

Research Article

Evaluating 5% Healthier: An e-Service-Learning Teleexercise Program for Undergraduate and Graduate Students in Exercise Physiology

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Received 3 February 2022; Revised 23 March 2022; Accepted 1 April 2022; Published 19 April 2022

Academic Editor: Gwo-Jen Hwang

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An e-service-learning teleexercise program, 5% Healthier, provided a remote experiential learning opportunity for students and a supervised exercise program for participants during the COVID-19 pandemic. The present study retrospectively evaluated whether students achieved course learning outcomes and improved their ability to work in teleexercise and if the intervention was a successful exercise program for participants. Supervised by graduate students, undergraduate student coaches provided 10 weeks of personalized exercise coaching to participants. Pre- and postperformance assessments were collected on participants, and anonymous surveys were administered to students and participants. Twenty-two undergraduate students and nine graduate students participated. Students' perceptions of the e-service-learning experience were generally positive, and almost all felt it allowed them to meet the course learning outcomes and improved their ability to work in teleexercise. Seventy-three participants completed the exercise program and showed improvements in all performance assessments (body composition (weight, BMI), shoulder and hamstring flexibility, upper and lower body muscular endurance, and overall function ($p < 0.01$)). Participants rated the program highly and agreed that 5% Healthier helped them gain fitness (93%). The 5% Healthier e-service-learning program is a successful model for experiential learning in exercise physiology, and the teleexercise program improved participants' performance outcomes.

1. Introduction

Service-learning, a type of experiential learning, requires students to actively participate in organized experiences that meet community needs [1, 2]. By placing equal focus on learning goals and service outcomes, the curricular concepts are experienced in the context of real-life situations [2]. Therefore, by unifying what they are learning in the classroom with the service they are providing in the community, students apply newly acquired skills and knowledge to address real-life needs [2, 3], which can help them develop civic or social responsibility [4].

Increasingly incorporated into higher education to advance curriculum goals (e.g., deepening understanding of academic content) [1], service-learning requires practical application of gained knowledge, refinement of technical

skills, and development of higher order thinking, thereby bridging academic understanding and applied experiences [2, 5–9]. Further, it is positively correlated with graduation rates and employment outcomes [10] and can facilitate students' personal and professional development [11–13]. e-service-learning (electronic service-learning), as defined by Waldner and colleagues, occurs when the instruction component, the service component, or both are conducted online [14]. This frees service-learning from geographical constraints and improves, in many cases, the flexibility and adaptability of service-learning experiences.

e-service-learning predates the COVID-19 pandemic, but the pandemic onset marked the growth of e-service-learning as many courses pivoted to remote delivery [15]. In the discipline of exercise physiology, typical experiential or service-learning opportunities that delivered exercise

training (e.g., personal training and group fitness classes) were transitioned online making teleexercise (exercise programming and interventions provided remotely and delivered via information and communication technologies) more common [16]. Students delivering teleexercise as part of an e-service-learning course during the pandemic may develop important skills sets for the postpandemic workforce (e.g., comfort with technology-based communications), including those specific to being an exercise physiologist (e.g., delivering exercise training remotely). However, these benefits have yet to be determined.

For many, teleexercise was a welcome intervention as the pandemic negatively impacted physical and mental health outcomes [17]. The benefits of regular physical activity and/or exercise are well-documented, but the impact of COVID (e.g., working from home and closures of fitness facilities) contributed to increased sitting time, decreased physical activity, and poorer physical health among many [18, 19]. Additionally, the pandemic has been a significant source of stress and isolation for many, contributing to poorer mental health [19, 20]. Incorporating regular physical activity or exercise through teleexercise during the pandemic could decrease sedentary behavior and improve stress, physical fitness outcomes, and exercise adherence.

An e-service-learning teleexercise program, 5% Healthier, was developed to provide students a remote experiential learning opportunity and participants a supervised exercise program during the pandemic. However, the success of e-service-learning teleexercise programs has not been documented, and determining the viability of this program as a valid learning experience and successful exercise intervention is warranted. Therefore, the present study sought to evaluate whether students completing this e-service-learning experience achieved course learning outcomes and improved their ability to work in teleexercise addressing pandemic-related health concerns. Further, this study evaluated whether the teleexercise intervention was a successful exercise program for participants.

2. Methods

The primary objective of this study was to determine whether an e-service learning physical activity program improved participant's fitness outcomes as well as learning outcomes of student interns. This study was conducted as a retrospective mixed-methods analysis (quantitative and qualitative data included) of the program and was approved by the Institutional Review Board (IRB 21114732235) of West Virginia University (WVU).

Authors include the co-directors of a Professional Field Placement course and the supervisors of this project (teaching assistant professor and a clinical associate professor) as well as a performance physiologist (teaching assistant professor) that analyzed deidentified data. All authors were faculty from a large (~900 students) undergraduate exercise physiology major in the School of Medicine at a land-grant, R1 research institution (doctoral granting institution with very high research activity, as per the Carnegie Classification of Institutions of Higher Education) in West Virginia (mid-

Atlantic United States) where the 5% Healthier e-service-learning teleexercise program was conducted. During the COVID-19 pandemic, this free exercise coaching program was developed and implemented for university-affiliated faculty and staff, which included two satellite campuses in more rural settings. Briefly, supervised by graduate student who served as supervisors, undergraduate interns (4th year undergraduate students completing an internship for required coursework) served as student coaches which allowed them to integrate their understanding of relevant coursework (e.g., flexibility assessments, and exercise prescription) and apply it by working directly with participants (university-affiliated faculty and staff).

Professional Field Placement is a hands-on learning internship course designed to provide students an opportunity to reinforce classroom knowledge within a supervised environment. These experiences promote experiential learning, practical application of acquired skills, and valuable work experience while fulfilling a necessary graduation requirement. All undergraduate students are required to complete four credit hours (45 contact hours/1 credit hour) totaling 180 hours of internship experience for their senior-level (4th year) Professional Field Placement course. Students self-select placement into a variety of different internship settings including strength and conditioning, clinical exercise prescription, and fitness/wellness for healthy populations. Additionally, this course requires undergraduate students to receive a formal evaluation from supervisors at the midpoint and end of the semester (final). For this pass/fail course, undergraduate students fail if they do not receive a rating of "acceptable" in all categories of their final evaluation. Graduate students in the exercise physiology masters program are also required to accumulate internship hours through Professional Field Placement. Due to social distancing measures enforced during the COVID-19 pandemic, remote internship opportunities that paralleled these in-person, hands-on experiences were needed to meet undergraduate and graduate course and graduation requirements.

During the spring 2021 semester, 97 undergraduate students enrolled in the course, of which 22 participated in 5% Healthier, a remote exercise coaching program. This program was implemented to meet the growing wellness needs of West Virginia University faculty and staff while allowing internship students to practice telehealth as a means of delivering personalized exercise programming. This e-service-learning program was designed to reflect the specific learning outcomes intended for the Professional Field Placement course, including the following:

Undergraduate

- (i) Take part in practical experiences within the exercise physiology environment
- (ii) Gain a more complete understanding of various exercise physiology functions
- (iii) Develop the ability to analyze and propose solutions to problems that you may encounter as an exercise physiologist

- (iv) Develop a greater understanding about career options while more clearly defining personal career goals
- (v) Improve your level of responsibility and professionalism pertaining to both course work and industry
- (vi) Develop and refine oral and written communication skills with potential employers, coworkers, and instructors

Graduate

- (i) Translate scientific information to a lay audience
- (ii) Interact professionally with clients/patients
- (iii) Develop exercise programming and prescription
- (iv) Provide important and meaningful service to others
- (v) Provide services to remote workers

Prior to beginning the e-service-learning program and during the first three weeks of the semester, the undergraduate students matriculated through a three-part series of virtual, active learning education sessions encompassing various facets of exercise prescription. Each of these virtual education sessions was administered through a learning management platform asynchronously and promoted creation of exercise prescriptions and proficiency in utilizing telehealth technologies. All undergraduate students received training on administering preexercise assessments, taking a health history, and engaging participants in a goal-setting discussion through a videoconferencing platform. Students received feedback from instructors and the course graduate assistant on all aspects of training. Following this training, undergraduate students were assigned to a graduate student mentor that served as their supervisor throughout the semester.

For their Professional Field Placement requirements, all graduate students from the masters program in clinical exercise physiology served as a supervisor to two undergraduate students. In this role, graduate students, with more clinical training, education, and experience, critiqued each exercise prescription prior to the undergraduate student distributing it to their assigned participant. Furthermore, graduate students surveyed weekly exercise programming for safety and effectiveness, provided feedback, and mentored their assigned undergraduate students towards producing safe and effective exercise prescriptions. Graduate students were responsible for formally evaluating undergraduate students at the midsemester and final evaluations; graduate students were formally evaluated by the Professional Field Placement course faculty.

Participants for the 5% Healthier program were recruited via university e-mail announcements advertising free, personalized coaching via telehealth. Interested participants registered for the program and were randomly assigned to an undergraduate student intern that served as their exercise coach (roughly 5 participants per undergraduate student intern). Once assigned, undergraduate students connected with their assigned participants to determine the

best means of correspondence as well as an ideal virtual meeting space and time. Students met with their participants utilizing live videoconferencing to conduct preliminary fitness assessments (body composition, shoulder and hamstring flexibility, upper and lower body muscular endurance, and overall function), collect health histories, and discuss the participants' needs and goals.

2.1. Participant Performance Outcomes. Performance outcome variables for all participants were collected prior to and following the 10 weeks of personalized coaching. Student coaches were trained on how to assess all performance outcome variables utilizing a videoconferencing platform. Training included the use of educational videos and digital worksheets of which all students viewed and completed for familiarization. Once completed, students attended a live videoconferencing session guided by the course instructors and graduate students. During the session, students were provided a demonstration of how to effectively conduct the performance assessments and then divided into pairs to conduct practice assessments on their peers. Subsequently, students were asked to provide feedback and ask questions for further clarification of the procedures.

2.1.1. Anthropometrics. Height and weight were reported by each participant and recorded by the student. Body mass index (BMI) was then calculated from height and weight (kg/m^2).

2.1.2. Flexibility. Lower extremity flexibility was assessed using the chair sit and reach adapted from the Senior Fitness Test [21]. Participants were asked to sit in a stationary, sturdy chair in a way that the camera could capture the full range of motion during the assessment. They were instructed to sit on the edge of the chair and extend one leg while dorsiflexing their foot. Participants were instructed to place one hand atop the other, take a deep breath in and upon exhalation, hinge forward from their waist without rounding their backs, and extend their arms to reach for their foot. Students cued participants to maintain a straight leg during the test and reach as far as they could with their middle finger. Students recorded the outcomes and made note of the distance attained with both the right and left sit and reach test. The more flexible of the two limbs was further measured. Two additional tests were conducted on the more flexible limb with notes being taken on body position and distance reached.

Upper extremity flexibility was assessed using a shoulder flexibility assessment commonly referred to as the back scratch test [22]. Participants were instructed to reach one arm up towards the ceiling with the palm facing forward and one arm down towards the floor with the palm facing backwards. Further instruction of bending the top arm's elbow to "pat yourself on the back" and bending the bottom arm's elbow with the back of your hand reaching towards the shoulder blades was provided. Participants were coached to reach their fingertips towards one another to try to get them to touch. The test was completed on both the right

and left sides. Students recorded the outcomes and made note of the distance attained.

2.1.3. Strength. Functional lower extremity strength was assessed using the 30-second sit-to-stand test [23]. Participants were instructed to position a sturdy, stationary chair against a wall. They were then directed to sit with their arms crossed against their chest and their feet planted in a staggered stance, slightly behind the knee joint on the ground. Students cued the participants to move from sit to stand as quickly as possible with safety in mind. Participants completed as many sit-to-stand actions as they could within a 30-second time frame while the students silently counted their repetitions. Students reinforced that participants had to move from a completely seated position to a fully standing position in order for the repetition to count. Total number of repetitions were recorded in addition to any comments in reference to posture, fatigue, or other notable observations.

The push-up test [24] was administered to assess upper body strength. Students instructed proper push-up form depending on gender and ability as per ACSM's Guidelines for Exercise Testing and Prescription [25]. Students emphasized that the body, including the back, must be straight at all times, and that each repetition would be counted as the chin touches the mat and returns back to the extended arm position. The assessment was stopped when the client strained forcibly or was unable to maintain the proper technique. The number of repetitions was counted and recorded by the student.

2.1.4. Mobility and Balance. The timed up and go (TUG) test was used to assess mobility and balance [26]. Observations concerning gait and fall risk were also noted during the assessment. Participants were instructed to set a sturdy, stationary chair up in a place where the video would be able to capture the entire test. They were then directed to move from sit to stand and then walk approximately 10 feet where they would turn around and return to their chair. Distances walked were adjusted in relation to where the participant was performing the assessment. Students made note of location and distance during the preassessment so that the test could be replicated for the postassessment. Participants were given a demonstration of the test and were then instructed to complete the test as quickly as possible. Students recorded the time, location, and distance, as well as documenting other important information concerning location or performance.

Using this data, undergraduate students created a personalized 10-week exercise prescription as well as educational resources for global wellness needs that were integrated into weekly program emails. Participants, undergraduate students, and graduate students received a weekly educational email focused on a specific wellness topic (e.g., exercise to boost the immune system, the importance of strength training for healthy aging) and included an informative infographic created by a student coach, links to wellness tools, and related articles, as well as recommendations for the wellness practice.

The personalized coaching sessions were conducted via videoconferencing in addition to email correspondence and

shared video recordings. Participants and students were permitted the autonomy of selecting the telehealth platform that best suited their needs and coaching styles. Regardless of platform, weekly one-on-one coaching sessions advanced participants through the 10-week program. At the culmination of the program, participants completed postassessments and a 14-item online feedback survey (delivered via Qualtrics, Inc., Provo, UT) that included some open-ended questions. Questions were on a 5-point Likert scale with lower numbers associated with more positive or favorable responses (e.g., how would you rate...: (excellent (1), good (2), average (3), poor (4), and terrible (5)); the 5% Healthier program helped me... (strongly agree (1), somewhat agree (2), neither agree nor disagree (3), somewhat disagree (4), and strongly disagree (5))). The online survey was designed in-house by the project coordinators and was not validated (appendix 1).

At the end of the semester, once internship requirements were finalized and all undergraduate students had been formally evaluated for the course, they completed an anonymous impact evaluation survey relating e-service experiential learning to improvements in knowledge base and transferrable skills. The survey was a 37-item online (delivered via Qualtrics, Inc., Provo, UT) survey. The survey integrated the Professional Field Placement learning objectives as well as questions specific to professional development competencies and skills related to address pandemic-related health issues and remote exercise coaching. Questions were on a 5-point Likert scale with lower numbers associated with more positive or favorable responses (e.g., do you feel you have met these course learning objectives? (definitely yes (1), probably yes (2), might or might not (3), probably not (4), and definitely not (5)); compared with when you started your internship, how much have you improved in the following areas? (a great deal (1), a lot (2), a moderate amount (3), a little (4), and same as before (5))). The online survey was designed in-house by the project coordinators and was not validated (appendix 2).

At the end of the semester, after graduate students were formally evaluated for the course, and they also completed a separate anonymous online survey to assess the impact of their mentoring experience. The survey was a 27-item online (delivered via Qualtrics, Inc., Provo, UT) survey. The survey integrated the Professional Field Placement learning objectives with professional development skills. Questions were on a 5-point Likert scale with lower numbers associated with more positive or favorable responses (e.g., this role has improved my ability to: (definitely yes (1), probably yes (2), might or might not (3), probably not (4), and definitely not (5)); compared with when you started this supervisor role, how much have you improved in the following areas? (a great deal (1), a lot (2), a moderate amount (3), a little (4), and same as before (5))). The online survey was designed in-house by the project coordinators and was not validated (appendix 3).

For quantitative data, descriptive statistics summarizing numerical data were analyzed using Microsoft Excel and reported as means \pm SD. Differences between pre and post-assessments were analyzed using paired *t* tests. Bonferroni

corrections were employed to control for familywise error rate in multiple comparisons. p values less than 0.05 were considered significant. For Likert data, the number of positive responses on (1 and 2) the 5-point Likert scale was summed and calculated as percent positive responses. Mean \pm SD were reported to indicate strength of positive responses and range (minimum (most positive/favorable)–maximum (most negative/least favorable)) was reported to demonstrate the spread of the data.

For qualitative data, using thematic analysis, standard qualitative analysis procedures were employed. Qualitative responses were compiled and content-analyzed by two independent researchers with a tiebreaker when necessary. Researchers independently identified themes in the data, compared results for congruence, and discussed differences to reach consensus on all themes [27].

3. Results

3.1. Undergraduate Students. During the spring 2021 semester, 22 undergraduate students completed their internship requirement by serving as a student coach in the 5% Healthier e-service-learning program. All students completed course requirements and passed assessment of the course learning outcomes; the final evaluation was completed by their graduate student supervisor.

Students' perceptions of the program were generally positive; almost all felt the experience allowed them to meet the course learning outcomes.

- (i) Take part in practical experiences within the exercise physiology environment (95%, 1.4 ± 0.6 , range: 1–3)
- (ii) Gain a more complete understanding of various exercise physiology functions (95%, 1.6 ± 0.7 , range: 1–3)
- (iii) Develop the ability to analyze and propose solutions to problems that you may encounter as an exercise physiologist (84%, 1.6 ± 0.8 , range: 1–3)
- (iv) Develop a greater understanding about career options while more clearly defining personal career goals (95%, 1.4 ± 0.6 , range: 1–3)
- (v) Improve your level of responsibility and professionalism pertaining to both course work and industry (95%, 1.3 ± 0.6 , range: 1–3)
- (vi) Develop and refine oral and written communication skills with potential employers, coworkers, and instructors (95%, 1.3 ± 0.6 , range: 1–3)
- (vii) Translate scientific information to a lay audience (89%, 1.6 ± 0.7 , range: 1–3)

Further, the internship experience helped undergraduate student interns better understand exercise physiology coursework (95%, 1.6 ± 0.8 , range: 1–4), apply concepts from exercise physiology coursework (95%, 1.5 ± 0.6 , range: 1–3), synthesize information from different exercise

physiology courses (100%, 1.4 ± 0.5 , range: 1–2), and develop professional competencies (95%, 1.3 ± 0.5 , range: 1–2) (Table 1). The e-service-learning program achieved important outcomes related to implementing remote exercise coaching and addressing health consequences of the pandemic (Table 2).

Most students felt their graduate student supervisor was helpful (89%, 1.5 ± 0.8 , range: 1–3) and provided them learning opportunities (84%, 2.0 ± 1.2 , range: 1–4) and sufficient feedback (74%, 1.7 ± 0.9 , range: 1–4).

3.2. Graduate Students. Nine graduate students served as supervisors for undergraduate student interns. Of these, all students completed course requirements and passed assessment of the course learning outcomes as assessed by the final evaluation (completed by the course faculty). Almost all (8/9) felt their experience prepared them to work in a remote or hybrid employment position after graduation. Graduate students' perceptions of the program were generally positive. Almost all felt the experience allowed them to meet the course learning outcomes.

- (i) Translate scientific information to a lay audience (78%, 2.0 ± 1.2 , range: 1–4)
- (ii) Interact professionally with clients/patients (78%, 2.1 ± 1.3 , range: 1–5)
- (iii) Develop exercise programming and prescription (89%, 1.9 ± 1.3 , range: 1–5)
- (iv) Provide important and meaningful service to others (78%, 1.8 ± 0.8 , range: 1–3)
- (v) Provide services to remote workers (78%, 1.8 ± 1.1 , range: 1–4)

Further, the supervisor experience allowed them to help mentees develop greater understanding of exercise programming (75%, 1.8 ± 0.9 , range: 1–3), employ strategies to enhance mentees knowledge and abilities (100%, 1.3 ± 0.5 , range: 1–2), recognize and take advantage of teaching moments (88%, 1.5 ± 0.8 , range: 1–3), and develop professional competencies (67%, 2.2 ± 0.7 , range: 1–3) (Table 3).

3.3. Participants. Of those that started the program ($n = 110$), 73 (66%) participants completed the postassessments and 57 participants (52%) completed the survey. Of those that completed the survey, 77% ($n = 44$) completed at least 9 of the 10 weeks of exercise training. Prior to starting the program about half ($n = 36$, 49%) met recommendations for exercising (at least 3 times per week), but this increased to 92% ($n = 62$) during the program.

There were significant improvements in all outcome measures including body composition (weight and BMI), shoulder and hamstring flexibility, upper and lower body muscular endurance, and overall function (Table 4).

Of those participants that completed the feedback survey, most reported a "good" or "excellent" experience with their student trainer (91%, 1.3 ± 0.6 , range: 1–3), the quality of the programming (100%, 1.3 ± 0.5 , range: 1–2),

TABLE 1: Undergraduate student professional competency improvement.

	% positive	Average \pm SD	Range
Interact professionally with clients/patients	89%	1.5 \pm 0.7	1–3
Develop exercise programming and prescription	100%	1.3 \pm 0.4	1–2
Provide important and meaningful service to others	100%	1.2 \pm 0.4	1–2
Assuming responsibility	79%	1.8 \pm 0.8	1–3
Taking the initiative	74%	2.0 \pm 0.8	1–3
Self-confidence	74%	1.8 \pm 0.9	1–3
Accepting constructive criticism	79%	2.1 \pm 1.1	1–5
Leadership abilities	84%	1.6 \pm 0.9	1–4
Quality of work produced	79%	1.8 \pm 0.9	1–4
Ability to convey topics effectively	68%	1.9 \pm 1.0	1–4
Timeliness of communication	68%	2.3 \pm 1.4	1–5
Appropriateness & courtesy of communication	84%	1.5 \pm 0.9	1–4
Verbal communication with clients/patients	74%	1.6 \pm 1.0	1–4
Verbal communication with supervisors	74%	1.7 \pm 1.0	1–4
Written communication with clients/patients	84%	1.7 \pm 0.9	1–4
Written communication with supervisors	79%	1.7 \pm 0.9	1–4
Tech based communication	79%	1.7 \pm 0.9	1–4
Communication within a group or team	58%	2.1 \pm 1.1	1–4

% positive: relative percent of positive responses (1 and 2) on 5-point Likert scale (1 is most positive, and 5 is most negative); mean \pm SD, range (minimum/most positive–maximum/most negative).

TABLE 2: Development of remote exercise coaching and pandemic-related outcomes.

	% positive	Average \pm SD	Range
<i>Exercise coaching-related outcomes</i>			
Provide services to remote workers	100%	1.2 \pm 0.4	1–2
Help clients develop the habit of exercising	95%	1.4 \pm 0.6	1–3
Help clients improve activities of daily living	100%	1.2 \pm 0.4	1–2
Help clients create an active workday	95%	1.2 \pm 0.5	1–3
Help clients prioritize their health and fitness	100%	1.3 \pm 0.4	1–2
<i>Pandemic-related outcomes</i>			
Sedentary behavior	100%	1.2 \pm 0.4	1–2
Social isolation	100%	1.3 \pm 0.5	1–2
Stress	89%	1.4 \pm 0.7	1–3
Mental wellness	89%	1.5 \pm 0.7	1–3

% positive: relative percent of positive responses (1 and 2) on 5-point Likert scale (1 is most positive, and 5 is most negative); mean \pm SD, range (minimum/most positive–maximum/most negative).

and the educational component (88%, 1.7 \pm 0.7, range: 1–4). Almost all (98%) would recommend this program to others. The respondents agreed that 5% Healthier helped them gain fitness (93%, 1.4 \pm 0.6, range: 1–3), improve mental health (81%, 1.7 \pm 0.9, range: 1–5), relieve stress (83%, 1.7 \pm 0.8, range: 1–4), develop the habit of exercising (83%, 1.7 \pm 0.9, range: 1–5), and improve their ability to complete daily activities (80%, 1.7 \pm 0.9, range: 1–4).

3.4. Qualitative Outcomes. Themes identified through analysis of responses of participants to open-ended questions included enjoyment of the program, qualities and skills of student trainers, and recommendations for additional resources and improvements to the program.

The program received generally positive open-response feedback from participants, “This was a lot of fun!”, “What a great program!”, and “Very much enjoyed the program.”

TABLE 3: Graduate student professional competency improvement.

	% positive	Average \pm SD	Range
Active listening skills	100%	1.6 \pm 0.5	1–2
Providing constructive feedback	88%	1.5 \pm 0.8	1–3
Assuming responsibility	67%	2.4 \pm 1.7	1–5
Taking the initiative	56%	3.0 \pm 1.6	1–5
Self-confidence	67%	2.7 \pm 1.6	1–5
Accepting constructive criticism	44%	2.9 \pm 1.4	1–5
Leadership abilities	67%	2.8 \pm 1.7	1–5
Quality of work produced	44%	3.1 \pm 1.7	1–5
Ability to convey topics effectively	67%	2.7 \pm 1.4	1–5
Timeliness of communication	44%	3.1 \pm 1.7	1–5
Appropriateness & courtesy of communication	44%	3.2 \pm 1.8	1–5
Verbal communication with clients/patients	44%	2.9 \pm 1.8	1–5
Verbal communication with supervisors	44%	3.1 \pm 1.9	1–5
Written communication with clients/patients	56%	2.6 \pm 1.7	1–5
Written communication with supervisors	56%	2.8 \pm 1.6	1–5
Tech-based communication	67%	2.6 \pm 1.9	1–5
Communication within a group or team	56%	2.9 \pm 1.8	1–5

% positive: relative percent of positive responses (1 and 2) on 5-point Likert scale (1 is most positive, and 5 is most negative); mean \pm SD, range (minimum/most positive–maximum/most negative).

TABLE 4: Performance outcomes.

	Pre	Post	Change
Weight (lbs)	181.5 \pm 48.3	178.4 \pm 47.3	-2.7 \pm 4.6*
BMI (kg/m ²)	29.4 \pm 6.9	28.9 \pm 6.8	-0.4 \pm 0.7*
Sit and reach left (in)	-0.3 \pm 3.6	1.1 \pm 2.8	1.4 \pm 2.7*
Sit and reach right (in)	-0.2 \pm 3.6	1.4 \pm 2.8	1.6 \pm 2.4*
Shoulder flexibility left (in)	-2.6 \pm 4.3	-1.3 \pm 4.1	1.2 \pm 2.0*
Shoulder flexibility right (in)	-2.0 \pm 3.8	-0.8 \pm 3.5	1.3 \pm 2.1*
Sit to stand (count)	12.1 \pm 4.4	18.8 \pm 5.3	3.7 \pm 3.0*
Time up and go (sec)	9.4 \pm 3.2	7.8 \pm 2.4	-1.5 \pm 2.2*
Push-ups (count)	12.8 \pm 10.6	17.9 \pm 13.7	5.3 \pm 7.2*

Mean \pm SD; * p < 0.01 after Bonferroni correction; pounds: lbs; kilograms: kg; meter: m; inches: in; seconds: sec.

I'm down 25 pounds and feel great!" The student trainers received especially strong praise from participants, "[Student] was wonderful as my educational motivation instructor", "My student was wonderful to work with!", and "my trainer was amazing!"

Specific praise included the personalized exercise programming, "she created excellent individualized goals" and "I really appreciated the way she was able to adapt the workout to meet me where I was. I had a shoulder issue that she addressed with exercises that helped me improve without risking further injury to my shoulder." Participants also mentioned specific improvements, such as strength, "I used to walk every day. This program helped me go beyond walk-

ing and helped me strengthen particular muscles and gain strength." and adherence to exercise, "this was a wonderful way to build confidence in setting a daily fitness habit."

Recommendations for future semesters included extra videos and links for all participants, "perhaps you could include a video component of the exercises" and "I think videos of the workouts would be helpful, there were a few moves that I had to google to look up because I wasn't sure what to do based on the description." Some participants noted disparities between what they received from student coaches and what other participants received, "I participated with other people that I know. My student trainer was excellent, but my friends' experience was not the

same,” and recommended incorporating additional follow-ups during the week, nutritional information, and mandatory meetings for personal training sessions either in person or via videoconferencing.

4. Discussion

During the pandemic, an e-service-learning teleexercise program was developed, 5% Healthier, to provide students a remote experiential learning opportunity and participants a supervised exercise program. Using a mixed-methods model, the present study retrospectively evaluated whether students completing this e-service-learning experience achieved course learning outcomes as well as improved their ability to work in teleexercise addressing pandemic-related health concerns and if the teleexercise intervention was a successful exercise program for participants (i.e., improved fitness outcomes). Overall, the e-service-learning experience was a successful model for meeting course learning outcomes and developing professional competencies among undergraduate and graduate students, and the teleexercise program improved participants' performance outcomes and received positive feedback.

Robust support for the inclusion of experiential and service learning in higher education paired with the growing inclusion of telehealth within the fitness, wellness and healthcare spectrum support the emergent need to include education and experience on telehealth within healthcare-related curricula [28, 29]. Indeed, some estimates predict remote work doubling after the pandemic, and students need professional development experiences that can prepare them for this reality [30]. After the pandemic, it is likely employers will seek applicants that exhibit high productivity in remote positions. If service-learning is, at least in part, responsible for preparing near graduates for future careers, adopting hybrid and remote options is critical. Students' survey responses at both the graduate and undergraduate level indicate this e-service-learning teleexercise program helped them become comfortable and competent working remotely. By working one-on-one with clients remotely, these undergraduate students are prepared for a postpandemic workforce that prioritizes engaging and connecting with others in a virtual setting while collaborating remotely.

In this new and emerging workforce, social isolation and working from home could contribute to employees having lower mental health [31] and greater sedentary behavior [18, 19]. This unfortunate consequence of the pandemic is an opportunity for graduates from exercise physiology and similar programs that can implement successful strategies to reverse and minimize these deleterious consequences. Through this program, almost all undergraduate students felt prepared to address pandemic-related outcomes of sedentary behavior (100%), social isolation (100%), stress (89%), and mental wellness (89%) through specific skills of helping clients develop the habit of exercising (95%), creating an active workday (95%), and prioritizing their health and fitness (100%). This evidence supports the viability of this program as a permanent learning experience for undergraduate students.

In the present study, all undergraduate and graduate students met course learning outcomes (as assessed by supervisors on their final evaluation and through self-reports on the final survey). Almost all undergraduate students reported improvements in their ability to develop exercise programming and service to others, and graduate students had high ratings of their participation on key skill sets for a supervisor position: it allowed them to help mentees develop greater understanding of exercise programming (75%), employ strategies to enhance mentees' knowledge and abilities (100%), recognize and take advantage of teaching moments (88%), and develop professional competencies (67%). This evidence supports the continued implementation of this e-service-learning teleexercise programming, including the current model of using graduate students as supervisors.

Among undergraduates, most students felt they improved in many professional development competencies, but the lowest ratings of improvement were related to communication (e.g., within a group or team (58%) and timeliness of communication (68%)), despite 95% reporting they met the course learning outcome of developing and refining oral and written communication skills. Further, less than half of graduate students felt the program improved their communication, including timeliness (44%) and appropriateness (44%) of communication as well as verbal (44%) and written (56%) communication. It is possible students felt communication was a strength at the start of the semester and therefore did not attribute improvements to participation in the program. However, communication is a critical skill in remote work [32], and the self-reports from students are clear evidence that, in future iterations of this program, faculty must include additional teaching and resources around communication skills in telehealth contexts and should explicitly connect students' roles and experiences to professional competencies related to communication so students can more fully appreciate their skill development, especially as it relates to remote work.

Exercise enjoyment has long been linked to adherence and psychological benefits from physical activity [33]. The high adherence in the current study (66%) was likely due to subject enjoyment of the teleexercise methodology in terms of both programming quality (100%) and experience with their student trainers (91%). Physical activity and exercise are beneficial for a variety of mood disorders and overall mental health [34]. However, exercise enjoyment may be a mediator of the mood experience following exercise [35]. Therefore, it is unclear whether the improvements in mental health and stress in the study participants were due to exercise or whether they were driven largely by an overall enjoyment of the teleexercise program as participants provided qualitative feedback on the program that suggests strong enjoyment (e.g., “This was a lot of fun!” and “My trainer was amazing!”).

Teleexercise is a promising tool to promote exercise in a variety of populations and has health benefits in older adults and clinical populations [36–38]. We found improvements in all health outcomes in a group of community dwelling adults, further suggesting teleexercise as a viable alternative to in-person exercise prescription and programming. In

addition, the improvements in body composition and muscular strength likely contributed to overall better physical function and well-being, as participants not only improved in objective measures of physical function (i.e., sit to stand performance), but also in subjective measures of physical function (i.e., 80% improved ability to complete daily activities). Our results and the results of others [38] indicate teleexercise improves measures of physical fitness (body composition, flexibility, muscular strength, and endurance) and can improve overall physical function.

This study determined the success of an e-service-learning teleexercise program and proved the viability of this program as a permanent learning experience and successful exercise intervention. However, it is not without limitations. This retrospective mixed-methods analysis lacked many control measures that would support the continued implementation of this teleexercise program, including pre and postsemester ratings of student professional development competencies. This, for example, would provide stronger evidence if students improved communication skills by participating in this e-service-learning program rather than relying on self-reports at the end of the semester. Additionally, some participants started but did not complete the 10-week program ($n = 37$, 33%) which meant students lost the opportunity to create and direct programming for those clients. Poor participant adherence may have limited the experiential learning opportunity for the student. An additional limitation is that performance outcome data collected from participants was a combination of participant self-report and remote (videoconference) measurement by the undergraduate students. This reduces the accuracy of measurements and introduces the possibility of error if either participants or students had an unconscious bias towards reporting improvements.

Future directions for the program, as recommended by participants, include a more uniform experience for participants with more frequent check-ins for accountability and instructional videos to enhance exercise performance. Future e-service-learning teleexercise programs could provide more training and educational resources for student coaches at the beginning of the semester and include explicit expectations (e.g., creating or sharing demonstration videos and mandatory weekly meetings via videoconference with participants). Further, faculty should better connect students' roles and experiences to course learning outcomes so students can fully identify the importance of their role and its impact on professional development competencies. It may also be beneficial for both the undergraduate and graduate students to cocoach participants: graduate students could supervise the interactions and provide feedback following the session to promote a more adaptive mentorship and higher levels of communication with both the student and participant. Future research could evaluate the accuracy and reliability of performing exercise testing measurements via videoconference. Future educational research could evaluate whether incorporating teleexercise skills into lecture and laboratory curriculum would better prepare students who go on to complete teleexercise capstone experiences.

5. Conclusion

This retrospective mixed-methods analysis confirmed the success of an e-service-learning teleexercise program and proved its viability as a valid learning experience and successful exercise intervention. This emerging teleexercise model illustrates how an exercise physiology-related program can create a successful internship experience while broadening its reach by providing exercise training to clients and patients who may otherwise have limited access (e.g., those in rural settings).

Data Availability

Data are available upon request from corresponding author.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Supplementary Materials

Supplemental materials include 5% Healthier participant postsurvey, the online feedback survey for participants (appendix 1); the Professional Field Placement postsemester survey for undergraduate students (appendix 2); and the graduate student postsemester survey for graduate students (appendix 3). (*Supplementary Materials*)

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