


Make Movement Your Mission: Evaluation of an online digital health initiative to increase physical activity in older people during the COVID-19 pandemic

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Abstract

Objective: To formatively evaluate the Make Movement Your Mission (MMYM) digital health initiative to promote physical activity (PA) levels and help avert the negative consequences of sedentary behaviours in older adults during the SARS-CoV2 pandemic.

Methods: Mixed-method study to explore activity levels, changes in physical function and Activities of Daily Living (ADLs), quality-of-life, social engagement, technology use, and accessibility. Survey data were analysed descriptively. Qualitative interviews were analysed using framework analysis.

Results: Forty-one respondents completed the survey (Mean age 68.4 (8.9) years; 34 Female), 68% aged ≥ 65 years. Average attendance was 14.3 sessions per week (3.5 h). 73% had been with MMYM for >1 year, 90% reported they were engaging in more movement on a typical day, and 75% reported improvement in ability to perform moderate PA. Since starting MMYM, participation in activities targeting strength, balance and flexibility increased (by 48%, 73% and 75%, respectively). 83% met strength and 90% balance PA guidelines for health ($\geq 2x$ per week). Between 18% and 53% of respondents reported improvements in ADLs, 53% reported better quality-of-life, and 28% increased use of the internet.

Eight participants were interviewed (Mean age 70.7 (6.7) years; 7 Female). Activity levels were promoted by having direct support from the instructor through Facebook messages pre and post live sessions, having group expectation about quality and level of engagement, having a sense of control and encouragement from others, MMYMs regularity, choice around level of engagement and accessibility. Noticing short-term outcomes in balance and posture helped boost confidence and continued participation.

Conclusion: Clinical trials need to robustly assess its effectiveness and acceptability.

Keywords

Physical activity, older people, ADLs, physical function, social isolation, eHealth, COVID-19

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Introduction

The 2020-2021 SARS-CoV2 (COVID-19) pandemic has presented new challenges for health care systems worldwide.^{1,2} Age is a risk factor for severe COVID-19 infection, hospitalisation and death.^{3,4} On top of UK mandatory stay-at-home legislations,⁵ older people were advised to remain home to avoid infection. However, such shielding decreases physical activity generating increased risk of falls, poorer engagement with social and family contacts,⁶⁻⁸ and reduced access to health care services,⁹ affecting both physical and mental health¹⁰ and decreasing life expectancy.¹¹ Reductions in physical activity caused by measures to control COVID-19 transmission could have serious adverse consequences for community dwelling older people,¹² with increases in future rehabilitation need.¹³

Older people with multimorbidity are particularly affected by the range of deficits caused by the illness and by reduced access to health care interventions.⁶ They may require targeted falls prevention programmes,¹⁴ including digital services to replace and or adjunct face to face interventions. As social restrictions are lifted and in anticipation of possible future restrictions, there will still be the need to deliver effective physical activity and exercise interventions remotely. Internet-based interventions, defined as eHealth, can help better reach out to older people beyond the current pandemic, when they experience restricted access to in-person care (e.g. those living in rural areas, those who have mobility problems). The delivery of hybrid forms of interventions, where digital platforms accompany face to face provision may help better respond to the demands of care post-pandemic.¹⁵

The MMYM digital health initiative was launched on 23 March 2020 on the first day of the UK's national lockdown due to COVID-19. MMYM aimed (i) to offer a place for exercise instructors to direct their clients to when face-to-face sessions ceased, and (ii) to help older adults and those with reduced mobility to be able to take part in and understand (physical literacy) the importance of light physical activity (PA) throughout the day.¹⁶ The study aimed to evaluate in what ways a digital health initiative delivering remote group physical activity can help reduce the risk of deconditioning and increase the opportunity for socialisation in older people during the COVID-19 pandemic. The research questions for this formative evaluation of MMYM were:

1. Did older adults who engaged in MMYM improve their levels of light PA, strength and balance?
2. Did they improve their physical literacy as a consequence of their engagement?
3. What were the barriers and facilitators to programme acceptability?
4. What was participants behaviour towards a digitally delivered PA programme?

Materials and methods

This is a mixed methods cross-sectional study based on an anonymised online survey and on semi-structured qualitative interviews with a subset of respondents to explore the experience of older people participating in MMYM. We below report a description of the MMYM initiative before describing the sample and the methods we used.

The MMYM initiative

MMYM is an initiative to promote additional movement minutes into the day over and above any other physical activity or structured exercise people may be doing. MMYM is *not* a structured exercise programme with a set frequency, duration, or progression. There is no pre-exercise assessment nor health check. The instructors cannot 'see' the people joining or whether or how they are moving whilst participating. Although MMYM is not 'progressed' over time like a structured exercise programme, progressive options are included within each movement 'snack'. MMYM is based on the premise of best practice instruction, people watching and choosing support options (standing/seated) that meet their needs and increasing physical literacy to help foster additional movement throughout the day, not just during the online sessions. MMYM comprises deliberately repetitive movements to help habit formation and easy recall of movements outside of the sessions, plus new group members are always joining the group. The main components of fitness (circulation boost, mobility, stamina, strength, balance, co-ordination and flexibility) are covered throughout the three sessions each day and are linked to how these can help or be practised during everyday tasks around the home and garden (e.g. grip, push, pull, step, balance, lift etc.) to help prompt habit formation. Instructors prompt people to do progress checks (shoulder and back of thigh flexibility, 30 s sit-to-stand and 4-point balance) which can be recorded in a daily movement calendar (iCAN diary). Further information about the qualifications of the instructors and the detail of the motivational and social aspects of the initiative to encourage habit formation, group cohesion, promote physical literacy and behaviour change and support self-management are available in the TIDIAR Checklist¹⁷ (see Appendix 1 in Supplementary Data). MMYM is free to access.

Participants can join MMYM live on Facebook at 08:00, 12:00, and 16:00 GMT/BST. These times are defined as movement 'snacks' and these are then available to 'catch up' on the Facebook page and on an open access YouTube channel. Each movement 'snack' consists of a 15-20 min session, including a welcome 'preamble' chat. The Facebook platform also allows interaction with

participants and between group participants to create group cohesion to promote adherence.¹⁸ Over 4000 members had registered by August 2021, with 40–60 people viewing each live session, and 150–200 people viewing recordings post-session.

Although well received by participants, the MMYM activity regimen, and mode of delivery have not been formally tested. This study aims to evaluate MMYM, by means of (1) an online survey and (2) qualitative interviews.

Participants

Convenience sampling was used for recruitment of participants to the survey study. Given the time sensitive nature of the research being conducted during the COVID-19 pandemic, we recruited participants already registered in MMYM initiative who volunteered to complete the survey.

The online survey was made available on the MMYM Facebook group to gain an understanding of the kinds of participants engaging with the MMYM programme (e.g. demographic information; frequency of technology use; levels of physical activity both before and during participation in the programme). At the time of data collection, MMYM had over 3000 members, with 40–60 people viewing each live session. All participants registered for MMYM were eligible to complete the survey, regardless of age, but because of data protection regulations only if they were based in the UK or in a member state of the European Economic Area (EEA). The University of Manchester ethical approval only allowed participants based in the UK at the time the remote interview took place, to take part in the qualitative study.

Procedure

Recruitment occurred via the MMYM Facebook group, open to MMYM members only. It was made clear that involvement in MMYM was in no way dependent on being involved in the research. The advertisement contained information on the study and hyperlinks to the two participant information sheets (one for the survey and one for the qualitative interviews, which ran concurrently). A hyperlink was also included to lead participants to the Qualtrics¹⁹ software page where they were asked to confirm they had read the information sheet and that they gave consent before being directed to complete the survey. If a participant did not give consent, they were logged out of Qualtrics. No question was compulsory to answer.

All personal data were anonymised. Interviews took place either over the telephone, or online using Zoom or Skype. Telephone interviews were recorded using an encrypted digital recorder. Zoom/Skype interviews were recorded via the cloud recording function, immediately transferred onto the University of Manchester Research

Data Storage Service (Isilon) and deleted from the recording device. At the beginning of the interview, participants were asked to give verbal consent to participate, which was recorded and stored separately.

Data collection

The survey questionnaire (see Appendix 2 in Supplementary data) included questions on socio-demographics, long standing (>12 months) illness or disability and degree of limitation in activities, level of participation in PA (light, moderate and vigorous PA; strengthening, balance and flexibility activities) before, during MMYM and after. Questions asked about surrounding support for engagement in MMYM (technology, family, friends), how often across the week they engage, whether they document their progress over time and whether they will continue after COVID-19 restrictions are lifted. The survey also asked participants about changes in shoulder mobility, back of thigh flexibility, 4-point balance and 30 s chair rise (5 responses much worse to much better or N/A). Single questions on general health and quality-of-life (5 responses poor to excellent), how often they have lacked companionship or felt isolated from others in the past two weeks and whether feelings of loneliness or social isolation have changed. Participants' knowledge and understanding of physical activity and fitness included 7 questions on body needs to stay fit and healthy, capabilities and limitations, how to improve strength, balance and flexibility and two global questions on physical literacy. They were asked if knowledge and understanding, movement skills and confidence in ability to participate in PA had changed and if so, what caused this change.

Responses were informed by evidence-based literature on health and quality-of-life.^{20–22} In particular, for questions on activity levels, functional fitness and health-related quality of life, we adapted questions from the SF36, which has been evidenced for its construct validity in older populations and with respect to inquiring about recent health services usage.²⁰ For questions around social isolation, we adapted an item from the UCLA 3-item Loneliness scale. The scale has been evidenced to be highly reliable, both for internal consistency and for test-retest reliability over one year.²¹ Questions on demographics and technology use were also taken from the English Longitudinal Study of Ageing (ELSA), an on-going nationally representative cohort study on health in aging.²² Questions were mostly multiple choice or Likert scales. A free-text box was provided to encourage participants to express their views about the intervention. The survey took around 15–20 min to complete. Data collection lasted 6 weeks from April to May 2021.

All qualitative interviews were semi-structured and around five main themes: participation, physical activity

levels, perceived quality-of-life, social connections, and technology use (see Appendix 3 in Supplementary Data). This strategy helped explore the views of participants in more depth and helped clarify some of the mechanisms behind the effectiveness of the intervention.

Data analysis

Statistical analysis. All authors agreed on the analysis plan. Descriptive statistics were computed for frequency and mean for socio-demographic and survey data, using SPSS® version 24.

Qualitative analysis. All qualitative interviews were transcribed and analysed using Framework Analysis.²³ The Theory of Planned Behaviour (TPB)²⁴ informed theme-categorisation, by providing a framework to explore how participants engagement with physical movements was dependent on personal attitudes towards the activity, the perceived behaviour control that they feel towards the ease and difficulty of engaging in such activities, and a series of social norms that may influence their level of engagement.

We used framework analysis as this analytical method is a step-by-step approach and facilitates the understanding of what works, for whom, and under which conditions. All transcripts were initially read in full by two authors (AB and DS) to create broad themes for data coding in NVivo® 12.²⁵ We followed the steps of familiarization through reading the transcripts and get acquainted with the text and reach an intimate knowledge of contents. We then identified themes or patterns as emerging from the text. We subsequently divided the transcripts in manageable sections and we indexed the themes we developed by applying them to all the transcripts to code sections of text. The last two steps ‘charting’ and ‘mapping’ consisted in laying out summary of findings (i.e. themes and their respective coded texts) in a table and map all categories and pieces of text together to reach final interpretation. To contain research bias in data interpretation, inter-rater agreement was calculated across raters. AB developed a codebook²⁶ (see Appendix 4 in supplementary data), which was used to code up to 10% of transcripts by two raters (AB and DS) independently. The codebook was in the form of a guidance to facilitate the coding process and included information on how to code texts according to themes; it also included examples of coded texts to ease the analytical process. Inter-rater agreement was measured with Kappa coefficient (Cohen’s Kappa).²⁷ Parameters by Landis and Koch²⁸ were used to report the range of agreement (0.81–1.00 = almost perfect; 0.61–0.80 = substantial; 0.41–0.60 = moderate; 0.21–0.40 = fair; 0.00–0.20 = slight; < 0.00 = poor). Disagreement in coding was resolved through reaching consensus among all authors. The analysis was iterative and this allowed us to make changes to

the interpretation during the analysis and create links with data from other sources (i.e. survey data). Participants’ free text comments from the survey aided theme categorization alongside qualitative transcripts and were grouped using the theme categorisation developed from the qualitative interviews.

Results

Survey data

Participants. A total of 41 respondents completed the survey (Mean age: 68.4 years; SD = 8.9; 34 Females) and 28 (68%) were aged ≥ 65 years. All were white, living independently in the community, and the majority ($n = 26$, 65%) had either a higher or graduate degree education. Sixteen (39%) had a long-standing illness/disability (with 10 limited a little or a lot in their activities) and six (15%) were wheelchair users. With regard to Activities of Daily Living (ADLs), the number/percentage rating their abilities as good/excellent was: heavy gardening ($n = 17$, 44%), climbing several flights of stairs ($n = 20$, 51%), and walking more than a mile ($n = 26$, 65%). General Health was rated as fair by 15% ($n = 6$) and as very good/excellent by 53% ($n = 21$). Quality-of-life was rated as fair or poor by 13% ($n = 5$) and as very good/excellent by 65% ($n = 26$). A quarter ($n = 10$, 9 aged ≥ 65) were ‘shielding’ during the pandemic, as advised by the Government and their General Practitioners. Feeling a lack of companionship in the past 2 weeks was reported by 20% ($n = 8$) and 15% ($n = 6$) reported they often or always felt isolated from others.

95% of respondents ($n = 38$) (26 aged ≥ 65) reported using the internet (e.g. checking email, browsing the web) every day or almost every day. 42% of respondents ($n = 32$) reported using multiple devices to access MMYM (Table 1).

Physical activity levels. Attendance time was reported by 41 respondents (median:12; range:1–15 months). Most respondents reported attending MMYM for twelve ($n = 15$, 37%) and thirteen ($n = 10$, 24%) months, and only one respondent (2%) reported attending for only one month since its inception. Weekly attendance ranged between 1–21 sessions and on average each person attended 14.3 weekly sessions (approximately 215 min or 3.5 h per week). 34% ($n = 14$) of respondents reported attending all 21 weekly sessions. 46% ($n = 19$) (15 aged ≥ 65) of respondents reported attending at least two daily sessions per week and 73% ($n = 30$) (21 aged ≥ 65) reported attending at least one daily session per week.

Activity levels were reported by 40 respondents out of 41. 73% ($n = 29$) of survey respondents had been with MMYM for at least a year since first lockdown. Nearly all respondents ($n = 36$, 90%, 26 aged ≥ 65 years old) reported they had been doing more overall movement on

Table 1. Participants' characteristics.

Demographics	Total Sample (n = 41)	Male (N,%)	Female (N,%)
Age* (Mean, SD)	68.4 (8.9)	64.6 (11)	69.1 (8.4)
Gender*	-	6 (15.0)	34 (85.0)
Ethnicity*			
White	40 (97.5)	6 (15.0)	34 (85.0)
General Health*			
Excellent/very good	21 (52.5)	2 (33.4)	19 (54.3)
Good	13 (32.5)	2 (16.7)	11 (34.3)
Fair/Poor	6 (15.0)	2 (33.4)	4 (11.4)
Quality-of-life*			
Excellent/very good	26 (65.0)	3 (50.0)	23 (67.7)
Good	9 (22.5)	1 (16.7)	8 (23.5)
Fair/Poor	5 (12.5)	2 (33.3)	3 (8.8)
Lacked companionship*			
Always/Often	8 (20.0)	1 (16.7)	7 (20.6)
Some of the time	9 (22.5)	2 (33.3)	7 (20.6)
Hardly ever/Never	23 (57.5)	3 (50.0)	20 (58.9)
Felt isolated*			
Always/Often	6 (15.0)	—	6 (17.6)
Some of the time	14 (35.0)	3 (50.0)	11 (32.4)
Hardly ever/Never	20 (50.0)	3 (50.0)	17 (50.0)
Number of individuals living in the same household*			
0	6 (15.0)	1 (16.7)	5 (15.2)
1	9 (22.5)	-	9 (27.3)
>2	25 (62.5)	5 (83.4)	19 (57.5)
Living with partner* (Yes)	22 (55.0)	4 (66.7)	18 (52.9)
Living with other family members* (Yes)	7 (17.5)	2 (33.3)	5 (14.7)

(continued)

Table 1. Continued.

Demographics	Total Sample (n = 41)	Male (N,%)	Female (N,%)
Education*			
Graduate	17 (42.5)	3 (50.0)	14 (41.2)
A level	9 (22.5)	1 (16.7)	8 (23.5)
O level or below	10 (25.0)	2 (33.4)	8 (23.5)
Other (no qualification, City Guilds, exercise teacher)	4 (10.0)	-	4 (11.7)
Long-standing illness/ Disability (Yes)	16 (39.0)	5 (83.3)	11 (32.4)
Wheelchair user (Yes)	6 (15.0)	1 (16.7)	5 (14.7)
Use of internet			
Every day/almost every day	38 (95.0)	—	—
At least once a week	2 (5.0)	—	—
Less than every week	0 (0)	—	—
Devices used**			
Computer (desktop/laptop)	20 (26.3)	—	—
Tablet	24 (31.6)	—	—
Smartphone	32 (42.1)	—	—

*In cases where there was one missing data, n = 40 was considered as total sample, and the missing data was removed. ** if they used multiple devices they could report this so count does not equal 40.

a typical day than before starting MMYM; only three (8%) (2 aged ≥ 65) reported doing almost the same amount of movement, and only one person reported doing less since participating in MMYM (Table 2).

75% (n = 30) (12 aged ≥ 65 years old) reported they had improved their ability to perform *moderate physical activities* (e.g. vacuum, moving furniture, brisk walking). 35% (n = 14) (10 aged ≥ 65) reported that their ability to perform *vigorous physical activities* (e.g. activities such as running, lifting heavy objects) was much/somewhat better than prior to MMYM involvement (Table 2).

Strength, balance and flexibility guidelines. Within noon and 4pm sessions strength and balance moves were embedded

Table 2. Physical activity levels since joining MMYM.

	Doing more	About the same	Doing less	Total count
Movement minutes (light PA) per day	36	3	1	40
Strengthening activities	19	18	3	40
Balance activities	29	9	2	40
Flexibility activities	30	10	0	40

into approximately 72 min of the increased PA time. With respect to the proportion meeting the recommended frequency of *strength, balance and flexibility* promoting activities,²⁹ there were improvements in all domains. 48% (n = 19) (13 aged ≥ 65) had increased strength promoting activity since starting MMYM, 73% (n = 29) (21 aged ≥ 65) had increased balance promoting activities and 75% (n = 30) (21 aged ≥ 65) reported they were doing more flexibility exercises since starting MMYM (Table 2).

83% (n = 33) reported performing structured exercises to improve their strength for two or more days weekly, and 43% (n = 17) exercised five or more days every week. Only 13% (n = 5) (two were wheelchair users) reported not performing any activities targeting strength in the previous week.

90% (n = 36) reported performing physical activities challenging their balance for two days or more every week, of these 48% (n = 19) reported doing these five or more days weekly. Only 10% of respondents (n = 4) (one was a wheelchair user) reported not performing balance exercises in the previous week.

93% (n = 37) reported performing exercises that aimed to improve their *flexibility* and range of movement for *two days or more* every week. 65% (n = 26) reported doing these five or more days weekly. Only 8% of respondents (n = 3) reported not doing any flexibility exercise in the previous week.

ADLs and physical function. 25% of respondents (n = 10 out of 40) completed the question about change in their performance of ADLs following MMYM participation. 80% of these (n = 8 out of 10) reported somewhat better/much better.

The rest of the questions on specific activities of daily living and physical function were completed by 40 participants. The 8 self-reported ADLs were rated as *much or somewhat better* by a range of 18% and 53% of respondents. For example, for 'walking for more than one mile' 45% of respondents (n = 18 out of 40) who could do this

task said they were much or somewhat better (Table 3). 73% of respondents (n = 29) rated their progress in the 4 functional tests of *shoulder mobility, back of thigh flexibility, sit to stands in 30 s and 4-point balance*. None reported experiencing worsened abilities following involvement in MMYM. Between 62% and 79% of respondents reported much or somewhat better ability in these 4 tests compared to before starting MMYM (Table 3). 33% (n = 13) reported that they often or always recorded their progress in these 4 functional tests when prompted monthly by the instructor during movement snacks.

Physical literacy. Between 75% and 85% of respondents rated their physical literacy on 7 questions as good to excellent. However, between 68% and 80% said that, compared to before they joined MMYM, their literacy had improved in all 7 areas. 68% (n = 27) said their knowledge and understanding about how movement affects their health and fitness has improved very much and only 3% (n = 1) said it had not changed. 71% (n = 28) reported this was because of the instruction, guidance and information provided by the MMYM instructors during the snacks, 15% (n = 6) reported it was because of information from other MMYM participants through online comments and messages. 55% (n = 22) reported that their movement skills and ability, and their confidence in their ability, to engage in physical activity had improved very much since joining MMYM.

Health and quality-of-life. 55% of respondents (n = 22) reported that their general health and 53% (n = 21) their quality-of-life (15 aged ≥ 65) as being much/somewhat better than before they joined MMYM. No one reported worse health or quality-of-life.

Social engagement. Social engagement was reported by 40 respondents out of 41. A reduction of their overall feeling of loneliness since joining MMYM was reported by 75% (n = 30) (n = 21 aged ≥ 65). 70% (n = 28) agreed/strongly agreed that their involvement in MMYM reduced their social isolation (19 aged ≥ 65). 98% (n = 40) engaged with instructors or other MMYM participants through comments, messages and 'likes' on FB and 44% (n = 18) took part in two additional social zoom events. 33% (n = 13) live alone but of the remaining, only 14% (n = 4) said other members of their household joined them in MMYM always or often. 41% (n = 17) connected with family or friends in other locations through MMYM. 40/41 would like MMYM to continue after restrictions are lifted and 83% (n = 33) that they would participate in the same/ or more number of snacks.

Technology use. Technology use was reported by 40 respondents out of 41. 28% of respondents (n = 11) (6 aged ≥ 65) reporting having increased the time they

Table 3. Participants rating of change in ADLs and self-reported functional tests since joining MMYM (counts).

	N (total)	Much better/ somewhat better	About the same	Somewhat/ much worse	(Not applicable – do not do)
Activities of daily living					
Moderate intensity activities	39	19	17	1	2
Vigorous intensity activities	40	14	19	0	7
If wheelchair user, moving in/ out chair	5	1	4	0	-
Lifting or carrying groceries	39	18	18	1	2
Heavy gardening	39	7	22	1	9
Light gardening	39	15	20	1	3
Climbing several flights of stairs	39	10	24	1	4
Climbing one flight of stairs	39	16	20	1	2
Bending/kneeling/ stooping	40	21	16	1	2
Walking for more than one mile	40	18	17	1	4
Bathing or dressing	40	14	24	1	1
Functional tests					
Shoulder mobility	29	23	6	0	-
Back of thigh	29	22	7	0	-
4 point balance	29	18	10	0	1
30 s chair rise	29	20	9	0	-

spend on the internet following their participation in MMYM. 5% (n=2) would require ongoing support to access MMYM daily.

Qualitative interviews

Semi-structured qualitative interviews were conducted with 8 participants who took part in MMYM (mean age 70.7 years, SD = 6.7; age range: 63–79). One participant had a family carer who was present during the interview. Seven (88%) participants were female, 3 (38%) were living on their own, 7 (88%) were either retired or not working at the time the interview was conducted.

Interviews lasted on average 29.7 min. Five themes (Figure 1) and associated subthemes emerged from the framework analysis (see Appendices 5 and 6 in

Supplementary Data for theme categorisation and associated quotes from the interviews and the survey open question).

Themes, linked in with TPB, were found around motivation to engage in physical activity intervention, elements of MMYM that impacted on the individual's control beliefs and discouraged and/or promoted their level of participation, perceived benefits following involvement in MMYM, and the level of digital literacy and how new knowledge was acquired through participation. A final theme was reported around the long-term effects experienced by participants in terms of habit formation to continue physical activity and external variables that could impact on long-term commitment to exercise engagement. A substantial level of inter-rater agreement was found ($k=0.80$) in the coding of interviews.

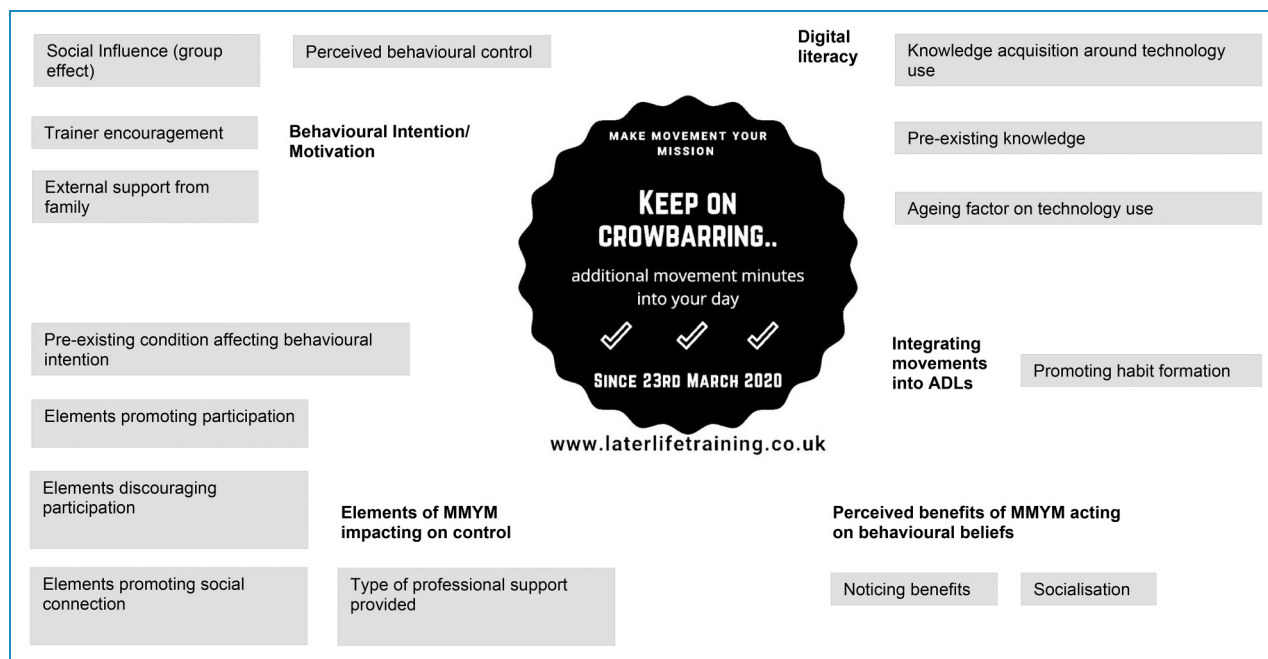


Figure 1. Themes, linked in with theory of planned behaviour.

Behavioural intention/motivation (theme 1)

From the available cases, participants' engagement in physical activity was influenced by motivational drives. Their engagement was dependant on whether the physical activity was perceived of as easy or difficult to undertake, the presence of social pressure to motivate the person to train as part of a team and whether the trainer employed strategies to encourage physical activity. Pre-existing morbidities could affect the extent to which the person could engage in movement snacks.

As described by a participant, there was an individual sense of control over physical activity levels, a drive to attend the sessions regularly to avoid sedentary behaviours:

'I do now, I am very strictly three times a day and I set an alarm so that I don't miss it. So to start with I was definitely, 100 per cent always do the eight o'clocks and then work would get in the way with 12 and the fours. But I need to be getting up, I really don't want to be sat at my laptop too much.' (Participant 8, Female, 64 years old)

'I think MMYM has taught me the value of short bouts of movement, and that the few minutes you might take to do some movement while waiting for your tea to cook has value.' (Participant 2, Female, 79 years old)

A group-effect acted on individuals' motivation for exercise engagement. A subjective norm based on the belief that important referent team members, also participating in

MMYM, could approve or disapprove of each individual's level of participation:

'...I mean, you might not always say something yourself, but you're looking on to see what other people are saying and what they're doing. It is interesting. It is something to look forward to, yes...' (Participant 1, Female, 77 years old)

The more the participants felt that the opinion of other participants mattered to them, the stronger seemed to be their sense of responsibility to attend the movement snacks. A normative belief or sort of sense of camaraderie was established in some cases for activity participation:

'So, it's been great to be part of this because although you don't know everybody else that's on there, there's camaraderie as well and you can say about the weather or you've been doing a certain job and other people will comment on it as well, so you feel part of a wider network. That's been brilliant.' (Participant 4, Female, 71 years old)

'I have enjoyed interacting with the team and other participants'. (Participant 30, Female – 74 years old)

"great rapport with fellow snackers. Being a part of this group has inspired me to keep moving with awareness of the benefits". (Participant 15, Female, 66 years old)

At times, the social norm was perceived so intense that it could lead to feelings of guilt if the person did not attend the movement snacks:

'And I feel guilty when I don't attend, because I feel that I'm letting them down for all their wonderful work that they're doing. And it's not just the physical side it's the mental side.' (Participant 5, Female, 70 years old)

Other times, social pressure created such a strong expectation in the person, that they decided to opt out of MMYM. This was the case of a husband of one of the participants who tried to attend one movement snack, but who felt that group participation clashed with his private nature:

'... I tried to get him involved, he's decided it's really not for him. He likes to be quite anonymous and I think [trainer] picked up that he was there and tried to get him to interact, but he wasn't having it and he just didn't. He did it for a week or so and then he tailed off...' (Participant 8, Female, 64 years old)

It was fairly shared across participants that their motivation to take part in the movement snacks was promoted by the having support from their family members, and from the strong encouragement they received from the trainers:

'... the enthusiasm of the instructors comes across as well... they're not reading from a script. They're engaging with you, you know.' (Participant 3, Male, 78 years old)

Motivation could be affected by the presence of existing morbidities. Having physical impairment affected the quality and level of participation in MMYM:

'Because they do say when we get to, during the sequence specifically in the morning, now we're doing, extend your legs and that sort of thing. I can't do that and they say, go round and, do another round, I'm afraid I never do. I always try and stay to the end and I might just do some kicking. But I can't do, scrunching my toes and that sort of thing.' (Participant 5, Female, 70 years old)

Some participants noted, however, that having mobility issues should not necessarily act as barrier to physical activity engagement, as instructors offered alternative movements:

'I enjoy the care that they take in giving the explanations for people to adapt to what they can do, because I gather there are people having a range of movement possibilities, so I think that's very useful for the instructors to pay attention to that. So it's really about enjoying and the feel that

these movements are useful.' (Participant 6, Female, 64 years old)

Elements of MMYM impacting on control beliefs (Theme 2)

This second theme refers to any elements related to MMYM that participants felt that encouraged and or discouraged their participation and increased physical activity levels. Contrary to behaviour intention, where motivation was promoted or discouraged by individual's control beliefs about MMYM and perceived level of support, this theme is specific to the elements of the intervention that influenced participation.

What eased activity engagement, was the level of accessibility to movement snacks that were offered to participants. For some participants, accessibility was associated with a degree of flexibility or freedom to take part in the sessions without disrupting their morning routine:

'... To be honest with you, most of the eight o'clock in the morning is done in my pyjamas, basically.' (Participant 3, Male, 78 years old)

For others, being able to choose their degree of involvement in the snack session or social zoom events, meant they could exert autonomous decision making when exercising:

'...I know when we did the Grinch, I mean I tuned in, but I had told [trainer], don't you give me a speaking part, I couldn't have done that. But then when it came to the next one where we were doing the hand movements and head movements, I really enjoyed participating in that one, because you didn't have to say anything...' (Participant 4, Female, 71 years old)

Still some participants described accessibility in terms of creating a friendly environment open to people experiencing reduced mobility:

'Because considering it was paralysed and I am moving it, it encourages me to try and get the impossible done. So I manage to do the hard bits as well. I like that as well because it encourages me to do better.' (Participant 2, Female, 79 years old).

Final comments on accessibility were made in terms of reaching participants living in far geographic locations. As a participant explained, living in:

'a rural location and not close to anything...I would have to drive five miles to a class and a lot of classes are during the day when I'm working so access isn't brilliant. So for me this has been an absolute lifesaver, Make Movement Your Mission, yeah.' (Participant 8, Female, 64 years old)

Having a briefing around the movements was key to promoting safe and informed physical activity session:

'I like the way that everything is explained. Because in the past you might have done some of the movements but not really understood what benefits they had to you then. So, I've enjoyed learning that while I'm doing something. I mean it's like when you go to yoga, you might do certain things that they tell you how to do, but they don't tell you what benefits there are or why you're doing it.' (Participant 4, Female, 71 years old).

Although it was very well received among participants, some commented on how some elements of the MMYM intervention seemed to discourage participation. One participant noticed that the movement snack seemed to last longer over time:

'if you take in the preamble it's really often, some take longer than others, it's about half an hour. Whereas when we started it was 15 min, [instructor] is really good on the timekeeping, so it was quite a short, sharp thing. But this thing is sort of slightly extended now.' (Participant 7, Female, 63 years old)

Another participant reported on the fact that catch-up video sessions on YouTube or Facebook, for those who missed the online broadcast session, could be difficult to attend as it would require some dedicated time to it, and there was less incentive to join:

'Yeah, and catch-up is a good way, but then it's like if you lose the...I've got to make a slot for that to become a routine to get the catch up, and I haven't managed to do that. So, yeah.' (Participant 7, Female, 63 years old)

The same participant felt that the very nature of the movements broadcast, may be very different from exercises people may expect to find in a gym session, and this may put off some people who believe that they need to exercise more intensely:

'...there's something to do with the exercise, that they're expecting exercises, and that these movements are movements, but that's not to say they're not actually making your muscles and everything, you know, they are things that are making areas of your body work. And the posture is the thing, like the coat hanger for the clothes, if that's not right, then nothing else is going to be right. So, some friends have done it a lot, for a bit, and then stopped.' (Participant 7, Female, 63 years old)

Participants commented on how the intervention promoted a sense of community belonging, even if remotely delivered. Being immersed in a group live broadcast,

saying 'hello' and what the weather is like and what people are doing later, in the 'preamble' before snacks start, and having the opportunity to share their own experiences, hobbies and interests, through the use of chat on the Facebook page of MMYM, was regarded by participants as creating a strong social connection:

'Yes, I think it does. Yes. I mean, you might not always say something yourself, but you're looking on to see what other people are saying and what they're doing. It is interesting. It is something to look forward to, yes. But it's a very important part of the exercise programme is the preamble.' (Participant 1, Female, 77 years old)

Finally, having a direct interaction with the instructor maximised engagement, as participants felt they were taken care for by dedicated and professional trainers throughout their involvement:

'And I will also, I really want to bring in the psychological aspect of it, if you don't mind. Because again, their personalities are so wonderful. They don't know us, but you feel as though they do because they reach out and the comments and there's interaction, they're dedicated, they're absolutely dedicated. They take the trouble to go back to the comments and reply.' (Participant 5, Female, 70 years old)

Perceived benefits of MMYM acting on behavioural beliefs (Theme 3)

This theme referred to the perceived benefits that participants experienced from taking part in movement snacks and MMYM online interaction as a whole. These benefits were mostly related to physical activity.

Noticing benefits following participation helped boost confidence in participants, potentially encouraging their level of engagement in physical activity. Participants commented on how positive outcomes were noticeable shortly after the start of their participation in MMYM:

'Yeah, I mean I noticed that I'm certainly more flexible than I was. I'm able to do tasks round the house better, yeah. I mean when I go walking I'm finding I'm better when I'm out walking. I think it's your posture is better, so therefore you're thinking about it then, without realising you're thinking about it I suppose.' (Participant 4, Female, 71 years old)

For some participants, alongside physical activity engagement, MMYM was experienced as alternative solution to counteract the social isolation imposed by lockdown procedures during the COVID-19 pandemic:

'We've been stuck indoors...We kept religiously to what we're supposed to do. Since January, MMYM's been like a little light flicking on over me.' (Participant 3, Male, 78 years old)

Digital literacy (Theme 4)

This theme referred to participants reporting on how they acquired more knowledge on the use of technology over time, how having pre-existing knowledge about using digital services has helped in taking part in MMYM, and how ageing is associated with having more problems accessing technology.

Participants maintained that technology use is a must-have knowledge to prevent social isolation:

'No, I think technology is important and I think we've got to move with the times. All the grandchildren, that is the way that I contact them really. They're all away, you know, all over the country and they're all on Facebook and Messenger and WhatsApp. So, that's what we have to do.' (Participant 6, Female, 64 years old)

An age effect on technology use was reported by participants as limiting participation to online services:

'...the youngsters are growing up with it and are au fait with it whereas we old people we have got to learn it and we haven't learnt it as we go along and I think elderly people...I have got a sister-in-law who is 92 and she can't understand any of it. If you are that end of the scale age wise it is not helpful.' (Participant 2, Female, 79 years old)

Integrating movements into ADLs (Theme 5)

This theme refers to habit formation and in what ways MMYM had helped participants integrate the movements into their activities of daily living:

'Oh yes, yes, definitely. For example, I have learned to pay attention to the way I do the movements when I do tasks in the garden, for example. So I pay attention to the way I use my wrists or when I do gardening and I kneel or I bend over, I pay attention. I know now that my thighs are strong enough for me to do the squat instead of bending my back over, things like that, so that has helped, yeah.' (Participant 6, Female, 64 years old)

Mapping the MMYM context, implementation process, reach, participant engagement and consequent changes in physical activity, physical function, quality-of-life and social health was the final stage, where data from the

survey and from the qualitative interviews were triangulated (Table 4).

Discussion

The MMYM digital health initiative aimed to promote engagement in physical activity in older people experiencing social restrictions during the COVID-19 pandemic. No participants reported a decline in physical function over the year that they participated in MMYM and many reported increased physical activity and improved mental, social, functional and physical health.

As a result of the pandemic, older people reported a considerable reduction in strength and balance activity, with the greatest reduction reported in the 70–74 age group with 45% of males and 49% of females reporting a decrease.³⁰ Against this trend, 90% of MMYM participants reported more movement minutes (light activity), an additional 3.5 h/week and an increase in time (over an hour a week) spent in strength, balance and flexibility activities since starting MMYM. One year on from starting MMYM, 83% meet strength guidelines and 85% meet balance guidelines of $\geq 2 \times$ per week, more than 40% are now doing these activities on at least 5 days of the week.

In terms of physical function, no one reported worsening of function since restrictions began. This is also very different from reports from a number of sources. Data from a survey, of 1364 people over the age of 60 in Aug/Sept 2020, showed that 25% of respondents were not able to walk as far as they used to, 20% reported feeling less steady on their feet.³¹ The decline in function was more pronounced in people with long-term health conditions with 43% of people unable to walk as far compared to 13% of people without a long-term condition.³¹ Around 40% of individuals with dementia reported deterioration in their functional abilities.³²

Those who took part in MMYM were not just the healthiest older adults. 39% of MMYM were living with a long-standing illness or disability yet 73% of respondents had been taking part in MMYM for more than a year, 46% taking part in at least 2 snacks a day, 7 days a week. None of the activity in MMYM is strenuous and the emphasis is on light activity, not moderate intensity activity, which may be more appropriate for those that may live with fatigue due to their conditions. The value of light activity was given more prominence in the updated PA Guidelines, as increasing light activity can improve function and health, especially if it replaces sedentary behaviour.²⁹ In line with evidence on fall prevention and functional health, the very nature of online delivery of MMYM enabled participants to safely execute light exercises in small indoor spaces.³³

A large proportion of MMYM respondents felt they had improved their physical literacy as a result of MMYM and most were confident they had a better understanding of their

Table 4. Mapping evaluation of the MMYM initiative.

Outcome measure	Definition	Data source	Key findings
Context of the MMYM initiative	Barriers and facilitators influencing the delivery of MMYM	Discussion with instructor and trainers delivering MMYM prior to delivery.	Facilitators: Trained exercise instructors delivering facilitating short physical activity sessions online, free to access, within people's homes, and interacting through Facebook (FB) comments before and after the movement snacks. Saves travel time for instructors and participants. Barriers: Not available to individuals with no access to or knowledge of internet or digital devices. English language as only medium for delivery.
Implementation process	Resources in place essential for MMYM to be delivered	Study records	3 instructors delivering freely accessible online MMYM movement 'snacks' three times daily (at 8am, 12 noon; 4pm) lasting 10-20 min each. Facebook Group and YouTube Channel. Instructors paid by company. Free to participants with internet access/WiFi. No exercise equipment required.
Reach	Number of participants receiving MMYM	Routinely recorded as participants access MMYM	A total of 4000 registered on the MMYM Facebook Group (as of Aug 2021). 524 subscribers on YouTube (as of Aug 2021) up to 600 views per video 30-60 people view live each snack, 150-200 catch up each snack
Participants' engagement	Levels of participation and engagement of participants	Survey data	Attendance/adherence 29 (73%) participated for 12-14 months. 35 (83%) often/always engaged with instructor/other members through messages on FB. No obvious preferences for morning, midday or afternoon sessions. 46% attended at least 2 daily snacks per week, 73% at least one daily snack per week. 10 (24%) took part in the sessions with members of their household. 24 (59%) connected with friends or family members through online MMYM sessions.
Physical activity levels	Amount of physical activity per week and proportion meeting PA guidelines*	Survey data and qualitative interviews	Physical Activity (n = 40) 36 (90%) reported doing more overall movement (light intensity) on a typical day than before starting MMYM. Strength activities (n = 40): 33 (83%) meet PA guidelines for doing strengthening activities $\geq 2x$ per week 17 (43%) did strengthening activities ≥ 5 days a week. 29 (48%) did more strengthening activities now compared to before joining MMYM.

(continued)

Table 4. Continued.

Outcome measure	Definition	Data source	Key findings
Health and Quality-of-life (QoL)	Perceived physical, mental health and overall quality-of-life (before and after joining MMYM)	Survey data and Semi-structured interviews with participants	<p>Balance activities (n = 40): 36 (90%) meet PA guidelines for doing balance activities \geq 2x per week. 19 (48%) did balance activities \geq 5 days a week. 29 (73%) did more balance activities now compared to before joining MMYM.</p> <p>Flexibility activities (n = 40): 37 (93%) meet PA guidelines for doing flexibility activities \geq 2x per week. 26 (65%) did flexibility activities \geq 5 days a week. 30 (75%) reported doing more flexibility exercises since starting MMYM.</p> <p>Monitoring progress (n = 40): 13 (33%) reported recording often or always their progress. 14 (50%) used the Later Life Training iCAN calendar to record their progress.</p> <p>Mechanisms encouraging activity levels: Receiving informative instructions and recording progress was reported by participants as making them more aware of the benefits of physical activity for balance and posture. The repeated sessions of snacks over the week and prompting to do activities in between snacks promoted continuous participation. The movement snacks promoted a routine formation and helped integrate movements in their ADLs.</p> <p>Mechanisms discouraging activity levels: Having a physical or mental morbidity could affect the quality of performance and engagement. Although seated options always offered, specific seated snacks were only once a week or on YouTube (not live).</p>
Health and Quality-of-life (QoL)	Perceived physical, mental health and overall quality-of-life (before and after joining MMYM)	Survey data and Semi-structured interviews with participants	<p>General Health and Quality-of-life (n = 40) 22 (55%) reporting their general health as being much/somewhat better than before they joined MMYM. 21 (53%) reported their quality-of-life as being much/somewhat better than before they joined MMYM.</p> <p>Mechanisms of MMYM on QoL: Participation in the movement snacks boosted participants' confidence, showed them what they could do despite their health conditions (through comments and instructor comments), helped them being more socially stimulated and avert the consequences of sedentary life and lack of companionship during the pandemic.</p>

(continued)

Table 4. Continued.

Outcome measure	Definition	Data source	Key findings
Social engagement	Level of social contacts and quality of interaction established during participation in MMYM	Survey data and Semi-structured interviews with participants	<p>Loneliness and Social Isolation (n = 40) 30 (75%) agreed/strongly agreed that their involvement in MMYM reduced their overall feeling of loneliness. 28 (70%) agreed/strongly agreed that their involvement in MMYM reduced social isolation.</p> <p>Mechanisms of MMYM on social engagement: The social element of MMYM (comments and photos shared on the MMYM FB page) maximised participation and helped avert the consequences of social isolation as people felt they were 'meeting' new people and some 'met' with family or friends at the snacks. Barriers: Very private people could be put off by group engagement, especially if asked to engage in comments by the instructors (when a new name appeared on live broadcast).</p>
Technology use	Perceived level of digital literacy and access to MMYM	Survey data and Semi-structured interviews with participants	<p>Access to MMYM and use of the internet 2 (5%) require support (e.g. computer use, encouragement) to take part in MMYM. 38 (95%) reported using the internet every day or almost every day. 11 (28%) reported having increased their use of the internet following their participation in MMYM.</p> <p>Mechanisms of MMYM on technology use: MMYM in some increased use of the internet and technology awareness (how to best use FB etc). Barriers: Some reflected on how ageing can affect access to technology and potentially reduce opportunity for activity engagement.</p>
Adaptations	Changes required to MMYM delivery to match demands posed by context	Discussion with instructor and trainers delivering MMYM post intervention.	No adaptations were made to the intervention. ²

(continued)

Table 4. Continued.

Outcome measure	Definition	Data source	Key findings
Mechanisms of impact	Participants' perceived benefits and pitfalls of MMYM	Survey and Semi-structured interviews with participants	<p>Physical Function and ability to perform ADLs</p> <p>None reported experiencing worsened abilities following involvement in MMYM.</p> <p>Reported as 'much' or 'somewhat' improved in ability to perform moderate and vigorous exercise and all asked aspects of ADLs, including walking and climbing stairs (18-53%)</p> <p>Reported improvement in 4 functional tests (shoulder mobility, back of thigh flexibility, 4-point balance and 30 s chair rise test (62-79%).</p> <p>98% (40 out of 41 responses) reported they would continue MMYM after restrictions are lifted.</p> <p>83% (33 out of 40 responses) reported they would attend at least as many sessions or more as they have during the pandemic.</p>
			<p>Mechanisms impacting on perceived effects of MMYM: Noticing short-term outcomes in balance and posture encouraged continued participation in MMYM. Having a direct support from MMYM instructors helped performance and increased participants' motivation to engage. Online group sessions create a group-effect on motivation and increased activity levels, as participants feel that maintaining certain activity levels is the norm for the group (social norm) and see what others can or do achieve.</p> <p>Barriers: Movements snacks becoming longer could discourage participation as it would take away the benefits of the brief sessions (a few perceived sessions were longer than they were at the start). The catch-up sessions were 'dry' compared to live broadcast sessions, and attendance to the catch-up session would require participant to find time/motivation to attend.</p>

Key: * PA Guidelines for Health, UK [29].

physical body and health. Their quotes relay the importance of physical literacy to changing habits and behaviour. There is limited involvement of health care providers in the concept of physical literacy, little research in physical literacy and older adults, despite physical literacy being linked to physical activity, sedentary behaviour and cardiorespiratory fitness.³⁴

In addition to the physical activity and function decline effects of the pandemic restrictions, there were many reports of increased anxiety, depression and social isolation. Loneliness, anxiety, and depression were all higher amongst older adults who shielded and older adults with multiple morbidities than those with better health.³⁵ However, more than half of MMYM respondents said they had better quality-of-life since starting MMYM at the start of the pandemic, three-quarters felt that MMYM had reduced their feelings of loneliness and almost as many that it reduced their feelings of social isolation.

Evidence around the effectiveness of the components of behaviour change within MMYM have long been established in the literature on previous intervention studies.³⁶ In particular, self-monitoring and feedback have been associated with increased activity levels in participants.³⁷ These motivational tools, and prompts, acting on individual's motivation, favoured goal attainment. In line with the TPB, the person's decision to attend the movement snacks, or physical activity sessions in general, may be influenced by a checks and balance principle for behaviour intention/motivation, a decision informed by intrinsic motivations and external variables promoting or discouraging participation. In MMYM, the person is provided with tools to self-monitor their progress (i.e. iCAN diary or verbal prompt), is encouraged to use the messages for instructor's feedback (i.e. the use of Facebook chats), the group performing alongside them help create a social norm encouraging activity engagement and goal attainment, the person's perceived behavioural control may lean towards the ease of performing the physical activity.

Use of technology amongst older people has to be considered when designing and implementing an online intervention. 95% of MMYM respondents were using the internet daily and only 2 required help to connect from family members for each session. This is not representative of technology use among older people living in the community in the UK. The use of the internet in adults in the UK is around 92%, declining with increasing age.³⁶ The Office of National Statistics has shown a marked increase in the proportion of those aged 75 and over who are recent internet users, doubling from 29% in 2013 to 54% in 2020.³⁸ The pandemic spurred many more people to get online or to use the internet in new ways compared to before the outbreak.³⁹ The use of MMYM in those who are less confident in interacting with technology has not been assessed.

There are limitations to this evaluation, not least that this was a convenience sample of people who had been with

MMYM for some time and had remained with the initiative. Many people chose not to take part in the survey and many more people have joined MMYM and then not appeared regularly on the live broadcasts. The responses here are therefore from those who valued it and wanted to let others know. Nearly all respondents were white and well educated, most were women. This means that the initiative did not appear to attract others and perhaps only those who are already interested in their health and fitness so its value at reducing health inequalities is not huge. However, for those that do participate, including many with multiple and disabling chronic conditions, there is a strong sense of community and group cohesion, friendly banter and more importantly, sustained physical activity engagement and a positive future health and independence trajectory.

Developing age-friendly online services for physical activity and rehabilitation require knowledge promotion on digital use and the need for an instructional scaffolding to maximise user experience. Large scale implementation of digital health initiatives, however, requires technology innovation and improved user knowledge towards telehealth and healthcare digitalisation. Further demands are posed to physical therapists and training instructors on implementing digital practice for physical rehabilitation when social restrictions are lifted, post-COVID-19 pandemic. A digital competency framework has recently been published by Health Education England to support Allied Health professionals on 10 digital competency domains,⁴⁰ continuous support, however, is needed with a focus on what teams/health professionals may need over time across domains to enable them to engage with and promote digital health practice.⁴¹

Conclusion

This mixed method formative evaluation of MMYM showed that participants taking part in MMYM during the pandemic increased the amount of light physical activity and the amount of people achieving strength and balance activity guidelines. By providing behaviour change support and improving physical literacy participants experienced improvements in physical function, quality-of-life and ease of performing ADLs, along with reductions in loneliness and social isolation. The MMYM initiative is still ongoing and warrants a clinical trial to robustly assess effect and acceptability.

Ethics

Ethical approval was granted by the Proportionate University Research Committee (UREC) at the University of Manchester [Ref:2021-11259-18280 19/03/2021].

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