a national inequity of access to virtual group WMPs among older and BAME  
199 populations. Our study collated quantitative categorical data on reasons for declining  
200 uptake of the virtual group WMP. However, future research should explore patient's  
201 reasons for declining transfer to a virtual group WMP through qualitative data, in  
202 order to gain a deeper understanding of barriers to participation.

203

204 In conclusion, most patients opted to transfer to a virtual format of our group WMP in  
205 our Tier 3 weight management service. However, older age and identifying as BAME  
206 were associated with reduced likelihood of uptake of a virtual group WMP. There is a  
207 need address factors such as improving digital literacy to ensure safe and equitable  
208 access to virtual group WMPs during the COVID-19 pandemic and beyond,  
209 particularly considering the links between obesity and COVID-19, and the increased  
210 risk of severe COVID-19 among older patients and BAME groups.

211

212 **Transparency:** The lead author affirms that this manuscript is an honest, accurate,  
213 and transparent account of the study being reported. The reporting of this work is  
214 compliant with STROBE guidelines. The lead author affirms that no important

215 aspects of the study have been omitted and that there are no discrepancies from the  
216 study as planned.

217

218 **Competing interests:** The authors declare that they have no conflicts of interest.

219

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- 329

330 **Table legends**

331 Table 1: Baseline Characteristics. Data presented as mean (SD) or n= (%)

332 Table 2: Binary logistic regression analysis of uptake of virtual group weight

333 management programme

