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Abstract

Exercise is critical for health maintenance in late life. The COVID-19 shelter in place and social distancing orders resulted in wide-scale interruptions of exercise therapies, placing older adults at risk for the consequences of decreased mobilization. The purpose of this paper is to describe rapid transition of the Gerofit facility-based group exercise program to telehealth delivery. This Gerofit-to-Home (GTH) program continued with group-based synchronous exercise classes that ranged from 1 to 24 Veterans per class and 1 to 9 classes offered per week in the different locations. Three hundred and eight of 1149 (27%) Veterans active in the Gerofit facility-based programs made the transition to the telehealth delivered classes. Participants' physical performance testing continued remotely as scheduled with comparisons between most recent facility-based and remote testing suggesting that participants retained physical function. Detailed protocols for remote physical performance testing and sample exercise routines are described. Translation to remote delivery of exercise programs for older adults could mitigate negative health effects.

Keywords

older adults, exercise, tele-health, mobility, physical performance, veterans

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Introduction

Early data on COVID-19 suggested that older adults are at highest risk for severe illness (Onder et al., 2020). Physical distancing during the pandemic was strongly recommended and consequently, in-person healthcare and health promotion programs were reconfigured to reduce community transmission of the disease. Older adults dependent on structured or facility-based programs

for exercise therapies experienced disruptions to their care. Without these programs, reduced levels of social interactions, physical activity and mobility were likely. The psychological and physiological harms of isolation and immobility are clear and include anxiety, depression, loneliness, substance abuse, muscle loss, neuromuscular degradation, increased fatty deposition and insulin resistance, systemic inflammation, and other deleterious effects (Galea et al., 2020; Narici et al., 2020). To prevent



physical decline from immobility and the negative psychological impact of social isolation, in-person exercise programs for older adults required rapid transformation.

The Gerofit program is a supervised exercise and health promotion program for older Veterans, ages 65 years and over, established at the Durham Veterans Affairs (VA) Medical Center in 1986. Program participation results in reduced cardio-metabolic risk, improved fitness and physical function, improved well-being, and reduced 10-year mortality (Cowper et al., 1991; Morey et al., 1996, 1989, 2002; Peterson et al., 2004). With this robust evidence of wide ranging positive outcomes, Gerofit was declared a VA Best Practice (Elnahal et al., 2017). Since 2014, with funding from the VA Office of Geriatrics and Extended Care, the Durham Gerofit program has led dissemination and expansion to 16 additional sites across the country. With additional funding from the VA Office of Rural Health Enterprise-wide Initiative (US Department of Health Affairs, 2020), Durham VA leads a Gerofit collaborative effort to develop and test methods of distance-based exercise delivery for rural Veterans without easy access to facility-based classes (Briggs et al., 2018; Morey et al., 2018). Although studies have reported positive outcomes with telephone or telehealth-delivered home-based exercise or rehabilitation interventions, most depend upon face to face visits to evaluate outcomes which was less favorable during a pandemic and a challenge for participants living distant from testing facilities (Bernocchi et al., 2018;

Hwang et al., 2017; Levy et al., 2015). Fully remote group exercise with older Veterans participating from their individual homes and with function and health outcomes assessed remotely via video visits with no face-to-face contact is a novel, untested approach that had to become the standard of care during the pandemic.

This article describes preliminary findings and lessons learned for rapid implementation of a group-based telehealth-supported exercise intervention with tailoring for individual functional status and provides protocols for remote physical performance testing and program delivery. This work has potential implications for other restorative and rehabilitative services that could leverage telehealth to reach older adults in their homes not only due to the pandemic, but also to overcome other barriers such as impaired physical or mental health, geographic distance, caregiving responsibilities, and time and costs associated with travel or gym membership.

Methods

The Gerofit facility-based program is offered at 17 VA medical centers across the United States and is described in full elsewhere (Morey et al., 2018). The program is standardized for delivery across sites and provides individually tailored guidance for older adults' participation. Group-based exercise includes cardiovascular and strengthening exercise on machines individually (treadmills, ellipticals, and strengthening equipment, etc.) and classes such as tai

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chi, yoga, and chair or floor classes promoting mobility, balance and strength (Morey et al., 2018). Each person receives a tailored exercise prescription derived from a functional assessment of performance tests and directed to progressively meet national exercise guidelines. Assessments are performed at enrollment to establish baseline, 3, 6, and 12-months and then annually (Guralnik et al., 1994, 1995; Rikli & Jones, 1999). Questionnaires assess well-being, global health, self-reported physical activity, satisfaction, post-traumatic stress symptoms, and social interactions at each above specified assessment (Diener et al., 1985; Hays et al., 2009; Ware & Sherbourne, 1992; Ware et al., 2000; Weathers et al., 2013; Wilson et al., 2006). Gerofit programs are clinical and program modifications are considered quality improvement. The Durham VA maintains an annually reviewed and approved IRB protocol for retrospective analyses of program outcomes.

Eligibility Criteria

Gerofit participants must be 65 years of age and older, in stable health and have approval to participate by their VA primary care physician prior to enrollment. Participation is voluntary and written consent is not required for this clinical program. Exclusion criteria from the program include: significant cognitive impairment/dementia impeding ability to exercise independently, unstable angina, proliferative diabetic retinopathy, oxygen dependency, inability to perform activities of daily living (ADL) or perform transfers independently without assistance, volatile behavioral issues or inability to work in group setting, uncontrolled incontinence, open wounds, active substance abuse, and homelessness. For transition to a Gerofit-to-home (GTH) program we retained the eligibility criteria except for the latter four exclusion criteria that were pertinent for group facility-based program in a public setting. Access to technology was not an exclusion criterion since the VA devotes substantial resources to meet equipment and connectivity needs. While VA provides tablets to Veterans without smart devices, connectivity for some remains an issue and not every Veteran is adept at using provided devices. Standardized safety considerations for participating in GTH required having contact information and an emergency contact prior to each session.

Transition to GTH

Initially, and well before the COVID pandemic, national VA privacy regulations limited the use of their telehealth platform to single face-to-face sessions and GTH was only delivered one-on-one to rural Veterans. Over time, the platform was expanded to allow group-based interactions. Building from our experience with group-based tele-exercise to community-based clinics (Briggs et al., 2018), all Gerofit sites were in various stages of preparing to implement group-based exercise directly to older adults' homes. The VA supports telehealth using VA Video Connect (VVC) within the VA Virtual Care

Manager (VCM) platform. This technology allows Veterans to enter a virtual medical room to receive care from their home using a smart device.

Within a week of when the World Health Organization announced COVID-19 was a pandemic, all of the facility-based Gerofit programs were ordered closed. Over 1000 Veterans were affected. The Durham Gerofit program was the only site using VVC for GTH with Veterans. The other 16 programs were testing the protocols and remote assessments, building VVC clinics, training staff, and obtaining approvals for deployment. Each adhered to local and national guidance for approval. Although policies varied between local facilities, the pandemic led most health care systems to rapidly adopt broad policies to fast track use of telehealth modalities (Wright & Caudill, 2020).

To rapidly transition, all approaches developed by other sites were shared in a meeting among all 17 participating programs so that each site could adapt to their local facility guidance. For example, the Puget Sound program on the West coast was the first to be affected (closed March 3rd) and was not ready to transition to VVC but immediately implemented a telephone and mail-based outreach effort to provide enrolled Veterans with information and home exercise resources. The Durham, Salem, and Baltimore programs on the East coast shared examples of informational handouts for participants to receive the last day of facility-based interactions. For the most part, these described general medical center COVID-19 instructions for patients with contact information and information for home-based exercise resources including internet web addresses ("links") to the Gerofit website that has instructional exercise videos (http://www.va.gov/geriatrics/gerofit/gerofit_Home.asp).

In addition to the informational handout, Veterans were provided information to participate in GTH. Each participant received information on how to pre-test smart devices for compatibility and join GTH classes for their center. A group tele-health agreement form with safety and policy guidelines was provided. E-mail and telephone numbers of all participants were obtained and their general interest in attending GTH classes was recorded. Anyone not present on the last few days of facility-based sessions were subsequently contacted by telephone and mailed the above materials. Additional calls, letters and emails with invitations and how to join were sent periodically. All mailed information included a link to pre-test their device, or instructions to visit our website to access the link, that was followed by a telephone call. Some of the telephone calls were lengthy, exceeding 1 hour, with a staff member walking through the process step by step. Mailings to rural Veterans continued with invitations to participate in expanded program offerings.

Remote Group-based Exercise

During the pre-COVID-19 piloting of GTH, participants initially engaged in individualized sessions and gradually

Table 1. Aerobic Exercise Circuit.

Aerobic exercise circuit	Level 1 most deconditioned	Level 2	Level 3	Level 4 least deconditioned
Marching	Seated	1 arm support	Unsupported	Higher step march
Forward/backward march	Seated	1 arm support	Unsupported	Unsupported increased speed
March w/arm swing	Seated	1 arm support	Unsupported	Higher swings/speed to sustain RPE
Step both feet out, step in	Seated	1 arm support	Unsupported	Wider step
Single leg toe taps (R)	Seated	Standing two arm support	Standing two arm support	Standing two arm support
Single leg toe taps (L)	Seated	w/toe tap to shoulder width	w/ toe tap wider than shoulder	w/wide step with increased speed
Step jacks	Seated	Standing w/1 hand support	Standing no support	Standing increased speed to sustain RPE
Mini-Squat and cross punch	Seated	Standing w/1 hand support	Standing no support	Standing increased speed to sustain RPE
Walking with hand claps	Seated	Standing arm claps only	Standing arm claps + stepping	Standing arm claps + stepping increased speed
Heel taps	Seated	Standing 1 arm support	Standing unsupported	Standing increased speed to sustain RPE

Note. One circuit of aerobic exercises features 30 seconds per exercise, for a total of approximately 5 minutes. All exercises are adapted for different levels of ability. Exertion will be assessed after each circuit level and adjusted to keep intensity within the moderate range of Rate of Perceived Exertion (RPE) of 4 to 6 on a scale of 1 to 10.

transitioned to small group classes. In the transition to a 100% remote delivered program, staff adjusted their models for faster onboarding. Staff contacted participants and practiced logging into a sample class outside of the regular class schedule. Two instructors were involved in each class to allow one person to lead the exercise class and the other person to troubleshoot technical issues and concerns. Three weeks after initiating the classes, the VA allowed the use of Zoom which provided better visibility, greater log-in ease, higher participant capacity, and more flexibility than the VVC platform.

Participants were offered live group-based classes with verbal encouragement to meet recommended exercise guidelines and engage in exercise on other days (US Department of Health and Human Services, 2018). Each session was comprised of functional, strength and aerobic exercises. Functional and strength exercises were performed from a seated position or standing behind a chair (see Supplemental Materials, pages 22–25) with aerobic training components at the end (2–3 5-minute bouts of continuous movement) with adaptations to increase difficulty as needed (Table 1). Participants were polled on their rate of perceived intensity of effort, on a scale of 0 (easy) to 10 (very hard) during the exercise and given guidance on increasing intensity as needed. Safety tips/modifications were embedded in each routine, that is, hold on to the chair if your balance is poor. The bi-weekly Gerofit all-site collaborative meetings provided an ongoing venue for sharing strategies and materials. Participant satisfaction and program feedback was sought by phone. The GTH approach sought to maintain program fidelity with the facility-based

program's structure of group cardiovascular, flexibility, strength, and balance exercise 3 days a week.

Remote Physical Performance Assessment

The facility-based program has a battery of functional performance tests: usual gait speed, 30-second arm curls, 30-second chair stands, standing balance (side-by-side, semi-tandem, and tandem), 8 foot up and go, and 6-minute walk. For transition to fully remote performance testing, we selected three assessments that could be safely performed from the home and require minimal space and equipment: the 30-second arm curls as a measure of upper body strength, 30-second chair stands as a measure of lower body strength, and a 2-minute step test as a measure of cardiorespiratory function (Rikli & Jones, 1999). Assessment of gait speed, one of the simplest and most powerful markers of health, was not feasible because it requires more space, and accuracy could not be validated with the VVC or Zoom platforms. Supplemental Figure 1 presents change over time performance scores for the initial four Veterans who piloted the GTH prior to COVID-19.

Individuals used their own personal smart device (e.g., tablet, smartphone, laptop, e-reader, or desktop with webcam) and email address to connect to staff. In addition, a non-rolling chair without arms was preferred equipment, along with a piece of tape of discernable color, and an unopened gallon container of water or canvas bag with an item of known weight (i.e., dumbbells or 5/8 pound bag of flour). Performance tests and additional self-reported outcomes followed protocol

guidelines and testing scripts (see Supplemental Material). Upon completion of the assessments, scores were converted to age-based percentile rankings and interpreted to the participants (Rikli & Jones, 1999). Assessments were designed to be conducted without support; however, involvement of caregivers or others in the home facilitated easier camera set-up and transitions between measurements. An online training session, held 3 weeks after the shutdown, on GTH physical performance testing was developed and attended by 34 persons across all Gerofit sites (see Supplemental Text S5 with public URL link to view).

Analysis

Each site maintains a database for tracking participant and program related data that is stored behind each site's medical center firewall. Data are downloaded and shared behind a password protected website for pooling of data. Descriptive analyses were conducted in Excel and comparisons between groups, using *t*-tests for continuous variables and chi-square tests for categorical variables, were performed using SAS version 9.4. Two of the 17 programs were not included in these analyses because they did not have facility-based programs to transition to GTH. These include a hybrid rural walking program with no facility-based program and another too early in the implementation process and without enrolled participants at the time of the shutdown.

Results

Within 3 weeks of the shutdown, five of 15 programs had initiated GTH programs and approximately one-quarter of active program participants were engaged in GTH. By the eighth week, all of the sites had initiated GTH with overall engagement remaining stable at about 27% of the total of active participants affected by the shutdown. Class sizes ranged from 1 to 24 Veterans per class and one to nine classes offered per week in the different locations. By July 2020, across sites the average class size was 10.1 participants and an average of 6.4 classes were offered each week. Class size was influenced by tele-health platform used; programs using VA supported platforms had limitations in the number of persons observed on the screen simultaneously and had smaller class sizes, whereas individuals using zoom had larger class sizes due to the ability to simultaneously view a higher number of individuals.

The demographic characteristics between those enrolled in GTH by July 1, defined as attending at least one telehealth session, and those never attending were similar (Table 2); $p > .05$ for age, race, and gender with several sites having GTH participants in their mid-90s. However, the body mass index (BMI) and most recent physical performance scores between those enrolling and those who never attended GTH showed that enrollees had a higher BMI and better physical performance

than those who never attended ($p < .05$; Table 3). Reasons given for declining participation included the ability to exercise independently, lack of smart devices, lack of interest, and currently recovering or undergoing rehabilitation for medical procedures. Telephone follow-up of Veterans who initially declined resulted in increased enrollment to GTH. The staff continued to call and email participants to encourage enrollment with new patients joining the classes regularly, particularly as community-based fitness centers were instructed to close as part of COVID-19 related sequestration policies.

Over the 3 months following enforced shutdown at all sites, 365 individuals participated in a total of 5564 GTH classes. Of these, only 54 (14.2%) attended fewer than four sessions. Of the remaining 311 participants, 20 (6.4%) attended fewer than 25% of the total available number of GTH classes, and the majority, 291 (93.6%), attended classes regularly, with 53% attending more than 75% of the time. The average reported rate of perceived exertion for the sessions was 6.04 ± 1.45 and ranged across sites from 4.11 to 7.27.

Table 4 provides a descriptive indicator of physical performance sustainment over time by showing the average scores from the most recent facility-based assessment and the average scores of any subsequent virtual performance test for the individuals who had assessments in both settings. We chose not to perform comparative analytics on these items because additional validation on virtual testing is needed and the time frames for the most recent in-person test and the virtual assessment were highly variable. Ninety-four percent of GTH participants reported that they were very likely to recommend GTH to another Veteran and 95% reported that they felt safe while exercising in their home.

Discussion

We report the rapid transition of group facility-based exercise to live, tele-home-based exercise among a national cohort of older adults. VA Leadership has been widely supportive of these efforts and has minimized impediments to rapid uptake by allowing implementation of flexible technology. We have received requests from other services, such as physical therapy and rehabilitation medicine at other medical centers, for the training and materials provided in the supplement. GTH serves as a model that restorative and rehabilitative services can consider to translate facility-based therapeutic approaches to group-based telehealth programs.

The rapid transition was feasible because our participants were already enrolled in the program and familiar with staff and the exercise content. However, it was time-consuming because lengthy personal telephone calls were required to assist some individuals with learning the technology. As program staff became more comfortable with delivering GTH, we resumed enrollment of new participants with a virtual baseline

Table 2. Time to Implement and Demographic Characteristics of Individuals Enrolled versus Never Attended Gerofit to Home (GTH).

Site	Weeks to implement telehealth	Telehealth	Number of participants	Age mean (SD)	Gender % male	Race [†]
Ann Arbor	1	Enrolled	16	71.1 (3.5)	88%	81% White
		Never Attended	34	73.9 (5.4)	97%	79% White
Baltimore	2.5	Enrolled	28	73.1 (4.9)	96%	61% AA
		Never Attended	192	74.3 (6.4)	96%	73% AA
Boston	2	Enrolled	18	70.3 (7.2)	94%	72% White
		Never Attended	31	73.5 (8.6)	94%	55% White
Canandaigua	1	Enrolled	23	75.4 (7.2)	95%	91% White
		Never Attended	136	74.8 (7.5)	81%	90% White
Cincinnati	1	Enrolled	31	72.8 (5.2)	90%	81% White
		Never Attended	42	72.8 (4.6)	90%	86% White
Denver	2	Enrolled	18	74.3 (7.3)	89%	72% White
		Never Attended	40	74.5 (5.5)	93%	78% White
Durham	1	Enrolled	66	73.2 (6.3)	85%	59% AA
		Never Attended	80	75.4 (7.2)	90%	69% AA
Honolulu	4	Enrolled	25	77.1 (7.2)	92%	76% Asian
		Never Attended	50	78.5 (8.4)	88%	50% Asian
Los Angeles	1.5	Enrolled	19	81.4 (9.4)	90%	74% White
		Never Attended	42	81.6 (9.4)	98%	74% White
Miami	5	Enrolled	15	73.5 (3.3)	100%	67% AA
		Never Attended	44	70.3 (6.8)	86%	50% AA
Murfreesboro	7	Enrolled	6	74.7 (2.7)	50%	83% White
		Never Attended	30	72.2 (4.5)	93%	73% White
Pittsburgh	6	Enrolled	4	74.5 (2.9)	100%	75% AA
		Never Attended	22	72.6 (5.4)	96%	59% White
Puget Sound	7	Enrolled	9	74.3 (9.9)	89%	67% White
		Never Attended	27	73.0 (5.9)	78%	67% White
Salem	2.5	Enrolled	30	73.3 (6.5)	90%	73% White
		Never Attended	71	75.3 (7.4)	96%	68% White
*Overall	3.2	Enrolled	308	74.0 (6.7)	89%	55% White
		Never Attended	841	74.7 (6.8)	91%	57% White
				<i>p</i> = .17	<i>p</i> = 0.51	<i>p</i> = 0.45

**p* values are for overall comparisons of age, gender, and race of enrolled versus never attended.

[†]Race is reported by the predominant race of each site.

assessment. The ability to implement new aspects of the program varied by site due to staffing/resource differences where some sites have personnel entirely assigned to Gerofit while other sites have staff assigned to other competing duties. Differences in how local medical centers applied regulatory guidance accounted for some of the differences in the time needed to rapidly adopt new practices.

Key lessons learned from this transition are that a proportion of older adults are able to adopt this approach to home-based group exercise and many require coaching to enable their use of technology. Higher age was not associated with lower adoption rates. A small number of individuals were unable to describe their computer or telephone capabilities. Others reported that the printed and emailed web-links used to set up and test their devices were both helpful and timesaving. The older adults unable to activate their technology with telephone coaching had guidance and materials for exercise at

home mailed to them. A smaller proportion of older adults had no interest in online or remote-delivered exercise programs.

We acknowledge that although we have aimed to maintain the basic structure and content of Gerofit, several adaptations from our facility-based programs were necessary to deliver GTH. First, no machines are used for strengthening or aerobic conditioning. As a result, it is likely that the overall intensity of the GTH is less than that of the facility-based programs. The breakout room function in Zoom is used to facilitate classes of differing levels of intensity and difficulty being run simultaneously. We were encouraged that the average reported rate of perceived exertion was 6 (moderate intensity), meeting the recommended target for older adults for moderate physical activity (US Department of Health and Human Services, 2018). Program participants also appear to be maintaining their physical function. Second, we still deliver a multi-component exercise class but have

Table 3. Anthropometric and Physical Performance Characteristics of Individuals Enrolled versus Never Attended Gerofitt to Home (GTH).

Site/ Telehealth	Number	Body mass index mean (SD) (Range)	Gait speed meters/sec mean (SD) range	Arm curls Number of repetitions mean (SD) range	Chair stands Number of repetitions mean (SD) range
Ann Arbor/ Never Attended	16	33.1 (3.8) (27.8–41.9)	1.19 (0.18) (0.94–1.49)	21.0 (4.7) (15–31)	15.9 (4.1) (8–21)
Baltimore/ Enrolled	34	32.1 (6.8) (21.6–50.8)	1.14 (0.31) (0.49–1.81)	19.5 (5.5) (6–31)	10.8 (9.0) (0–29)
Boston/ Never Attended	28	30.1 (4.2) (22.0–36.9)	1.17 (0.22) (0.57–1.62)	23.1 (4.6) (14–31)	16.3 (6.6) (9–33)
Canandaigua Enrolled	192	30.4 (5.3) (19.0–49.39)	1.12 (0.26) (0.34–1.67)	22.4 (5.7) (10–37)	14.4 (6.0) (0–30)
Cincinnati Never Attended	18	30.7 (6.2) (21.8–41.3)	1.05 (0.27) (0.53–1.67)	14.7 (4.3) (8–24)	11.6 (5.1) (0–20)
Denver Enrolled	31	30.7 (5.5) (19.1–45.5)	1.08 (0.31) (0.70–2.48)	14.8 (4.3) (5–24)	12.3 (4.2) (4–21)
Durham Never Attended	23	29.6 (4.8) (22.4–38.6)	1.32 (0.28) (0.95–1.87)	22.6 (5.4) (14–34)	15.9 (5.1) (7–27)
Honolulu Enrolled	136	30.0 (5.2) (19.0–47.1)	1.20 (0.25) (0.42–1.90)	20.1 (5.6) (7–34)	13.1 (6.3) (0–33)
Los Angeles Never Attended	31	32.9 (6.3) (21.0–51.3)	1.30 (0.27) (0.81–1.92)	19.4 (4.0) (11–29)	15.8 (6.1) (0–33)
Miami Enrolled	42	30.7 (4.5) (21.4–39.6)	1.17 (0.22) (0.57–1.49)	19.1 (9.8) (8–29)	14.5 (7.1) (0–29)
Murfreesboro Never Attended	18	30.6 (4.2) (25.1–42.0)	1.01 (0.16) (0.70–1.32)	19.9 (7.3) (11–40)	12.1 (6.1) (0–27)
Pittsburgh Enrolled	40	31.0 (6.9) (20.0–48.8)	1.03 (0.21) (0.63–1.58)	17.1 (4.2) (8–27)	12.2 (4.4) (3–22)
Puget Sound Never Attended	66	31.9 (4.9) (22.2–44.2)	1.20 (0.21) (0.79–1.79)	22.4 (4.7) (13–34)	16.1 (5.6) (3–31)
Salem Enrolled	80	31.0 (6.1) (17.7–48.3)	1.10 (0.26) (0.51–1.69)	20.2 (4.6) (3–31)	14.8 (6.3) (0–30)
*Overall Never Attended	25	28.4 (4.7) (21.6–42.2)	0.97 (0.28) (0.20–1.44)	15.2 (4.2) (8–26)	11.7 (6.0) (1–26)
	50	28.8 (5.7) (20.9–44.9)	0.93 (0.28) (0.15–1.75)	15.7 (5.2) (3–31)	12.6 (3.8) (4–20)
	19	29.0 (5.5) (21.4–41.3)	1.17 (0.34) (0.68–1.73)	19.9 (5.2) (10–31)	13.6 (5.0) (9–29)
	42	29.0 (5.8) (17.8–44.3)	1.00 (0.27) (0.42–1.68)	17.3 (5.3) (4–31)	10.2 (5.7) (0–25)
	15	34.6 (5.2) (25.9–42.4)	1.51 (0.31) (0.99–1.96)	24.7 (7.7) (16–44)	16.1 (6.0) (3–31)
	44	31.9 (6.0) (18.4–45.5)	1.20 (0.36) (0.41–2.14)	17.7 (7.9) (0–41)	12.9 (5.5) (3–31)
	6	28.0 (4.8) (22.1–36.1)	1.34 (0.20) (1.02–1.58)	22.0 (6.3) (14–30)	15.5 (1.4) (13–17)
	30	31.0 (5.1) (24.5–46.2)	1.20 (0.29) (0.67–1.90)	20.7 (5.4) (9–30)	13.0 (4.2) (6–23)
	4	35.7 (6.7) (27.1–43.0)	1.12 (0.35) (0.70–1.49)	19.5 (3.7) (15–23)	8.3 (5.7) (0–13)
	22	32.4 (6.9) (21.6–47.9)	1.23 (0.29) (0.70–1.67)	18.3 (4.2) (11–28)	11.5 (5.3) (0–26)
	9	32.2 (7.9) (21.7–43.8)	1.10 (0.22) (0.74–1.29)	16.1 (6.1) (9–26)	10.0 (4.2) (3–17)
	27	29.6 (6.0) (19.9–41.4)	1.04 (0.27) (0.39–1.39)	16.9 (4.1) (7–25)	9.9 (6.2) (0–22)
	30	32.6 (6.5) (22.0–43.8)	1.25 (0.22) (0.80–1.68)	24 (4.0) (16–30)	15 (3.9) (7–23)
	71	29.5 (4.8) (22.4–46.1)	1.13 (0.25) (0.73–1.70)	27 (6.0) (0–37)	13 (5.3) (0–28)
	278	31.3 (5.5) (20.9–51.3)	1.19 (0.27) (0.20–1.96)	20.8 (5.7) (8–44)	14.7 (5.7) (0–33)
	770	30.5 (5.6) (17.7–50.9)	1.12 (0.28) (0.15–2.48)	19.5 (5.8) (0–41)	13.2 (6.1) (0.33)
		p = .03	p < .001	p < .01	p < .001

*p values for overall comparisons between enrolled and never attended.

Table 4. Site Average of Within-Person Physical Performance Scores for Most Recent Tests Performed Prior to Shut Down and Remote Tests Performed in Gerofit to Home (GTH).

Site	N	Pre-COVID in-person testing		Arm Curls average number of repetitions	Chair stands average number of repetitions
		GTH remote testing	Age mean (SD)		
Ann Arbor	6	In-Person	70.5 (5.1)	20.5	16.5
		GTH Remote	71.3 (4.8)	20.0	16.2
Baltimore	3	In-Person	74.7 (7.5)	25.0	11.7
		GTH Remote	75.3 (7.5)	21.0	10.3
Boston	8	In-Person	70.0 (5.0)	14.4	12.1
		GTH Remote	70.0 (4.8)	9.9	12.8
Durham	10	In-Person	71.8 (4.4)	20.9	15.2
		GTH Remote	72.4 (4.8)	20.1	17.7
Honolulu	9	In-Person	75.6 (8.5)	16.8	13.9
		GTH Remote	76.2 (8.5)	16.4	15.1
Salem	10	In-Person	69.8 (2.9)	23.5	14.9
		GTH Remote	70.7 (3.2)	26.5	19.0
Overall	46	In-Person	72.1 (5.7)	19.7	14.3
		GTH Remote	72.7 (5.8)	19.0	15.9

Note. Pre-Covid in-person testing might have occurred within 3 months of the mandated shutdown for persons newly enrolled in Gerofit or up to 1-year prior for individuals due an annual assessment.

restricted movement to a smaller space or to a chair. This approach allowed us to accommodate the different home environments. Finally, we had to rethink opportunities to maximize patient safety. In addition to restricting movement to a smaller space, we confirm that program staff have emergency contact information for each participant prior to each class and that a “gallery view” is used to continuously monitor all participants in the class in real time. Thus far, in the first 3 months of GTH during COVID-19, we have had no falls or adverse events with these adaptations. Going forward we anticipate continued evolution and improvements. Other technology platforms may be considered as we continue to evaluate expanded participation, flexibility in delivery, and a centralized class schedule provided across times of day and time zones facilitated by different sites to engage participants as a national cohort.

Observing the joy experienced by participants who are sheltering in place as they see and interact with their fellow Gerofit friends is a highlight of this transition. In addition, although the program allows and encourages spousal participation, new spouses have joined the exercise classes as they see their partners’ enthusiasm. One Veteran, whose regular attendance dropped as his caregiving responsibilities grew due to his wife’s dementia, is now able to participate consistently remotely with his wife participating as well. Other spouses, previously not interested in Gerofit, have joined the classes. We have adapted strategies to keep the classes dynamic, by offering a new exercise each day and by having the Veterans lead several components of the class. We also offer other classes, such as yoga and tai chi with this platform. Future research could measure the implementation and benefits of spousal or partner participation and peer-led programming.

We recognize several limitations of this report. In the interest of rapid scale-up and dissemination, we have yet to assess the impact of GTH on social isolation and other important outcomes. We also do not know how many participants had access to someone in the home to assist with overcoming technology barriers and the need to consider that for future enrollment or program implementation. Also, as these programs are dynamic and staff are managing many of the complexities associated with care delivery during COVID-19 service restrictions, adherence data are preliminary.

Despite our best efforts, about two thirds of participants did not enroll in GTH. Of primary concern is the challenge of overcoming technical obstacles which played a factor in our enrollment rates. Although concerning, as the prevalence of technology users increases over time, this challenge will diminish. Importantly, our data suggests that low functional status was a barrier to enrollment—addressing and adopting programs specific to the most vulnerable should be a priority for future research. An unexpected benefit of the pandemic is that many older adults have used online platforms to attend church or social gatherings and have adapted to telehealth visits for medical concerns and might be more amenable to receive telehealth interventions to the home. As such, we have identified important areas for future adaptation and research. The addition and validation of new virtual physical performance measures tailored to older adults will be an important contribution to the field. We note that others have validated and used tele-video for physical performance testing, but validation studies have typically been conducted in a laboratory setting and have not included measurement from the home which presents unusual challenges of available

space, digital literacy, and equipment for testing (Cox et al., 2013; Durfee et al., 2006; Hwang et al., 2017; Russell et al., 2013; Steele et al., 2012). We also plan to conduct formal research to compare the effectiveness or equivalence of facility-based versus home-based outcomes and to examine resilience trajectories as programs return to face to face encounters.

In summary, the COVID-19 pandemic provided an opportunity to accelerate innovations in the delivery of exercise to older adults. The delivery of a home-based clinical exercise program using telehealth is feasible. The Veterans Health Administration has long been at the forefront of providing care through telehealth, which facilitated this rapid transition (Cohen, 2019; Hoffman & Prieto, 2016; US Department of Veterans Affairs, 2019a, 2019b). Furthermore, our efforts on behalf of serving rural Veterans through the Office of Rural Health Enterprise-Wide Initiative helped us build the infrastructure that accelerated dissemination among our partner sites (US Department of Health Affairs, 2020). We believe that for some of our program participants, the rapid transition interrupted the potential negative impact of enforced program closure. We have extensive experience in the success of group-based exercise program delivery and this pandemic may be an opportunity to bridge services typically performed individually. The chronic and complexity of disease burden is high in this population and the work done by our teams likely has translatability to other health care systems as a model for post-acute or other rehabilitative services interrupted by the pandemic.

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Supplemental Material

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References

- Bernocchi, P., Vitacca, M., La Rovere, M. T., Volterrani, M., Galli, T., Baratti, D., Paneroni, M., Campolongo, G., Sposato, B., & Scavini, S. (2018). Home-based telerehabilitation in older patients with chronic obstructive pulmonary disease and heart failure: A randomised controlled trial. *Age Ageing, 47*(1), 82–88. <https://doi.org/10.1093/ageing/afx146>
- Briggs, B., Jain, C., Morey, M., Blanchard, E., Lee, C., Valencia, W., & Oursler, K. (2018). Exercise clinical video telehealth: Providing rural Veterans access to exercise through Gerofit. *Federal Practitioner, 35*(11), 16–23.
- Cohen, J. (2019). *Telemedicine growth follows 'Anywhere to Anywhere' rule at VA*. Retrieved January 23, 2020, from <https://www.modernhealthcare.com/information-technology/telemedicine-growth-follows-anywhere-anywhere-rule-va>
- Cowper, P. A., Morey, M. C., Bearon, L. B., Sullivan, R. J., DiPasquale, R. C., Crowley, G. M., Monger, M. E., & Feussner, J. R. (1991). The impact of supervised exercise on the psychological well-being and health status of older veterans. *Journal of Applied Gerontology, 10*(4), 469–485. <https://doi.org/10.1177/073346489101000408>
- Cox, N. S., Alison, J. A., Button, B. M., Wilson, J. W., & Holland, A. E. (2013). Assessing exercise capacity using telehealth: A feasibility study in adults with cystic fibrosis. *Respiratory Care, 58*(2), 286–290. <https://doi.org/10.4187/respcare.01922>
- Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality*

- Assessment*, 49(1), 71–75. https://doi.org/10.1207/s1532-7752jpa4901_13
- Durfee, W., Savard, L., & Weinstein, S. (2006). Technical feasibility of tele-assessments for rehabilitation. Paper presented at the Fifth International Workshop on Virtual Rehabilitation, IWVR 2006, New York, NY, USA. IEEE. <https://doi.org/10.1109/IWVR.2006.1707540>
- Elnahal, S., Maddock, E., & Shaheen, M. (2017). *Best care everywhere by VA professionals across the nation*. U.S. Government Publishing Office.
- Galea, S., Merchant, R. M., & Lurie, N. (2020). The mental health consequences of COVID-19 and physical distancing: The need for prevention and early intervention. *JAMA Internal Medicine*, 180(6), 817–818. <https://doi.org/10.1001/jamainternmed.2020.1562>
- Guralnik, J. M., Ferrucci, L., Simonsick, E. M., Salive, M. E., & Wallace, R. B. (1995). Lower-extremity function in persons over the age of 70 years as a predictor of subsequent disability. *New England Journal of Medicine*, 332, 556–561. <https://doi.org/10.1056/NEJM199503023320902>
- Guralnik, J. M., Simonsick, E. M., Ferrucci, L., Glynn, R. J., Berkman, L. F., Blazer, D. G., Scherr, P. A., & Wallace, R. B. (1994). A short physical performance battery assessing lower extremity function: Association with self-reported disability and prediction of mortality and nursing home admission. *Journal of Gerontology*, 49(2), M85–M94.
- Hays, R. D., Bjorner, J. B., Revicki, D. A., Spritzer, K. L., & Cella, D. (2009). Development of physical and mental health summary scores from the patient-reported outcomes measurement information system (PROMIS) global items. *Quality of Life Research*, 18(7), 873–880. <https://doi.org/10.1007/s11136-009-9496-9>
- Hoffman, N. B., & Prieto, N. M. (2016). Clinical video telehealth for gait and balance. *Federal Practitioner*, 33(2), 34–38.
- Hwang, R., Bruning, J., Morris, N. R., Mandrusiak, A., & Russell, T. (2017). Home-based telerehabilitation is not inferior to a centre-based program in patients with chronic heart failure: A randomised trial. *Journal of Physiotherapy*, 63(2), 101–107. <https://doi.org/10.1016/j.jphys.2017.02.017>
- Hwang, R., Mandrusiak, A., Morris, N. R., Peters, R., Korczyk, D., & Russell, T. (2017). Assessing functional exercise capacity using telehealth: Is it valid and reliable in patients with chronic heart failure? *Journal of Telemedicine and Telecare*, 23(2), 225–232. <https://doi.org/10.1177/1357633x16634258>
- Levy, C. E., Silverman, E., Jia, H., Geiss, M., & Omura, D. (2015). Effects of physical therapy delivery via home video telerehabilitation on functional and health-related quality of life outcomes. *Journal of Rehabilitation Research and Development*, 52(3), 361–370. <https://doi.org/10.1682/jrrd.2014.10.0239>
- Morey, M. C., Cowper, P. A., Feussner, J. R., DiPasquale, R. C., Crowley, G. M., Kitzman, D. W., & Sullivan, R. J. (1989). Evaluation of a supervised exercise program in a geriatric population. *Journal of the American Geriatrics Society*, 37, 348–354.
- Morey, M. C., Lee, C. C., Castle, S., Valencia, W. M., Katznel, L., Giffuni, J., Kopp, T., Cammarata, H., McDonald, M., Oursler, K. A., & Parker, D. C. (2018). Should structured exercise be promoted as a model of care? Dissemination of the Department of Veterans Affairs Gerofit program. *Journal of the American Geriatrics Society*, 66(5), 1009–1016. <https://doi.org/10.1111/jgs.15276>
- Morey, M. C., Pieper, C. F., Crowley, G. M., Sullivan, R. J., & Puglisi, C. M. (2002). Exercise adherence and 10-year mortality in chronically ill older adults. *Journal of the American Geriatrics Society*, 50(12), 1929–1933. <https://doi.org/10.1046/j.1532-5415.2002.50602.x>
- Morey, M. C., Pieper, C. F., Sullivan, R. J., Crowley, G. M., Cowper, P. A., & Robbins, M. S. (1996). Five-year performance trends for older exercisers: A hierarchical model of endurance, strength, and flexibility. *Journal of the American Geriatrics Society*, 44, 1226–1231. <https://doi.org/10.1111/j.1532-5415.1996.tb01374.x>
- Narici, M., De Vito, G., Franchi, M., Paoli, A., Moro, T., Marcolin, G., Grassi, B., Baldassarre, G., Zuccarelli, L., Biolo, G., di Girolamo, F. G., Fiotti, N., Dela, F., Greenhaff, P., & Maganaris, C. (2020). Impact of sedentarism due to the COVID-19 home confinement on neuromuscular, cardiovascular and metabolic health: Physiological and pathophysiological implications and recommendations for physical and nutritional countermeasures. *European Journal of Sport Science*, 1–22. <https://doi.org/10.1080/17461391.2020.1761076>
- Onder, G., Rezza, G., & Brusaferro, S. (2020). Case-fatality rate and characteristics of patients dying in relation to COVID-19 in Italy. *JAMA*, 323(18), 1775–1776. <https://doi.org/10.1001/jama.2020.4683>
- Peterson, M. J., Crowley, G. M., Sullivan, R. J., & Morey, M. C. (2004). Physical function in sedentary and exercising older veterans as compared to national norms. *Journal of Rehabilitation Research & Development*, 41(5), 653–658.
- Rikli, R. E., & Jones, C. J. (1999). Functional fitness normative scores for community-residing older adults, ages 60–94. *Journal of Aging and Physical Activity*, 7, 162–181.
- Russell, T. G., Hoffmann, T. C., Nelson, M., Thompson, L., & Vincent, A. (2013). Internet-based physical assessment of people with Parkinson disease is accurate and reliable: A pilot study. *Journal of Rehabilitation Research and Development*, 50(5), 643–650. <https://doi.org/10.1682/jrrd.2012.08.0148>
- Steele, L., Lade, H., McKenzie, S., & Russell, T. G. (2012). Assessment and diagnosis of musculoskeletal shoulder disorders over the internet. *International Journal of Telemedicine and Applications*, 2012, 945745. <https://doi.org/10.1155/2012/945745>
- US Department of Health and Human Services. (2018). *Physical Activity Guidelines for Americans*. US Department of Health and Human Services
- US Department of Veterans Affairs. (2019a). *VA reports significant increase in Veterans use of telehealth services*. <https://www.va.gov/opa/pressrel/pressrelease.cfm?id=5365>
- US Department of Veterans Affairs. (2019b). *VA telehealth services fact sheet 2019*. https://connectedcare.va.gov/sites/default/files/OT_va-telehealth-factsheet-2019-01.pdf
- US Department of Health Affairs. (2020). *Office of rural health enterprise-wide initiatives*. https://www.ruralhealth.va.gov/providers/Enterprise_Wide_Initiatives.asp
- Ware, J. E., & Sherbourne, C. D. (1992). The MOS 36-item Short-Form Health Survey (SF-36). *Medical Care*, 30(6), 473–483.

- Ware Jr., J. E., Snow, K., Kosinski, M., & Gandek, B. (2000). *SF-36® Health Survey: Manual and Interpretation Guide*. Quality Metric Incorporated.
- Weathers, F. W., Litz, B. T., Herman, D. S., Huska, J. A., & Keane, T. M. (2013). *The PTSD Checklist (PCL-5) - Standard*. International Society for Traumatic Stress Studies. <http://www.ptsd.va.gov/professional/assessment/adult-sr/ptsd-checklist.asp>
- Wilson, P. M., Rogers, W. T., Rogers, W., & Wild, T. C. (2006). The psychological need satisfaction in exercise scale. *Journal of Sport and Exercise Psychology*, 28(3), 231–251. <https://doi.org/10.1123/jsep.28.3.231>
- Wright, J. H., & Caudill, R. (2020). Remote treatment delivery in response to the COVID-19 pandemic. *Psychotherapy and Psychosomatics*, 89(3), 130–132. <https://doi.org/10.1159/000507376>