
Article

Remotely Delivered Exercise to Rural Older Adults with Knee Osteoarthritis: A Pilot Study

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Abstract: Enhance[®]Fitness (EF) is an evidence-based exercise program recommended for management of osteoarthritis (OA). However, access to EF is limited in rural areas. Accordingly, we evaluated the feasibility and acceptability of remotely delivered EF in rural, community-dwelling older adults with symptomatic knee OA. A single arm pilot trial of remotely delivered EF classes was conducted. Videoconferencing was used to livestream the instructor-led, 1-hour EF classes 3 days/week for 12 weeks. Outcomes were assessed at baseline and immediately post-intervention. A total of 15 participants were enrolled with a median age of 70 years (interquartile range [IQR]: 67-75) and 14 (93%) were women. Median EF class attendance rate was 91% (IQR: 85-94%). Knee pain, as measured by the Knee injury and Osteoarthritis Outcome Score (KOOS), improved significantly from baseline to 12-week endpoint (mean difference=-11.4 [95% CI:-20.9, -2.0]; $P=0.02$). In addition, participants' self-reported knee function improved significantly (mean difference in KOOS Function score=-11.8 [95% CI:-18.4, -5.2]; $P<0.01$) as well as their physical capacity (mean difference in Timed Up and Go test time=1.8 seconds [95% CI: 0.2, 3.4]; $P=0.03$). All participants (100%) were very satisfied with remotely delivered EF classes and there were no serious adverse events. Findings from this pilot trial indicate that remotely delivered EF is feasible and acceptable in rural older adults with knee OA.

Keywords: Tele-exercise; physical activity; rural; older adults; knee osteoarthritis; clinical trial

1. Introduction

Knee osteoarthritis (OA) is highly prevalent and a leading cause of pain that limits physical functioning in older adults [1]. Clinical practice guidelines recommend physical exercise for managing symptoms of knee OA [2]. Despite these recommendations, studies have shown that participation in exercise is very low in this population that has high risk for disability [3-5].

Recognizing the benefits of exercise for management of OA, the Centers for Disease Control and Prevention (CDC) has promoted evidence-based exercise programs that are group-based and led by instructors in the community [6, 7]. However, access to evidence-based exercise programs is severely limited in rural areas [8, 9]. Many rural residents are unable to participate in community-based exercise because of limited or lack of access to transportation and exercise facilities [10]. Walking is a common choice for exercise among older adults [11], yet, walking in rural areas is limited by lack of pedestrian infrastructure, including long distances between destinations and lack of sidewalks [12]. Considering that rural communities have a higher burden of arthritis [13] and obesity [14], as well as a higher proportion of older adults than non-rural areas [15], there is a critical need to adapt evidence-based exercise programs for remote delivery.

We have partnered with Sound Generations, a non-profit organization that manages Enhance@Fitness (EF), to adapt their evidence-based exercise program for remote delivery [16]. Enhance@Fitness is a multicomponent, instructor-led, group exercise program that is recommended by the CDC for adults with arthritis [17]. It is available in over 800 sites nationally and is covered by certain Medicare Advantage plans [18-20], but it is generally not available in rural areas. Therefore, we sought to evaluate the feasibility and acceptability of remotely delivered EF (tele-EF) among rural older adults with knee OA.

2. Materials and Methods

In partnership with Sound Generations and Arbor Health, a rural-serving health care system in Lewis County, Washington, we conducted a pilot trial of tele-EF. This study was reviewed and approved by the Institutional Review Board of the University of Washington in Seattle (STUDY00011517). The trial was registered with Clinicaltrials.gov (NCT04881864).

2.1. Study Design

This study was a single arm, 12-week pilot trial of tele-EF among rural older adults with knee OA. Outcomes were assessed at baseline and immediately post-intervention.

2.2. Participants and Recruitment

Study participants were residents of Lewis County, Washington, which is a rural county based on the CDC's National Center for Health Statistics urban-rural classification [21]. Inclusion criteria included: age ≥ 65 years, physician diagnosis of knee OA, symptomatic knee OA, knee pain-related difficulty with walking or going up/down stairs, community-dwelling, English-speaking, and able to walk independently. The exclusion criteria were cognitive impairment determined by a Mini Montreal Cognitive Assessment score of < 11 [22, 23] and any of the following in the past 6 months: cancer requiring treatment (except non-melanoma skin cancer), heart attack, stroke, hip fracture, hip/knee replacement, spinal surgery, heart surgery, deep vein thrombosis, or pulmonary embolus. Temporary exclusion included hospitalization within the last month.

To reach the target population (rural older adults with knee OA), we developed a toolkit for Arbor Health to promote the study, including a study brochure, poster, draft letter to patients identified through electronic health records, and content for print ads and social media postings. Arbor Health utilized all components of the toolkit to promote the project and the research team at the University of Washington fielded inquiries and screened potential participants by telephone. Recruitment occurred between December 18, 2020-March 16, 2021. Verbal informed consent was obtained from all study participants. Compensation for participating in the study was \$100. The pre-specified sample size was 14 participants.

2.3. Tele-EF Intervention

Zoom videoconferencing was used to livestream the EF classes that were led by an experienced, EF-certified instructor. Classes lasted 1-hour and were held 3 days per week, Monday, Wednesday, and Friday, for 12 weeks. Each EF class used a standardized format that included a 5-minute warm-up phase, 20 minutes of moderate-intensity aerobic training, 5-minute cool down with balance exercises, 20 minutes of strength training, and 10 minutes of cool down with stretching [18]. Strength training involved progressive resistance exercises, using adjustable 1- to 10-pound ankle and wrist weights. All participants were provided the same set of adjustable weights. In accordance with the EF protocol and training manual, the instructor modified exercises depending on the fitness level of individual participants, including doing exercises in the seated position, if necessary.

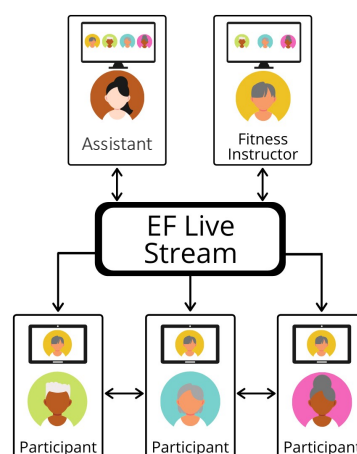


Figure 1. Illustration of remote delivery of EnhanceFitness® classes

Consistent with the guidance for remotely delivering EF, an Assistant helped the instructor and participants troubleshoot any technical challenges. In addition, the Assistant monitored for safety and had participant emergency contact information available.

Figure 1 illustrates that the EF instructor, participants, and Assistant could all interact during livestreamed EF classes. To facilitate opportunity for social interaction, the Assistant opened the virtual classroom approximately 10 minutes prior to the start of class and participants were able to join and see everyone in gallery view. Once it was time to start EF, the Assistant spotlighted the EF instructor on the screen, who then began leading the class in exercise. Importantly, however, both the EF instructor and Assistant were able to see all participants in gallery view to monitor for exercise form and any safety events. At the end of exercising, the Assistant removed the spotlight to provide participants an opportunity to visit and ask the instructor questions for a few minutes.

Prior to the start of classes, participants completed a technology needs assessment. Those who did not have appropriate equipment or sufficient access to broadband were given a cellular-enabled tablet to participate in the study. One-on-one orientation meetings were held via Zoom with each study participant to familiarize them to the tele-EF program and provide guided instruction on videoconferencing. When necessary, instructions on accessing and using Zoom were given by telephone prior to the orientation call. On average, the orientation meetings lasted 30 minutes (standard deviation=12 minutes). Tele-EF classes began on March 17, 2021 and ended June 9, 2021.

2.4. Measures

2.4.1. Participant Characteristics

Basic demographic (e.g., age, gender, race, ethnicity, etc.) and health characteristics (e.g., history of diabetes, myocardial infarction, stroke, etc.) were collected at baseline through an online questionnaire using the REDCap electronic data capture tools [24]. Participants also answered standard questions about their osteoarthritis and history of falling. The following definition of falling was provided, “By falling down we mean any fall, slip, or trip in which you lose your balance and land on the floor or ground or at a lower level.”

2.4.2. Feasibility and Acceptability

Multiple metrics were used to assess the feasibility and acceptability of tele-EF. The proportion of screened individuals who refused to participate but were eligible and the proportion of screened individuals who enrolled into the study are important feasibility measures. In addition, tele-EF class attendance was systematically recorded. We also recorded any technology challenges encountered when participants engaged in tele-EF

classes and, if telephone support was necessary, the call length was recorded. To assess acceptability, we asked participants at the end of the trial, "How satisfied are you overall with the Enhance Fitness classes?" There were 5 response options ranging from "Very dissatisfied" to "Very satisfied." Participants were also asked, "On a scale of 0-10, with 0 being not helpful at all and 10 being very helpful, how helpful was this program in supporting you to increase your physical activity?"

2.4.3. Secondary Outcomes

The collection of secondary outcomes was guided by expert recommendations for clinical trials of knee osteoarthritis [25, 26]. Multiple aspects of knee pain and physical function were measured with the Knee injury and Osteoarthritis Outcome Score (KOOS), which includes 5 subscales with scores ranging 0-100 (higher reflects better outcomes) [27]. The Patient-Reported Outcomes Measurement Information System 29-Item profile measure (PROMIS-29 v2.0) was collected to assess health-related quality of life across seven domains: anxiety, depression, fatigue, sleep disturbance, satisfaction with participation in social roles, physical functioning, and pain interference [28]. Domain scores range 0-100 with higher scores reflecting more of the concept being measured. To assess overall change in health, participants were asked to complete the single-item Patient Global Impression of Change (PGIC) rating ("Since the start of the study, my overall status is: "). The PGIC is widely used in chronic pain treatment trials and has 7 ordinal response options ranging from "Very much worse" to "Very much improved" [29, 30]. Participants completed all questionnaires online via REDCap.

In addition to self-reported measures, performance-based assessments of physical capacity were completed at Arbor Health, Morton Hospital by a trained physical therapist with over 30 years of experience in functional assessment. Tests of physical capacity included the Timed Up and Go (TUG), Short Physical Performance Battery (SPPB), and Single Leg Stand with eyes open (timed up to 30 seconds). For the TUG, participants stand up from a chair, walk 3 meters at their usual pace, turnaround, walk back to the chair, and sit back down [31]. Timing starts when the participant begins to stand up from the chair and stops when they sit back down. Older adults who take ≥ 12 seconds to complete the TUG test have greater risk of falling (vs. TUG time < 12 seconds) [32]. The SPPB is comprised of 3 tests of static balance (feet side-by-side, semi-tandem, and tandem for 10 seconds), usual gait speed over a 3- or 4-meter course (we used a 3-meter distance), and a 5-time sit to stand test [33]. Each of the 3 components of the SPPB is scored on a 0-4 scale and a total score is computed by summing the individual component scores (range 0-12, higher scores indicate better function). An SPPB score < 10 is associated with increased risk for mobility disability (vs. SPPB score ≥ 10) [34, 35]. During the visit with the physical therapist, height and weight were measured and participants picked-up or dropped-off the adjustable weights for exercise classes.

2.4.4. Adverse Events

Adverse events (AEs) were defined as any health event or injury that restricted a participant's activity for a day or required medical care, regardless of whether it was related to the tele-EF classes. Serious AEs were defined as any event that causes hospitalization or death or is life threatening. Every week during the 12-week intervention, participants completed an online questionnaire asking them about any activity-limiting health events or falls (as defined in section 2.4.1.) each day during past week. The study research coordinator contacted participants who reported an event or fall and obtained more information to determine its severity and relatedness to the study intervention.

2.4.5. Videoconference Technology Acceptance

A Technology Acceptance Model (TAM) scale was adapted to assess participant perceptions of the ease of use, usefulness, financial cost, and intention to use videoconference technology to exercise. Similar to prior studies that adapted the TAM-scale to assess use

of mobile technology [36, 37], the scale used in the current study has 10 items with 7-point Likert scale response options (see Supplementary Materials, Figure S1). There are 4 sub-scales with higher scores reflecting more of the concept being measured.

2.5. Sample Size and Data Analysis

A sample size of 14 participants was pre-specified to gain real-world experience implementing tele-EF classes in the target population. Guidance on remote delivery of EF recommends class sizes of 10-12 [38]. Resource constraints limited us to running a single livestream class for 12 weeks with an EF instructor and an assistant to monitor for safety and provide technology support. A group size of 12 is minimally recommended for pilot studies to assess for feasibility and provide minimal precision estimates of outcome measures [39]. We estimated an attrition rate of 15%, retaining 12 of 14 for data analysis.

Descriptive statistics were computed for all variables. Paired t-tests were used to examine within participant change (from baseline to post-intervention) in the secondary outcome measures as well as changes in videoconference acceptance measures. All statistical analysis was conducted with Stata IC 16.1 (College Station, Texas).

3. Results

3.1. Feasibility and Acceptability Metrics

A total of 27 individuals contacted the study team (Figure 2). Of these potential participants, 21 (77.8%) were eligible and 15 (55.6%) enrolled and completed the baseline assessments. Among those who enrolled, 13 (86.7%) completed 12 weeks of tele-EF classes and completed the post-intervention assessments. One participant withdrew in

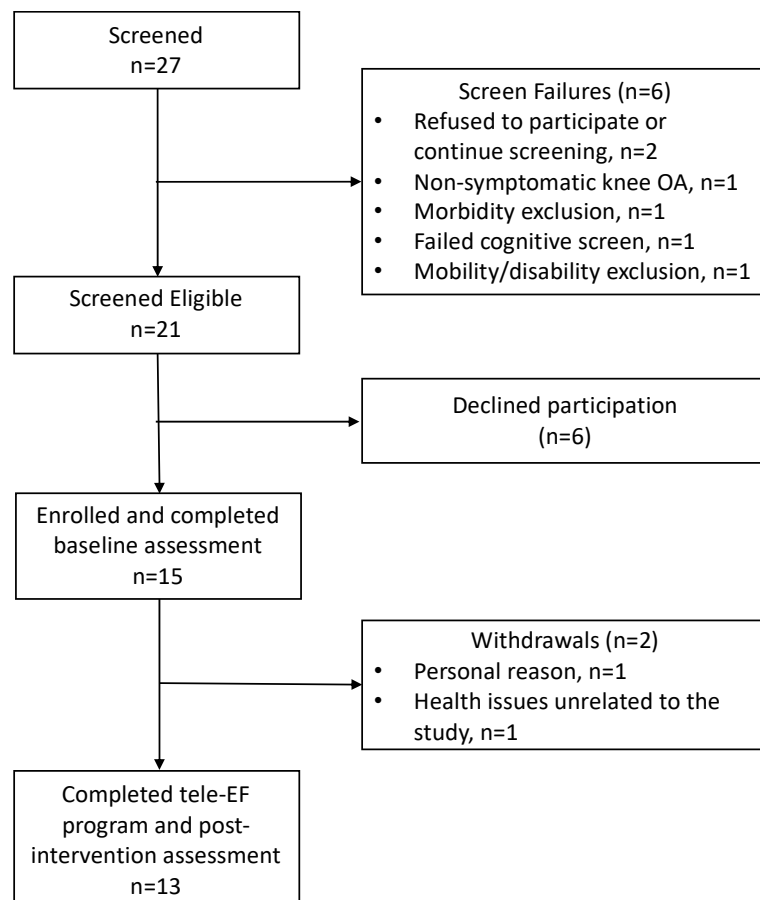


Figure 2. Flow of participants through the pilot trial of tele-EF

week 5 of the study because of health issues unrelated to tele-EF and another withdrew in week 10 to travel after COVID-19 restrictions were lifted. The study team was able to collect some self-reported outcomes data from the participant who withdrew to travel, but none from the participant who withdrew for health issues.

Over the 12-week intervention period, the median tele-EF class attendance rate was 91.4% (interquartile range: 84.5-94.3%; n=15). Fourteen telephone calls were made to address technology challenges that were encountered while participants attempted to engage in tele-EF. The majority (71.4%) of these technology support calls occurred during the first 2 weeks of tele-EF classes. The most common technology challenge encountered was a lack of or insufficient internet connection.

In terms of acceptability, all of the participants (100%; n=14) were very satisfied with tele-EF classes. On the 0-10 scale for rating how helpful the tele-EF program was for supporting participants to increase their physical activity, 9 (64.3%) gave a rating of 10 (very helpful), while 3 (21.4%) and 2 (14.3%) of the remaining participants gave ratings of 8 and 9, respectively.

Table 1. Participant characteristics at baseline (N=15)

	Mean (SD) or n (%)
Demographic Characteristics	
Age in years	71.8 (5.8)
Women	14 (93.3)
Race, White	14 (93.3)
Education	
High school graduate	1 (6.7)
Some college or vocational school	8 (53.3)
College graduate	4 (26.7)
Master's degree	2 (13.3)
Lives alone	3 (20.0%)
Retired	12 (80.0%)
Health Characteristics	
Duration of knee OA	
1-5 years	5 (38.5)
6-9 years	2 (15.4)
≥10 years	6 (46.2)
Hip OA	5 (33.3)
Hand OA	10 (66.7)
Knee replacement	5 (33.3)
Hip replacement	2 (13.3)
Obese (BMI ≥30 kg/m ²)	10 (71.4)
Total number of medical conditions	
2	3 (20.0)
3	6 (40.0)
≥4	6 (40.0)
Fall History	
Fell in the past year	8 (53.3)
Fell multiple times in the past year	5 (33.3)

3.2. Participant Characteristics

Table 1 shows the demographic and health characteristics of participants at baseline. Participants had a mean age of 71.8 years (standard deviation: 5.8), 14 (93.3%) were women, 14 (93.3%) were White, 9 (60.0%) had less than a college education, 10 (71.4%) were obese, and all had multiple chronic conditions. Most participants have had knee OA for over 5 years. The co-occurrence of hip and hand OA were common, and one-third of participants had a history of knee replacement surgery. Notably, half of participants reported falling in the past year and a third reported falling multiple times.

3.3. Secondary Outcomes

Table 2 shows results for the secondary outcome measures. Based on the mean KOOS scores at baseline, participants had moderate to severe knee pain and knee-related functional limitations. From baseline to the 12-week endpoint, the mean KOOS scores for knee pain, knee function in daily function, and knee function in sport and recreation improved significantly ($P<0.05$). The magnitude of improvements for knee pain and function in daily living are in the estimated range to be considered meaningfully important [40]. However, there were no statistically significant changes in other knee symptoms (e.g., stiffness) and knee OA-related quality of life. Anxiety, sleep disturbance, and pain interference, as measured by PROMIS-29, improved significantly ($P<0.05$). There were also improvements in

Table 2. Change in outcome measures from baseline to 12-week endpoint

	Mean (SD) at Baseline	Mean (SD) at 12-week Endpoint	Mean Difference from Baseline to 12-week Endpoint (95% CI)	P value
KOOS Subscales (n=14)¹				
Pain	53.6 (21.2)	65.0 (17.7)	-11.4 (-20.9, -2.0)	0.021
Symptoms	43.6 (13.8)	43.7 (13.8)	-0.1 (-5.9, 5.8)	0.977
Function in Daily Living	57.6 (22.0)	69.3 (16.3)	-11.8 (-18.4, -5.2)	0.002
Function in Sport/Recreation	17.5 (14.9)	25.0 (20.0)	-7.5 (-14.3, -0.7)	0.032
Quality of Life	42.4 (26.2)	43.3 (25.1)	-0.9 (8.5, -6.7)	0.801
PROMIS Domains (n=13)²				
Anxiety	51.4 (6.7)	48.5 (7.4)	2.9 (0.03, 5.7)	0.048
Depression	48.2 (7.3)	48.1 (7.3)	0.02 (-3.4, 3.4)	0.992
Fatigue	55.1 (10.6)	52.8 (10.8)	2.3 (-0.7, 5.4)	0.122
Sleep Disturbance	54.4 (10.1)	51.3 (4.6)	3.0 (0.1, 5.9)	0.043
Satisfaction with Participation in Social Roles	46.9 (12.0)	49.4 (5.9)	-2.5 (-7.7, 2.6)	0.303
Physical Function	38.8 (6.2)	41.7 (6.9)	-2.9 (-6.0, 0.1)	0.060
Pain Interference	58.3 (9.4)	54.7 (8.4)	3.6 (0.2, 7.0)	0.039
Tests of Physical Capacity (n=12)				
Timed Up and Go test in seconds	12.6 (4.6)	10.8 (3.7)	1.8 (0.2, 3.4)	0.032
Usual Gait Speed in meters/second	0.82 (0.20)	0.82 (0.17)	-0.003 (-0.07, 0.06)	0.933
Single Leg Stand test in seconds	6.3 (5.9)	7.4 (6.2)	-1.1 (-4.2, 2.0)	0.445
5-time Sit to Stand test in seconds	14.8 (4.1)	12.3 (2.8)	2.5 (1.2, 3.9)	0.002
Short Physical Performance Battery	9.2 (2.1)	10.1 (2.1)	-0.9 (-1.7, -0.1)	0.027

¹ KOOS=Knee injury and Osteoarthritis Outcome Score; subscale scores range 0-100 with higher scores reflecting better outcomes

² PROMIS=Patient-Reported Outcome Measurement Information System; domain scores range 0-100 with higher scores reflecting more of the concept being measured

self-reported physical function, fatigue, and satisfaction with participation in social roles, but changes in these PROMIS domain scores were not statistically significant. The magnitude of improvements in PROMIS anxiety, physical function, and pain interference are in the estimated range to be considered meaningfully important in adults with knee OA [41]. In terms of global rating of change, 12 participants (86%) reported that their condition had much improved or very much improved since beginning the tele-EF program.

The baseline means for the TUG and SPPB indicate that the study sample, on average, had elevated risk of falling and mobility disability. Performance on these 2 tests of physical capacity as well as on the 5-time sit to stand improved significantly from baseline to 12-week endpoint ($P < 0.05$). Improvements in TUG time and SPPB score are in the range to be considered meaningfully important [42, 43]. There were no statistically significant improvements in usual gait speed over 3 meters or in balance performance.

3.4. Adverse Events

Over the 12-week intervention period, there were 15 AEs and no serious AEs. The most common AEs were pain flares, falls, and back pain. Only one of the AEs (a pain flare) was related to the tele-EF intervention (participant reported exercising too intensively at the beginning of the study; pain flare resolved prior to the next EF class).

3.5. Acceptance of Videoconference Technology

Table 3 shows results from the adapted TAM scale used to assess perceptions of videoconference technology for exercising. From baseline to 12-week endpoint, there were statistically significant increases in participant perceptions of the ease of use and usefulness of videoconferencing for engaging in exercise ($P < 0.05$). At baseline, participants somewhat disagreed, on average, that the financial cost of videoconference technology would be a barrier. There was no change in this subscale at the end of 12 weeks of tele-EF. Participants intention to use videoconferencing for exercise also did not change, but the average rating on this subscale was high already at baseline, likely reflecting participants willingness to participate in tele-EF.

Table 3. Changes from baseline to 12-week endpoint in acceptance of videoconference technology for exercising

	Mean (SD) at Baseline	Mean (SD) at 12-week Endpoint	Mean Difference from Baseline to 12-week Endpoint (95% CI)	P value
Technology Acceptance Model Subscales¹ (n=13)				
Perceived Ease of Use	5.3 (1.0)	6.4 (0.8)	-1.1 (-1.6, -0.6)	0.001
Perceived Usefulness	5.8 (0.9)	6.6 (0.4)	-0.8 (-1.3, -0.4)	0.001
Perceived Financial Cost as a Barrier	3.0 (1.5)	2.8 (1.5)	0.2 (-0.9, 1.2)	0.745
Behavioral Intention	6.1 (5.8)	6.3 (5.8)	-0.2 (-0.7, 0.3)	0.337

¹ Adapted Technology Acceptance Model measure is comprised of 10 items that have a 1-7 response range with higher scores reflecting greater agreement with the concept being measured

4. Discussion

The current pilot study aimed to investigate the feasibility and acceptability of remote delivery of EF classes to rural, community-dwelling older adults with knee OA. The results show that, in partnership with a rural-serving health care system (Arbor Health), we were able to recruit a hard to reach population and enroll our target sample size over a 12-week period that included the winter holidays. Among potential participants who contacted us, over half were eligible and enrolled into the study. Also, the tele-EF class attendance rate and study retention rate were high. Lastly, several measures of pain and

physical function improved significantly from baseline to the 12-week endpoint. Perceptions on the ease of use and usefulness of videoconference technology for exercising also improved. Taken together, these findings indicate that remote delivery of EF to rural older adults with knee OA is feasible and acceptable.

The CDC and other groups have recognized the need to improve equity in access to and delivery of evidence-based arthritis management programs [6]. A recent study found that experts rated land-based home exercise the highest priority intervention for knowledge translation and dissemination to help decrease disparities in knee OA and improve outcomes in underserved populations, including rural communities [44]. Given the results of the current study, remote delivery of EF classes is a promising intervention to address environmental barriers to exercise participation [10] and reduce the high burden of OA in the rural population [13]. Although 5 participants in the current study received a cellular-enabled tablet to participate in tele-EF, the feasibility of disseminating tele-EF in the United States is enhanced by recent appropriations to expand broadband in rural areas to support telehealth services [45, 46].

Engaging rural older adults in health promotion is challenging for a variety of reasons, including geographic barriers and transportation difficulties. However, considering that older adults are routinely seen in primary care clinics, partnering with rural-serving health care systems can facilitate opportunities to promote physical activity. Indeed, our partnership with Arbor Health was critical to reaching the current study's target population. Anecdotally, some participants shared that receiving the recruitment letter from Arbor Health and checking with their physician helped assure them about the legitimacy of the study and tele-EF program. Partnerships with health care systems can also help sustain programs. Arbor Health, for instance, obtained an EF license to begin offering tele-EF classes in light of the feedback they received from study participants.

It is notable that half of the study participants at baseline reported falling in the past year and a third had fallen multiple times. (Table 1). Further, the average time to complete the TUG at baseline was ≥ 12 seconds (Table 2), a threshold recommended by the CDC to identify those with high risk of falling (<https://www.cdc.gov/steady/>). This high prevalence of falls-related risk factors is consistent with epidemiologic studies reporting that knee OA is associated with increased falls risk [47-50]. The magnitude of change in TUG time (1.8 seconds, Table 2) from baseline to 12-week endpoint was substantial and clinically meaningful [42], suggesting that participation in tele-EF may reduce falls risk. Previous studies have demonstrated that participation in the standard, in-person EF program improves performance-based measures of physical capacity, including the TUG test [51], and is associated with reduced risk of falls-related injury [52]. Indeed, the National Council on Aging recognizes EF as an evidence-based falls prevention program [53]. Future trials are needed to demonstrate the efficacy of tele-EF for reducing falls risk and other outcomes relevant to older adults with OA.

Several limitations should be considered when interpreting the current study results. First, this pilot study was not statistically powered to detect meaningful change in outcome measures. Also, there was no control group to compare changes in outcomes and evaluate the efficacy of tele-EF. Second, the duration of the tele-EF intervention was limited to 12-weeks (36, 1-hour exercise classes). Third, outcomes were only assessed immediately post-intervention without long-term follow-up. Lastly, the study's generalizability might be limited as we only partnered with one health care system in a single rural county in Washington state.

5. Conclusions

To our knowledge, this is the first study to evaluate remote delivery of EF – an evidence-based exercise program that is recommended by CDC for arthritis management [17]. The study findings indicate that remotely delivered EF is feasible and acceptable to rural older adults with knee OA. However, additional research is needed with larger trials to

evaluate the effectiveness of tele-EF for improving pain and physical function in this target population that has limited access to in-person evidence-based exercise programs.

Supplementary Materials: Figure S1: Adapted TAM scale.

Author Contributions: The following are individual contributions according to CRediT (Contributor Roles Taxonomy): conceptualization, K.P.; methodology, K.P., N.G.; validation, E.H., K.P.; formal analysis, K.P.; investigation, K.P., E.H., E.P., N.G.; resources, K.P.; data curation, E.H.; writing—original draft preparation, K.P.; writing—review and editing, E.H., E.P., N.G.; visualization, E.H., K.P.; supervision, K.P.; project administration, E.H., K.P.; funding acquisition, K.P., N.G., E.P. All authors have read and agreed to the published version of the manuscript.

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Institutional Review Board Statement: The study was conducted according to the guidelines of the Declaration of Helsinki, and approved by the Institutional Review Board of the University of Washington (STUDY00011517).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: De-identified data can be obtained under a data-sharing agreement by contacting the corresponding author.

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