A National Covid-19 Resilience Programme:

Improving the health and wellbeing of older people during the pandemic

The Physiological Society

Centre for Ageing Better

Expert Panel

Co-chair: Professor Paul Greenhaff
University of Nottingham

Co-Chair: Dr Alison Giles
Centre for Ageing Better

Professsor Charlotte Bolton
University of Nottingham, UK

Dr James Faulkner
University of Winchester, UK

Professor Carolyn Greig
University of Birmingham, UK

Professor Stephen D.R. Harridge
King's College London, UK

Dr Danielle Lambrick
University of Southampton, UK

Professor Susan Lanham-New
University of Surrey, UK

Professor Daniel Martin
University of Plymouth, UK

Professor Hugh Montgomery
University College London, UK

Dr Zoe Saynor
University of Portsmouth, UK

Professor Dawn Skelton
Glasgow Caledonian University, UK

Professor Sally Singh
University of Leicester, UK

Dr Richard Siow
King's College London, UK

Dr Claire Steves
King's College London, UK

Professor Claire Stewart
Liverpool John Moores University, UK

Professor Mike Tipton
University of Portsmouth, UK

Dr Julie Whitney
King's College London, UK

Please note that the views expressed in this report should not be attributed to any individual member of the Expert Panel or their institution.

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Professor Michael Joyner
Mayo Clinic, USA

Professor Bridget Lumb
University of Bristol, UK

Dr Mary Ni Lochlainn
King's College London, UK

Professor David Paterson
University of Oxford, UK

Dr Ellen Thompson
King's College London, UK

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Contents

Executive summary

Covid-19 poses a significant threat to the health and wellbeing of older people. The risks of serious illness requiring hospitalisation and dying both rise with age.

Moreover, measures to lessen the risk of suffering from Covid-19 such as lockdowns and shielding can make it harder for older people to stay active. Physical activity is an important factor in staying healthy and is likely to play a role in Covid-19 resilience. Lockdowns can also have a detrimental effect on the mental health and wellbeing of older people.

The Physiological Society and the Centre for Ageing Better brought together physiologists, nutritionists, geriatricians, physiotherapists and clinicians to discuss three critical areas where the impact of the pandemic and lockdown on older people required greater consideration.

What happens to an older person during lockdown or shielding?

Home confinement in older people may cause (i) cardiorespiratory and metabolic deconditioning, (ii) insulin resistance, (iii) muscle loss and (iv) increased fat mass. In addition, social isolation may be worsened.

How do Covid-19 risk factors relate to age?

Covid-19 disease severity rises with age and is also associated with comorbidities, such as obesity, diabetes and coronary vascular disease, that can accompany chronological age. Physical frailty is associated with poorer outcomes.

What are the physiological challenges to address as older people recover from Covid-19?

Covid-19 can cause or worsen frailty indirectly, e.g. deconditioning, or directly, e.g. lung disease, muscle wasting and neurological impacts. Mental health may also suffer, and needs for rehabilitation and mental health support may be quantitatively and qualitatively different from those of people who are younger. Risk of "long Covid", where people experience long term effects of Covid-19, is greater in women and rises with age and with body mass index (BMI).

A National Covid-19 Resilience Programme

In the absence of vaccines and treatments, physical activity (with tailored exercise or physical activity goals) represents the single most impactful way in which older people can reduce the risk of developing severe Covid-19, improve recovery, and limit deconditioning and frailty from home confinement.

We also recommend (i) clear guidance about the benefits and nature of a healthy, balanced diet containing sufficient levels of protein, with a balanced energy intake, and (ii) preventative and mitigative strategies to address mental health impacts. Older people will need to be supported to achieve these goals through clear advice and tools tailored to their needs. These actions will be especially important over winter months, when access to outdoor activity is already limited.

We thus call upon UK public health agencies to launch a National Covid-19 Resilience Programme to support older people through the pandemic and to keep them healthy over the winter. This should:

- Encourage appropriate exercise and physical activity;
- Support optimal nutrition;
- Enhance mental health and wellbeing;
- Support behaviour change to embed these behaviours.

This programme might be supported by a digital platform and by national broadcasters, e.g. regular televised activity classes.

Introduction

Covid-19 affects multiple organs and can manifest with different patterns and severity of disease. The risk of serious illness or death from Covid-19 rises with age. Mitigation measures such as lockdown, shielding (where older and vulnerable people are encouraged to stay indoors) or personal choice to limit leaving the home, reducing potential for exposure to the virus, can also have indirect physiological effects, for instance by making it harder for older people to exercise outdoors. Closure of places to meet, such as churches, cafes, social clubs and day centres, also mean they are likely to spend more time at home.

A physiological approach can help us understand how to reduce the risks to older people posed by Covid-19 itself and by the impacts of lockdowns. This is particularly important as we enter winter, when physical activity levels traditionally fall, comorbid disease states can worsen and other viral infections become more prevalent.

The following report is a joint initiative by The Physiological Society and the Centre for Ageing Better in order to address three questions:

1. What happens to a healthy older person during lockdown or shielding?
2. How do Covid-19 risk factors relate to age?
3. What are the physiological challenges to address as older people recover from Covid-19?

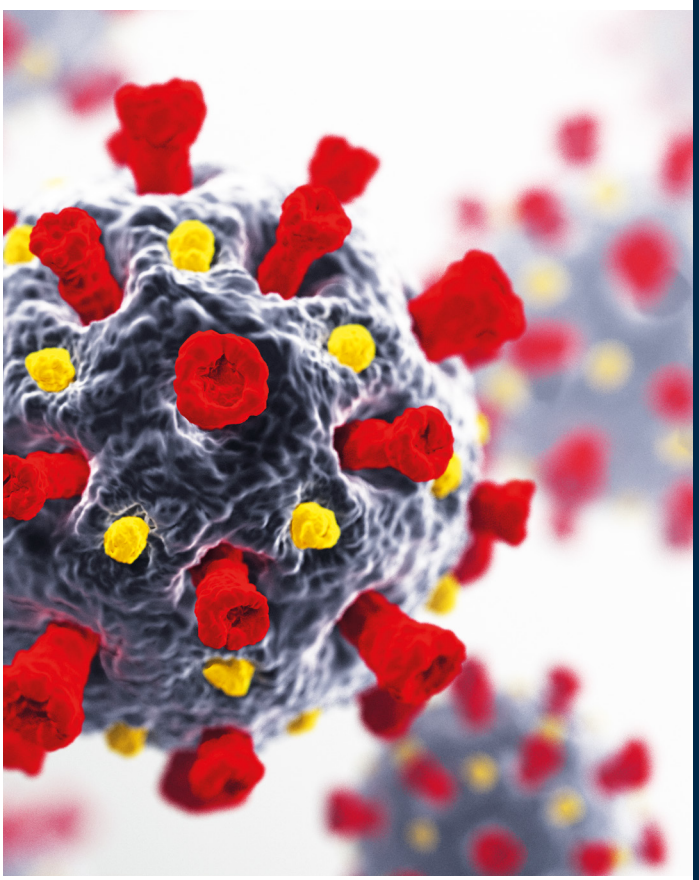
It draws together contributions from physiologists, nutritionists, geriatricians, physiotherapists and clinicians working on the front line of the pandemic. These experts contributed to three workshops and a series of accompanying interviews. Additional evidence was obtained through polling of older people carried out by YouGov about how the pandemic has affected aspects of their lives to date.

We conclude by making recommendations which address each question and by providing a set of overarching public health recommendations. These are not intended to be exhaustive, but instead to point towards areas where there is greatest potential to improve outcomes for older people.

The conclusions and recommendations are current as of November 2020, but we will continue this dialogue with experts and clinical professionals to understand how the evidence base changes over time.

Although this report identifies some negative physiological consequences of lockdown and shielding, it is not intended to criticise such strategies. Viral transmission to older people should be minimised, given Covid-19's disproportionate impact on them. Rather, the report focuses on how best to mitigate these negative impacts, whilst also reducing the risk of suffering severe disease.

Please note that the evidence for this report was gathered before the UK Government announced that a new lockdown would be imposed across England on 5 November 2020. While we do not therefore comment on the specifics of this new lockdown, we hope that our recommendations will be helpful in mitigating the negative impacts of these restrictions on older people.



CHAPTER 1 | UNDERSTANDING

Understanding the attitudes and behaviour of older people during the pandemic

During October 2020, The Physiological Society commissioned polling company YouGov to explore how people aged 50 years and over in the UK had experienced the lockdown and the pandemic. The poll was conducted online, and 2,226 people (53% female) participated. Of the participants, 49% were aged 65 or over and 50% were retired; 62% were married or in a civil partnership and, while 89% had no children living at home, 45% were grandparents. Overall, 68% were in the ABC1 social grouping – a higher proportion than the 57% of the entire UK population who are in this category (YouGov, 2019).

The responding sample is weighted to the profile of the sample definition to provide a representative reporting sample. The profile is normally derived from census data or, if not available from the census, from industry accepted data.

1.1 What has been the experience of older people so far during the pandemic?

We asked about exercise and physical activity levels, mental wellbeing, fruit and vegetable intake and what actions to maintain health participants thought would be most effective. The results showed that while the fruit and vegetable consumption habits of those polled were unchanged during lockdown, physical activity levels and mental wellbeing were affected.

Almost one in three people polled (32%) said they had done less physical activity (walking, sport, exercise, housework or moving around as part of their job, if working) during the UK's first national Covid-19 lockdown period (23 March – 4 July 2020) than during the period before the lockdown was brought in. Of those, 43% said that this was because they no longer had a reason, or had less reason, to get out of the house and be active; 32% were worried about catching Covid-19; and 29% reported lacking motivation to exercise. This compared with 28% reporting doing more physical activity than they had in the period before lockdown and 38% who said their activity level was about the same.

When asked to compare their levels of physical activity since the first national lockdown ended (after 4 July 2020) with their activity levels pre-lockdown, 36% said their physical activity levels were lower. This was most marked in the 75 and older age group, where 42% said they were less active. This compared with 25% who reported doing more exercise, and 38% who said they did about the same amount. Four in five (80%) of those aged 50 and over reported spending more time at home compared with the same period last year, with 59% saying they were spending much

more time at home. This finding is supported by unpublished data from the Covid Symptoms Study App, where older adults (aged over 60) reported a significant decrease in their physical activity levels post lockdown.

The pandemic also appears to have had a detrimental effect on the mental wellbeing of older people. Of those polled, only 6% reported feeling nervous, low, anxious or on edge every day before the first national lockdown; however, this rose to 16% during the lockdown period, and 13% reported feeling nervous, low, anxious or on edge every day during the past month (September – October 2020). For the oldest category (aged 75 and over), the proportional increase was even more marked, with 3% reporting feeling nervous, low, anxious or on edge every day before lockdown, increasing to 11% during lockdown and 9% after lockdown.

1.2 Tailoring support and policy for future lockdowns and shielding

Those polled were asked to indicate which of a range of actions would help them to maintain their health, if there were further restrictions due to Covid-19 in the coming winter months. Participants were able to select more than one option.

The most commonly chosen options related to supermarket shopping. Reliable access to supermarket shopping may help support a healthy, balanced diet. The single most frequently selected option was "better availability of online supermarket shopping slots", which was chosen by a third of respondents overall (33%) and 37% of those aged 75 and over. The second most popular was "better availability of protected time

Figure 1: Please imagine there were further restrictions due to Coronavirus in the coming winter months...Which, if any, of the following actions do you think would help you to maintain your health? (Please select all that apply)

Total number of Participants: 2,226	Age (Years)				
	50-54	55-59	60-64	65-74	75+
Exercise programmes specifically designed for people my age, available online (e.g. via YouTube or other websites)	**20%**	**17%**	**17%**	**18%**	**16%**
Exercise programmes specifically designed for people my age, on main TV channels	**13%**	**15%**	**18%**	**23%**	**20%**
Exercise programmes specifically designed for people my age, on main radio stations	**3%**	**2%**	**5%**	**3%**	**4%**
Diet advice specifically designed for people my age, by email	**12%**	**9%**	**12%**	**12%**	**11%**
Diet advice specifically designed for people my age, by post	**3%**	**3%**	**4%**	**3%**	**5%**
Diet advice specifically designed for people my age, by text message	**4%**	**2%**	**3%**	**2%**	**1%**
Better availability of online supermarket shopping slots	**31%**	**28%**	**34%**	**36%**	**37%**
Better availability of protected times for people my age to use supermarkets	**6%**	**12%**	**16%**	**29%**	**31%**
Other	**15%**	**12%**	**15%**	**12%**	**11%**
Don't know	**34%**	**36%**	**26%**	**22%**	**22%**

All figures, unless otherwise stated, are from YouGov Plc. Total sample size was 2226 adults. Fieldwork was undertaken between 13th-16th October 2020. The survey was carried out online. The figures have been weighted and are representative of all UK adults (aged 50+).

for people my age to use supermarkets" (20% of those aged 50 and over; 31% of those aged 75 and over). It is not clear to what extent, if at all, lack of access to supermarkets has negatively affected the quality of older people's diets.

The third and fourth most popular options from the list of measures for both the full respondent group and those aged 75 years and over both related to exercise. "Targeted exercise programmes on main TV channels" was selected by 18% of respondents overall and by 20% of those aged 75 years and over. "Targeted exercise programmes available online" was selected by 18% of respondents overall and 16% of respondents aged 75 years and over. Online content was preferred over radio content by both the full 50 and over group and those aged 75 years and over.

The polling suggests that a significant number of older people have reduced their activity levels in light of lockdown and shielding restrictions and concerns about avoiding exposure to the Covid-19 virus. Worryingly, the number of older people reporting feeling nervous, low, anxious or on edge on a daily basis increased during lockdown and had not returned to pre-lockdown levels following the lifting of strict measures.

On a more positive note, there appears to be a significant appetite across the full range of older age groups for online exercise content as well as for content provided via traditional media, with almost a fifth of respondents expressing an interest in TV-based and online programmes.

This suggests that a receptive audience exists for targeted interventions delivered to older people to mitigate some of the pandemic's worst effects on activity levels.

With significant proportions of the older people polled reporting decreasing activity levels and mental wellbeing, it is important to consider what impact this might have on Covid-19 resilience and how any negative effects of lockdown can be mitigated. The next section of this report explores in greater detail how the pandemic is impacting different aspects of older people's health and wellbeing and how some of these effects may be addressed.

CHAPTER 2 | MAINTAINING HEALTH

What happens to a healthy older person during lockdown or shielding?

There is marked heterogeneity in the extent to which older people are shielding, isolating or distancing. Not all older people are self-isolating or staying at home all the time, but many have significantly reduced their interactions with others and their time outside the house. This has the potential to reduce older people's activity levels.

2.1 What are the clinical and health risks to a healthy older person from staying at home more?

Four major risks were identified:

- Loss of cardio-respiratory fitness (e.g. maximal oxygen uptake decline) and muscle metabolic deconditioning (e.g. loss of muscle mitochondrial mass).
- Development of insulin resistance (impaired insulin mediated blood glucose disposal) and metabolic inflexibility (the ability to switch from fat to carbohydrate utilisation when fed carbohydrate).
- Decline in muscle protein synthesis in response to reduced activity levels, resulting in muscle mass loss.
- Energy intake in excess of metabolic demand (consuming more energy than the body requires), resulting in body fat mass gain.

These four phenomena are closely related to physical activity levels, metabolic resilience (the capability to respond to a physiological challenge) and nutrition, which are explored in greater detail below.

2.2 Physical activity levels

The World Health Organization defines physical activity as "any bodily movement produced by skeletal muscles that requires energy expenditure – including activities undertaken while working, playing, carrying out household chores, travelling, and engaging in recreational pursuits."

The term "physical activity" should not be confused with "exercise", which is a subcategory of physical activity that is planned, structured, repetitive and aims to improve or maintain one or more components of physical fitness (World Health Organization, 2018).

A decline in muscle mass affects strength, mobility and balance. Reduced physical activity or sedentary behaviour is defined as taking fewer than 5,000 steps a day (Tudor-Locke, et al., 2013). Very low step counts (1,413 per day)

can rapidly (within weeks) limit muscle growth, promotes muscle loss and impairs muscle glucose disposal (insulin resistance) (Breen, et al., 2013). More rapid and greater deficits are evident when an older person becomes completely immobile, with 3 days of muscle disuse in healthy adult subjects sufficient to significantly decrease muscle mass, tone and force (Demangel, et al., 2017) and with whole-body glucose uptake rate falling significantly after 7 days of bed rest (Mikines, et al., 1991). Immobilisation can include both bed rest and extended periods of sitting.

Low physical fitness is a risk factor for early mortality. Fit people who smoke and/or have elevated blood pressure or cholesterol levels have lower adjusted death rates than unfit people with none of these risk characteristics (Blair, 1996). Moreover, high amounts of moderate-intensity physical activity (60 – 75 minutes per day) seem to eliminate the increased risk of death associated with high sitting time (Ekelund, et al., 2016). However, there are risks associated with undertaking structured exercise regimes. As well as the potential for injury, mandating structured exercise can lead some people to compensate by decreasing the amount of non-exercise-based physical activity they undertake at other times (Kozey Keadle, 2014).

2.3 Who is most at risk due to staying at home more?

Those who are already more functionally limited may suffer the most. The combination of anabolic resistance, where the body is less able to build muscle protein from amino acids (Cuthbertson, et al., 2005), and lack of anabolic stimulus, resulting from inactivity (Breen, et al., 2013), can have dramatic functional consequences, perhaps tilting the balance from being just able to do something, e.g. rising from a chair, and not.

People who have arthritis or other conditions that affect mobility may have previously relied on swimming or non-weight-bearing exercise classes to maintain activity levels. Older people who are unable to exercise in the home or by walking are particularly vulnerable to deconditioning if exercise classes are cancelled to reduce virus spread or if they are unable to attend due to confinement in their home.

Frailty is a syndrome that combines the effects of ageing with the outcomes of multiple long-term conditions and a loss of fitness and physiological reserves. It is associated with decline in immune and endocrine function, sarcopenia (progressive and generalised loss of skeletal muscle mass and strength) and a proinflammatory state. Of people over 85 years of age, about one in four is living with frailty (The Physiological Society, 2019). The frail may be at greater risk of poor outcomes from Covid-19 and from the negative impacts of home confinement. For example, a frail older person may lose the motivation or confidence to get out of a chair – the British Geriatrics Society warns that loss of confidence is strongly correlated with objective impairment of abilities and higher falls risk (British Geriatrics Society, 2019).

2.4 Metabolic resilience and nutrition

Metabolic capacity declines with age, illustrated for example by a loss of muscle mitochondrial content, making it harder for muscle to respond as efficiently to a subsequent metabolic challenge such as climbing a flight of stairs (Broskey, et al., 2014).

As discussed above, physical inactivity also drives muscle wasting and increased insulin resistance (Narici, et al., 2020), while fat mass will increase in those who do not reduce calorie consumption to match reduced exertional expenditure. There is even some suggestion that behavioural responses in some people can cancel out the weight loss benefits of exercise – for instance, by increasing snack intake when exercising more (King, 2007). Obesity is associated with a low-grade inflammatory state, which may have negative effects on skeletal muscle (Murton, et al., 2015).

Although not specific to older people, a qualitative study of just 23 patients receiving obesity treatment in the Republic of Ireland suggested that the Covid-19 pandemic is having a negative impact on dietary behaviours, e.g. "comfort eating" and eating "out of pure boredom" (Grannell, et al., 2020).

2.5 Other health impacts associated with staying at home more

Management of pre-existing conditions such as heart disease, dementia, cancer or stroke may prove harder during home confinement, whilst patients may be reluctant to seek medical advice for new symptoms. For example, 53% of GPs responding to a recent Cancer Research UK survey said they were concerned that fewer older adults were contacting them with symptoms compared with before the pandemic (Cancer Research UK, 2020).

2.6 Mitigations

2.6.1 Physical Activity and Exercise Interventions

The potential benefits of physical activity and exercise are clear: as outlined previously, physical activity is a good approach for offsetting insulin resistance, increasing energy expenditure and stimulating bone and muscle synthetic rates (Narici, et al., 2020). Whilst just moving (not being sedentary) is of less benefit than more intensive exercise involving large muscle mass (Ekelund, et al., 2016) and whist high-resistance exercise will be more effective than light activity from the perspective of musculoskeletal health, some activity is better than none. It is less clear how older people

should go about exercising or how much exercise they need, especially if they are confined to their home and are worried about going outside.

Where an older person is able to exercise, a variety of options are available to support exercise in line with the UK Chief Medical Officers' Physical Activity Guidelines for older adults (National Health Service, 2019).

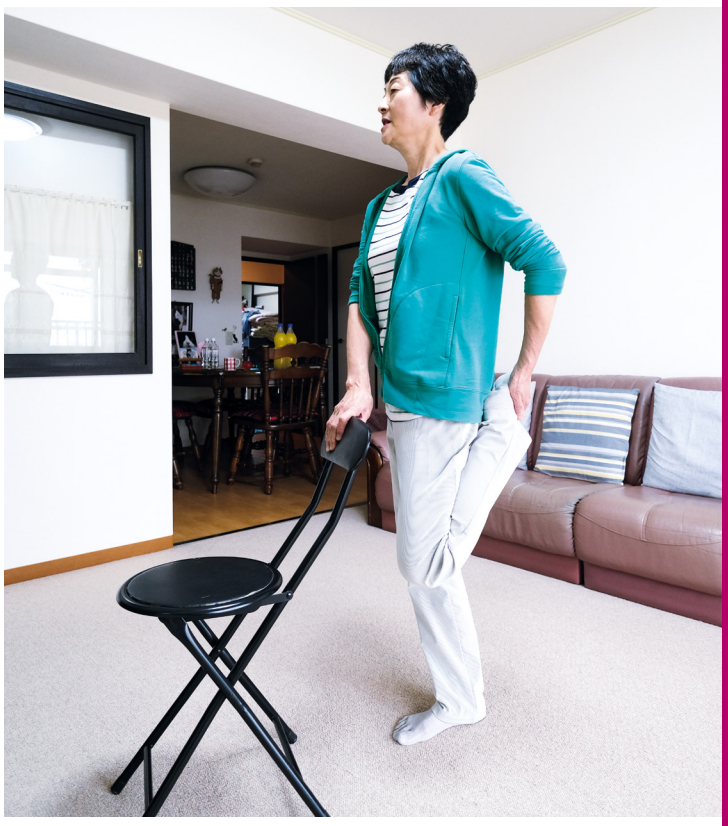
There are already several existing home-based exercise classes and resources designed for audiences with different needs. Examples are provided in figure 2 below:

Figure 2: Examples of existing exercise/ weight loss/movement programmes with relevance to older people

- Royal Osteoporosis Society exercise videos (Royal Osteoporosis Society, n.d.)
- NHS physical activity guidelines for older adults (National Health Service, 2019)
- Public Health England guidance on exercising at home (Public Health England, n.d.)
- Make Movement Your Mission YouTube videos and Facebook live content (Later Life Training Ltd, 2020)
- Keeping Well at Home (University of Manchester Healthy Ageing Research Group/ Greater Manchester Ageing Hub, 2020)
- How Fit Today online resource (How Fit Today, n.d.) (How Fit Today, n.d.)
- Falls Assistant online resource (Falls Assistant, n.d.)
- 10Today (Demos, 2018)

Recommendations for developing an online library of videos to address different components of fitness, levels of fatigue and frailty, motivation and adherence support, and pre-exercise assessment for those who have been in rehabilitation programmes have been published (Later Life Training Ltd, 2020).

There are also existing schemes that can be delivered in care home settings, such as an initiative where care home residents cycle on exercise bikes to access footage of places from



their childhoods on a screen (Hill, 2020). Home-based exercise programmes are likely to be particularly beneficial during the winter months when older people's ability to exercise will be affected by the shorter days.

Although digital exclusion is still an important consideration for older people, app-based exercise programmes are proving increasingly acceptable among this demographic. Indeed, our survey data showed that 18% of people aged over 50 would use exercise programmes delivered through YouTube or other web-based sources, and this level of engagement showed only a small decline as the age of respondents increased. Currently available physical activity and falls prevention apps include Nymbl, Keep On Keep Up, and Otago.

Older people appear to adhere to app use (at least in the short term), which may decrease sedentary time and increase physical activity and physical fitness (over three or so months). Recommendations for effective apps are that they should be theory-based, include behaviour change techniques, clear instructions and social and professional support, provide exercise/ activity interventions that fit in with older people's lifestyles and expectations and offer tailored interventions taking account of individual preferences and capabilities (NIHR Policy Research Unit Older People and Frailty, 2020).

Positive messages about the benefits of technologies for promoting active healthy ageing and independence have also been found to be critical: older people need to understand and appreciate the benefits of app use, which need to be in accord with older people's own lifestyle and aspirations. Emphasising staying independent is important, and when introducing apps to older people, the steep learning curve they may experience must be recognised and support must be supplied to help them become familiar with the app (NIHR Policy Research Unit Older People and Frailty, 2020).

Older people who lack a support network may find the practicalities of engaging with exercise programmes challenging, particularly where they are physically distancing – they may require additional support in order to access exercise interventions. It may be beneficial to explore the costs and benefits of allowing older people to form "super bubbles" to enable them to interact in a more active way outdoors and indoors in slightly larger groups, e.g. four people across two households provided social interactions are restricted beyond the super bubble and social distancing measures are in place.

Frailty:
Exercise resources should always be designed specifically for the needs of older people and those of individuals with a wide range of different needs and levels of existing fitness (Skelton & Mavroeidi, 2018).

Frailty can be assessed in the community (Theou, et al., 2017) and tools such as the Duke Activity Status Index (Hlatky, et al., 1989), the electronic Frailty Index (eFI) (NHS England, n.d.) and the Clinical Frailty Scale (Rockwood, et al., 2005) can help in this regard. While face-to-face access to a GP or a frailty multidisciplinary team may be challenging during the pandemic, some of these tools can be self-administered or administered by carers. The eFI tool is already used in primary care and relies on information in electronic patient records.

Exercise is probably the best therapy to reverse frailty status and to prevent it. A 2016 review recommended that pre-frail older adults should exercise two to three times a week for 45 – 60 minutes, with a programme combining aerobic, resistance, flexibility and balance training components, emphasising flexibility and balance training. For frail adults, the recommendation was to exercise three times a week for 30 – 45 minutes per session, with an emphasis on aerobic training (Bray, et al., 2016). However, a separate review was less conclusive, finding that although exercise has some benefits in frail older people, "uncertainty still exists with regard to which exercise characteristics (type, frequency, duration) are most effective" (Gine-Garriga, et al., 2014).

Research:
In order to understand better the scale of the problem relating to inactivity during lockdown and the needs of people in this demographic, survey work and qualitative work in groups is needed. In particular, more research is required into the mechanistic basis of how inactivity drives poor health outcomes and how best to mitigate these effects in people. There is also a question over the rationale for encouraging the public to limit their outdoor exercise to an hour a day, as was applied during the first national lockdown. It is unclear whether there was any policy or health reason why this time limit was chosen. Since then, restrictions imposed across the UK nations, including the November 2020 lockdown in England, have had no such time limit.

2.6.2 Nutrition

Vitamin D plays a role in regulating normal immune responses. Most people in the UK are deficient during the winter months because vitamin D is synthesised in response to exposure to sunlight, as well as being acquired through dietary intake. Vitamin D deficiency can be a particular problem for people in Black, Asian and other minority ethnic groups (Lanham-New, et al., 2020). Measures to prevent the spread of COVID-19, such as self-isolation among older people, may increase the risk vitamin D deficiency, as self-isolation during spring and summer is likely to prevent people from gaining adequate exposure to sunlight to meet their vitamin D requirement if they do not have a garden or balcony.

Healthcare professionals are well placed to identify 'at-risk' patients, advise on ways to increase vitamin D levels, and ensure, where appropriate, supplements are prescribed to achieve daily vitamin D requirements.

The NHS already recommends that adults and children use vitamin D supplements during the autumn and winter when it is difficult to synthesise sufficient vitamin D from sunlight in the UK (National Health Service, n.d.). Public Health England recommends a dose of 10 µg/d or 400 IU/day for adults and children aged 4 and over to avoid vitamin D deficiency (Scientific Advisory Committee on Nutrition, 2016).

The Scientific Advisory Committee on Nutrition older adults working group is in the process of reviewing current evidence on the role of nutrition in older adults and its impact on healthy ageing (Gov.uk, 2020). As our polling shows, priority access to supermarkets and food during lockdown periods is valued by older people. This is likely to be particularly important for older people who are shielding or restricting their interactions with other people during the pandemic. Addressing financial hardship, where this exists in the older population, will reduce the likelihood of older people being forced to rely on cheaper starchy food with poor nutritional value.

2.6.3 Management of long-term conditions

The NHS is preparing to provide more Covid-19-free spaces where people can receive treatment for existing conditions (Campbell, 2020). This will be of particular importance to older people given the increased prevalence of such conditions in this group. Action may also be necessary to address Cancer Research UK's findings (above) in order to ensure that older people can access primary care and diagnostic services and feel secure when doing so.

2.7 What would public health recommendations look like?

- **Prevent deconditioning:** use population health management approaches to identify the population(s) most at risk of deconditioning and provide proactive tailored advice about how to stay healthy during the coming winter.
- **Support appropriate physical activity:** encourage older people to be active and work as many muscles as possible, in line with the UK Chief Medical Officers' Physical Activity Guidelines for older adults (UK Chief Medical Officers, 2019). This may be through lower-intensity activity and/or appropriate resistance activity, for instance through use of a resistance band. Using a variety of media channels including national broadcasting, encourage older people without severe chronic long-term conditions to achieve a minimum of 4,000 – 5,000 steps a day where possible. For frail older people, light activity may be preferable, and this can be worked into normal tasks to break up sedentary behaviour, for instance by standing up for 30 seconds once an hour.

- **Explore the viability of "super bubbles":** it may be beneficial to explore the costs and benefits of allowing older people to form "super bubbles" to enable them to interact in a more active way outdoors and indoors in slightly larger groups, e.g. four people across two households provided social interactions are restricted beyond the super bubble and social distancing measures are in place.
- **Ensure guidance is fit for purpose:** government guidelines on physical activity should be reconfigured so that they are appropriate for someone shielding and indoors. Clear public health messages are required on negative effects of being inactive and positive effects of moving, along with exercise and activity sessions available in multiple formats (e.g. TV and online).
- **Ensure recommendations support behaviour change:** calls to increase activity levels must be reinforced with options that enable people to do something they would be both personally inclined and physically able to do. Use tailored exercise advice with online platforms designed for older people and encourage older people to continue being creative and resourceful – e.g. early morning walks and use of social media to support activity. The needs of digitally excluded adults should also be considered – a simple TV advertisement publicising proactive health messaging would be helpful.
- **Provide clear nutrition advice:** this should clearly reference the role of nutrition and energy intake in mitigating Covid-19 risk, focusing on issues such as five a day, recommended daily intake and meeting adequate protein and calorie intakes.

How do Covid-19 risk factors relate to age?

Older people face a significantly higher risk of severe Covid-19 illness and death. Between 28 December 2019 and 16 October 2020, 89% of deaths involving Covid-19 in England and Wales occurred in the 65 and over age group, with 42% occurring in those aged over 85 (Office for National Statistics, 2020). Amongst 20,133 English, Welsh and Scottish hospital inpatients with a Covid-19 diagnosis, the median age was 73 years (Docherty, et al., 2020). In the US, Covid-19 hospitalisation rates were 513.2 per 100,000 for those aged 85 and over, compared with 27.3 per 100,000 for 18- to 29-year-olds (Centers for Disease Control and Prevention, 2020).

3.1 What Covid-19 risk factors do older people exhibit and why are older people highly vulnerable?

Age is an independent risk factor for severe Covid-19 disease. However, risk rises with co-morbidities, which may accompany chronological age (Cunningham, et al., 2020). Chronic cardiac disease, uncomplicated diabetes, non-asthmatic chronic pulmonary disease and chronic kidney disease, were the most common comorbidities observed in an analysis of 20,133 English, Welsh and Scottish patients with Covid-19 (Docherty, et al., 2020). A different study found "critical care patients with Covid-19 were disproportionately non-white, from more deprived areas and more likely to be male and obese." (Richards-Belle et al, 2020).

Those belonging to Black, Asian and other minority ethnic (BAME) communities are also at greater risk of dying from Covid-19. This is due in part to socio-economic inequalities and an increased likelihood of underlying health conditions, as well as their being more likely to work in sectors such as health and social care where they will be more exposed to the virus (University of Manchester, 2020).

Increased risk of Covid-19 hospitalisation, disease severity (resulting in the need for ICU admission or mechanical ventilation) and death rise with body mass index (BMI) above the healthy weight range. It has been suggested that disparities in excess weight may explain some of the differences in outcome linked to Covid-19 for older adults and some Black, Asian and minority ethnic groups (Public Health England, 2020).

Frailty is also associated with poorer outcomes. A study of 1,564 patients admitted to hospital with Covid-19 in the UK and Italy found that disease outcomes were better predicted by frailty than by either age or comorbidity. Frailty was associated with earlier death and longer time spent in hospital, with outcomes worsening with increasing frailty, and with similar findings after adjustment for age and comorbidity (Hewitt, et al., 2020). As discussed previously, worsening frailty is a possible negative outcome of lockdown and shielding.

As explored previously, physical activity, exercise and dietary interventions may mitigate obesity and frailty in the elderly, and thus improve outcomes.

3.2 Access to treatment, medication adherence and prescribing

For older people with comorbidities that require ongoing medical care, ensuring access to routine medical services will be particularly important in order to avoid deterioration which could put them at greater risk in case of Covid-19 infection. In addition, access to community services such as podiatry and community therapy will be important for addressing issues that may compromise mobility, including prompt fall prevention assessment and intervention.

Similarly, ensuring adherence to medication regimes and managing impacts of Covid-19 on these may improve outcomes, for instance, diabetic control can be worsened by Covid-19 (Apicella et al, 2020).

3.3 Mental health and wellness

Older people may be at risk of loneliness (Tiwari, 2013), which may be worsened by social restrictions during the pandemic. In addition, risk factors for poorer mental health in older age include a loss of physical health and independence,

having a physical health condition that limits the amount of activities that can be undertaken most or all of the time, having caring responsibilities, and experiencing bereavement and complicated grief, for instance, being unable to say goodbye to the person who has died or not knowing that they had a good death (Independent Age, 2020). These risk factors will be particularly relevant for older people with Covid-19 and their families.

3.4 Infection control measures

Ensuring continued widespread adoption of infection control measures such as handwashing, social distancing and mask-wearing will reduce disease transmission to healthy older adults, for instance, where older people live in their own homes and are in receipt of domiciliary care. Thus, ensuring that social care staff are fully trained in handwashing procedures, use personal protective equipment appropriately and follow processes for isolation if symptomatic or exposed will be important.

3.5 What would public health recommendations look like?

Optimising the physical health of older people through diet and exercise are important in reducing Covid-19 impacts. In addition, efforts should be made to:

- **Ensure that medicines are optimised:** medicines should be reviewed regularly; patients should have sufficient supplies and should be compliant with prescriptions; and impacts of illness on medication needs and compliance should be reviewed.
- **Support the mental health of older people with Covid-19:** mental health may worsen through anxiety or social isolation.
- **Maintain the focus on infection control.**

CHAPTER 4 | RECOVERY

What are the physiological challenges to address as older people recover from Covid-19?

Covid-19 is a multi-organ insult that can cause lung and cardiovascular problems, renal and neurological dysfunction and muscle wasting. Since older people are likely to be affected more profoundly by Covid-19, rehabilitation strategies need to be able to address a wide range of deficits and help people with significant pre-existing frailty and illness (De Biase, et al., 2020).

4.1 What are the clinical and health challenges for a healthy older person recovering from Covid-19?

Following acute Covid-19, challenges to recovery may be physical, e.g. relating to deconditioning or organ-specific disease impacts, or mental.

4.1.1 Physical challenges

Physical effects of Covid-19 can include slow-to-resolve (or progressive, through bronchiolitis obliterans organising pneumonia or pulmonary thromboembolic disease) hypoxia, and for the severely ill, multiple organ failure; when combined with immobility and poor diet quality/energy intake, this will lead to significant health decline and functional deficits, including weakness and fatigue. Other consequences of Covid-19 infection include muscle wasting, renal impairment, delirium, Guillain–Barre syndrome, encephalitis, venous and arterial thromboembolism (including stroke) and post-traumatic stress disorder (De Biase, et al., 2020). Cardiac arrhythmias (such as atrial fibrillation) are reported after Covid-19, and right ventricular function may be impaired, perhaps as a consequence of pulmonary viral or thromboembolic involvement (European Society of Cardiology, 2020).

Effort should be made to identify the processes contributing to post-Covid-19 debility.

4.1.2 Post-illness deconditioning

The fact that many older people were encouraged to shield early in the pandemic, and are therefore at risk of becoming deconditioned, may have implications for the ability of older patients to recover from Covid-19, particularly when they are likely to need to resume shielding post-infection. This deconditioning will have significant implications for psychological and physical wellbeing, as well as associated co-morbidities of disuse. This is likely to have enormous societal and healthcare implications in the future. The Chartered Society of Physiotherapy has produced standards for the rehabilitation of adults who are hospitalised due to Covid-19 (Chartered Society of Physiotherapy, 2020).

4.1.3 Mental health challenges

Older people recovering from Covid-19 can also experience significant mental ill health effects as a result of their illness, from experiencing loneliness and isolation through being separated from their wider network of family and friends to facing life with a new health condition, related to their Covid-19 illness or possibly unrelated but detected while they were in hospital. It is possible that they may have had discussions around a "do not attempt cardiopulmonary resuscitation" order earlier in their treatment and they may potentially also have experienced bereavement.

4.1.4 Long Covid

Prolonged symptoms may follow Covid-19 disease ("long Covid"). A study of 4,182 cases found that of those affected, 13.3% have symptoms lasting longer than 28 days, 4.5% longer than 8 weeks and 2.3% longer than 12 weeks. Risk is more common in women and increases with body mass index (BMI) and age: it affects 9.9% of 18- to 49-year-old Covid-19 sufferers and 21.9% of those aged over 70 (Sudre, et al., 2020).

Clinicians working with patients recovering from Covid-19 have reported the importance of identifying contributing pathophysiology for example breathlessness related to lung fibrosis or thromboembolic disease, the presence of atrial fibrillation or renal impairment, or post-intensive-care syndrome.

4.2 What interventions may help recovery and why?

4.2.1 Building resilience

From a public health perspective, building resilience is likely to be an important feature of preparation for recovery from Covid-19. By exercising appropriately and safely to ensure maintenance of muscle mass, remaining in energy balance prior to infection, and losing weight if obese, older people will ensure they are physically as well-prepared as possible for a recovery from Covid-19. Additionally, they may be better protected from the virus in the first place because of better immune responses. The Your Covid Recovery NHS website (www.yourcovidrecovery.nhs.uk) can be used to support recovery. The second phase of this programme will include an exercise programme with a base aim of walking for 30 mins without stopping. This can be accessed through primary care or a hub if the patient has no respiratory or cardiovascular problems and will be offered after an assessment with an allied health professional, alongside tailored advice including consideration of other comorbidities. If the patient is more frail, a supervised package of care will be required.

4.2.2. Exercise and physical activity

As previously discussed, exercise benefits musculoskeletal health. Most Covid-19 patients who are not hospitalised recover well with 4–6 weeks of graded light exercise such as walking and Pilates (Greenhalgh, et al., 2020).

However, for patients with long Covid who are suffering prolonged fatigue, asking them to exercise can exacerbate the condition. More needs to be done to understand the physiological aetiology of long Covid symptoms and how these respond to exercise. Pending direct evidence from research studies, it has been suggested that exercise in such patients should be undertaken cautiously and cut back if the patient develops fever, breathlessness, severe fatigue or muscle aches (Greenhalgh, et al., 2020).

Where exercise is appropriate for older people recovering from Covid-19, guidelines should be designed for the cold temperatures and short days of the winter season to support exercising indoors;

adaptions could encourage outdoor activities to enable sunlight exposure and increased physical activity where possible – for instance, gardening.

Guidelines should be detailed enough to cover "when", "how" and "how frequently" to exercise. Older people who are able to exercise must also be supported to overcome concerns such as a fear of falling, which may impede their ability to exercise. It may also be necessary to reassure relatives and carers that the benefits of exercise outweigh the risks.

In older people for whom exercise is detrimental – for instance those whose prolonged fatigue means they are unable to exercise at present – breaking sitting with small periods of standing is beneficial for reducing sedentary behaviour as a minimum. Specialist input may be warranted for support with pacing and goal setting around safely increasing activity.

4.2.3 Higher-intensity rehabilitation

The British Thoracic Society has produced guidance on pulmonary rehabilitation for Covid-19 patients which makes recommendations on how an adapted pulmonary rehabilitation service might accommodate the needs of some post-Covid patients. However, it recognises the need for individual assessment of pre-Covid deficits, trajectory of deterioration and baseline (post-Covid) deficit, and the broader span of healthcare input that may well also be required (British Thoracic Society, 2020).

Recently announced NHS specialist centres for long Covid recovery will include some respiratory consultants, physiotherapists, other specialists and GPs, providing a multidisciplinary approach to tackling this complication (Lay, 2020). Such approaches should also be developed for those recovering from acute Covid, if this is not underway already.

4.2.4 Mental health support

Experiencing stressors is known to be associated with high blood pressure, diabetes, ischaemic heart disease and health-related negative behaviours (Public Health England; UCL Institute of Health Equity, 2017). A prolonged recovery period from Covid-19 may result in social isolation and unemployment, which are major stressors. Mental health professionals will thus be crucial in supporting older people affected by Covid-19.

4.2.5 Research

Building a better understanding of the physiological phenotype of Covid-19 patients will be critical to our understanding of recovery generally, and in relation to specific patients.

4.2.6 What are the risks?

Each individual patient's recovery programme needs to be as holistic and personalised as possible, drawing on the wider literature and on what we are learning as the pandemic continues.

Categorising Covid-19 as a single disease when it manifests itself in such different ways is a risk – an intervention might be beneficial to one population but detrimental to another.

4.3 What would public health recommendations look like?

Again, physical activity and a good diet will be important for recovering patients. In addition, the following points are likely to be important:

- **Emphasise the importance of building resilience:** highlight the benefits of daily exercise and eating well for providing the best chance of a good recovery from future Covid-19.
- **Recognise the value of moving (a reduction in sedentary behaviour) even with prolonged fatigue.**
- **Encourage the use of social networks to support recovery:** this should include digital assets.
- **Create clear funding mechanisms to support multi-disciplinary working:** greater interaction between physiologists, clinicians and behavioural psychologists to support recovery will be beneficial. To achieve this, clear funding mechanisms will be required, building on work already underway in the NHS for long Covid multi-disciplinary teams.

CHAPTER 5 | PUBLIC HEALTH RECOMMENDATIONS

A National Covid-19 Resilience Programme

Older people are not a homogenous group – they entered the pandemic with very diverse levels of fitness and frailty, and with different pre-existing conditions. However, a significant number of those polled reported that the pandemic has had negative impacts on their physical activity levels and mood.

Discussion

The pandemic is affecting different cohorts of older people in different ways depending on their health and on other factors such as socioeconomic status and how well networked they are. Older people will also have different concerns about how to respond to the virus and the lockdown measures, and different priorities in terms of how they would like to lead their lives in the coming months.

Clinical risk rises independently with age but is also increased by an age-related increase in the prevalence of obesity, type 2 diabetes and cardiovascular disease.

A number of cross-cutting recommendations apply in relation to all three pandemic challenges considered in this report, i.e. home confinement, illness and recovery: in particular, increasing activity levels, ensuring good levels of nutrition, meeting new and existing needs for mental health support and supporting existing and new medical conditions.

Until vaccines and treatments become more widely available, the single most impactful way older people can reduce physiological deconditioning from home confinement, reduce their risk factors for a serious Covid-19 infection and reduce the prospects of a challenging Covid-19 recovery is through improving their overall physical condition and limiting the risk of developing increasing frailty. The three main ways to achieve this are through:

1. Tailored exercise/physical activity goals

2. Clear guidance about the importance of a healthy balanced diet containing sufficient levels of protein, with a balanced energy intake; and

3. Measures to counter the mental health impacts of social isolation. Older people will need to be supported to achieve these goals through clear advice and tools tailored to their needs.

It will be important to emphasise that physical activity is not synonymous with exercise, in order to ensure that this feels accessible to older people who may have concerns about their ability to perform exercise. Public health teams will need to ensure that guidance on how to exercise and be active indoors is available, especially during the winter period, and that this is tailored to a range of abilities and accessible via different routes online and offline.

Similarly, nutrition advice specifically tailored to the needs of older people who are reducing their risk of infection by increasing their time spent at home will be required and must be made available via different channels. This advice should be linked explicitly to enhancing the body's resilience against Covid-19 through maintaining health and avoiding obesity, so that older people understand the direct link between good nutrition and resilience.

Health and care professionals and family members who are interacting with older people, as well as NHS responders and Covid-19 volunteers, should be supported throughout this period to help signpost older people to the most relevant support tools for their particular circumstances.

Conclusion and public health recommendations

For understandable reasons, the response to the Covid-19 pandemic to date has been framed primarily in terms of protecting older people from infection. This is important and appropriate, but the shielding approach can make older people feel that they only have a passive role in maintaining their own health and wellbeing and managing their risk.

With the pandemic showing no sign of abating, it is important to ensure that older people are able to feel more control over their lives, and that they receive clearer guidance about how best to protect themselves physiologically.

A National Covid-19 Resilience Programme

For this reason, we are calling for public health agencies across the UK to launch a National Covid-19 Resilience Programme to support older people in preparing themselves for the continuation of the pandemic and to keep them healthy over the winter.

Clearly, no such programme will change the fact that older people remain particularly vulnerable to the virus. However, we believe that the potential benefits in terms of health, wellbeing, reducing the risk of increasing frailty and preparedness in the case of contracting Covid-19 are sufficient to justify making a concerted effort to improve resilience in this group. This will be especially important over winter. Unlike the first national lockdown and shielding programmes earlier in the year, which took place in spring/summer with days getting longer and warmer, the next few weeks are going to be particularly challenging with respect to motivating older people to keep active during cold, dark winter days.

A National Covid-19 Resilience Programme should comprise the following elements:

Encourage appropriate exercise:

- **A tailored exercise programme** should be made available nationally, focusing on older people with key Covid-19 risk factors (obesity, type 2 diabetes, cardiovascular disease and sarcopenia). This should offer indoor physical activity recommendations designed for people with different levels of fitness. It will need to be designed in conjunction with exercise scientists and older people themselves and need to generate benefits within a short space of time. This could draw on the "Make Movement Your Mission" model (www.facebook.com/groups/MakeMovementYourMission) or similar schemes, with public health authorities across the UK (Public Health England, Public Health Scotland, Public Health Wales and the Public Health Agency in Northern Ireland) rolling a programme like this out nationally.
- **A broader intervention to support increased activity levels** with guidelines detailed enough to cover "when", "how" and "how frequently" to exercise, which should be provided using multiple channels. As well as a digital platform, the national broadcasters should promote the benefits of physical activity by running regular televised activity classes. These should be developed in conjunction with exercise scientists in order to ensure that the approach is suitable for older people with different underlying levels of fitness and frailty.

Support optimised nutrition:

- **Clear guidance about the importance of a healthy balanced diet** containing sufficient levels of protein, with an appropriate energy content. This advice should be linked explicitly to maintaining health and the body's resilience against Covid-19, so that older people understand the direct link between lifestyle choices and health and resilience.

Enhance mental health and wellbeing:

- **Using communities (both virtual and physical) to counter loneliness and isolation in order to improve mental health.** Virtual communities, such as the community that has formed around Make Movement Your Mission, can also be of benefit to mental health – existing organisations and charities could be supported to explore widening the participation of older people in virtual communities using social media and video conferencing.
- **Explore viability of allowing older people to form "super bubbles"** to enable them to interact in slightly larger groups (e.g. four people across two households), provided social interactions are restricted beyond the super bubble.

Embed behaviour change:

- None of this will work unless we can successfully re-build older adults' confidence and support them to stay active and keep well. Therefore, we will need to be able to **enlist the help of relatives, care workers and other professionals to reinforce messages around resilience in their day-to-day interactions with older people** in their families or for whom they care. There may also be a role for NHS Volunteer Responders to play in supporting this behaviour change, perhaps through telephone befriending or other schemes, provided appropriate safety checks have been carried out.
- Repeat the approaches taken at the start of the first national lockdown in March to identify and proactively contact those at highest risk to offer support and advice, using social prescribing link workers and the NHS responders.

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