AWARD NUMBER: W81XWH-20-1-0231

TITLE: Accelerating Physical Therapy Exercise Monitoring: Facilitators, Fidelity, and Fitness

PRINCIPAL INVESTIGATOR: Miriam Rafferty, PT, DPT, PhD

CONTRACTING ORGANIZATION: Shirley Ryan AbilityLab (Formerly Rehabilitation Institute of Chicago)
Chicago, IL

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14. ABSTRACT

The purpose of this project is to study ways to bridge the gap between research supporting digital health technology and behavioral interventions in PT and real-world practice. This annual report describes the progress made on the sponsored project "Accelerating Physical Therapy Exercise Monitoring: Facilitators, Fidelity, and Fitness" from July 1, 2020 to June 30, 2021. Aim 1 included interviews to inform the development of training resources. Three key themes that have preliminarily emerged from the data include (1) digital literacy and making technology more accessible to people with varied technology knowledge, (2) health policy and developing procedures for clinical documentation of digital health technology that is acceptable for third-party payers, and (3) the importance of developing strategies to make technology use easy for people with Parkinson's to use. We are beginning enrollment for Aims 2 and 3 to assess physical therapist and patient use of digital health technology and behavioral interventions to improve physical activity, physical function, and fitness. Additionally, the Principal Investigator has been involved in training activities including regular mentoring meetings, attending presentations on digital health technology, and translating evidence into presentations on nonmotor symptoms in PD and how they can impact exercise.

15. SUBJECT TERMS: Parkinson's disease, physical therapy, behavior change, exercise, physical activity, digital health technology, fitness tracking, accelerometer, implementation, knowledge translation, health services, physical therapist

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Table of Contents

Section 1: Introduction

Parkinson's disease (PD) is a chronic degenerative neurologic condition. Regular exercise is associated with slower declines in mobility and quality of life in people with PD. Physical therapy can proactively help people with PD to increase their amount and intensity of exercise. Research has shown that using digital health technology and behavior change techniques can improve participation in regular exercise and physical activity in people with PD. The purpose of this project is to study ways to bridge the gap between research supporting digital health technology and behavioral interventions in physical therapy and real-world practice. This annual report describes the progress made on the sponsored project "Accelerating Physical Therapy Exercise Monitoring: Facilitators, Fidelity, and Fitness" from July 1, 2020 to June 30, 2021.

Section 2: Keywords

Parkinson's disease, physical therapy, behavior change, exercise, physical activity, digital health technology, fitness tracking, accelerometer, implementation, knowledge translation, health services, physical therapist

Section 3: Accomplishments

What were the major goals of the project? The purpose of this project is to study ways to bridge the gap between research supporting digital health technology and behavioral interventions in physical therapy and real-world practice. We hypothesize that people with early PD who use digital health technology with behavioral interventions will improve their exercise participation, with associated improvements in physical function and fitness. The Aims of the study are as follows:

1. Aim 1: Compare barriers and facilitators to using digital health technology, from the perspectives of physical therapists (PT) and people with PD, before and after they use commercially-available sensors
2. Aim 2: Assess fidelity of digital health technology and behavioral intervention adoption by people with mild to moderate PD and their PT
3. Aim 3: Determine whether greater use of digital health technology and behavioral intervention strategies are associated with changes in fitness and function.

What was accomplished under these goals?

1. **Major activities/tasks (outline, details below)**
    a. Hiring Staff
    b. Preparatory Activities
    c. Regulatory Protocol Management (IRB and HRPO)
    d. Aim 1: Exploratory interviews
    e. Aim 1: Knowledge translation resource development
    f. Aim 2: Enroll and train PTs
    g. Aims 2/3: Recruit, consent, and baseline test people with Parkinson's

2. **Specific Objectives: Description of accomplishments under each major activity**
    a. **Hiring Staff:** PTs and support staff were hired to work on this project. One new project coordinator was hired (June 20, 2021), obtained IRB approval, and was onboarded to appropriate procedures. Coverage was allotted during maternity leave of PI and one PT.

    b. **Preparatory Activities:** We developed data collection tools including Aim 1 interview scripts, Aim 2 participant surveys and assessments, and Aim 3 EMR fidelity checklists. We pilot tested each data collection tool. Materials were built in Northwestern University's REDCap platform.

c. **Regulatory Protocol Management:** We obtained approval of our initial IRB protocol on August 27, 2020, from Northwestern IRB, and on December 21, 2020, from DOD HRPO.

d. **Aim 1: Exploratory Interviews:** We completed Aim 1 exploratory interviews with 12 people with Parkinson's (PwP), 12 PTs who work with PwP, and 13 digital health technology stakeholders. All interviews were completed over the phone or on Zoom and transcribed by our transcription vendor, Transcription Star. Two team members read through each interview and deductively coded text to align with the Consolidated Framework for Implementation Research (CFIR). Interview participants expressed novel ideas about barriers and facilitators to integrating technology into the PT clinic.

e. **Aim 1: Knowledge Translation Resource Development:** Recurring themes emerging from the qualitative coding were used to develop and revise knowledge translation resources for clinicians and patients to make technology use easier. We developed and/or updated a set of patient education and clinician resources.

Appendix A includes resources for PwP:

(1) Comprehensive list of fitness trackers, including wearables and apps, which lists out price, type of tracking, battery life, and instructions
(2) Simple table of digital health technology options, which lists out the basic features of each device
(3) Worksheet designed to help patients use digital health technology with a partner
(4) Handout with solutions to address cost as a barrier to using technology
(5) Goal-setting worksheet designed for patients to use with their PT

Appendix B includes resources for clinicians:

(1) Documentation templates and tips for clinicians when documenting digital health intervention in the EMR
(2) Glossary of digital health terminology
(3) Highlighted pertinent organizational resources to improve practice based on clinician needs
(4) Informational handout about use of education in therapy sessions

f. **Aim 2: Enroll and Train Physical Therapists:** We consented 4 PTs to participate in the study. After consenting, the PTs completed a brief survey measuring attitudes towards using digital health technology in clinical practice. On April 8 and April 13, 2021, the clinical facilitator delivered one-hour trainings to the participating PTs. The training discussed: (1) the benefits of incorporating digital health technology into clinical care, (2) barriers and facilitators to incorporating digital health technology into clinical care, (3) basic terminology and features of different types of technology, (4) and the importance of considering digital literacy and usability when incorporating into clinical care. The facilitator also shared the resources we developed and listed above, and illustrated how to use them. The facilitator then reviewed some example cases and discussed how to incorporate digital health technology into each case, including where and how to document the intervention in the EMR. The clinical facilitator continues to follow up with the participating PTs over email and by checking in during monthly Parkinson's staff meetings. ***Appendix C*** is the tool we developed and used to train PTs.

g. **Aims 2/3: Recruit, Consent, and Baseline Test People with PD:** As of 6/30/21, we consented and completed baseline testing for one participant with PD. We are currently working on adapting recruitment strategies in order to accelerate recruitment for participants with PD. We discuss this further in the section below, *"What do you plan to do during the next reporting period to accomplish these goals?*"

More specifically, the accomplishments outlined on the Statement of Work are below:

	Timeline (month)	Completed or person responsible
GENERAL: Project Initiation and Researcher Development		
Major Task 1: Project Initiation		
Subtask 1: Submit IRB protocol and consent documents to Northwestern University for approval	1-3	Completed
Subtask 2: Submit protocol and other required documents to HRPO for approval	1-3	Completed
Milestone Achieved: Northwestern IRB and HRPO approval obtained		Completed
Major Task 2: Researcher Development		
Subtask 1: Attend sensor technology training with outside staff (eg Scott Delp or Fay Horak)	3-12	Completed, but will continue looking for training opportunities
Subtask 2: Develop symposium outline and application for nonmotor barriers to exercise in people with PD	6-12	Completed (accepted to present at APTA CSM 2022), will submit another course for ACRM 2022 with Dr. Goldman
Subtask 3: Develop education course for implementation science for rehabilitation audiences	12-18	Completed (accepted to present at ACRM 2021)
Subtask 4: Complete advanced research training (comparative effectiveness modules and TIGRR)	6-18	Application In Process
Milestone Achieved: Submit R01 grant application		In progress
AIM 1: To compare barriers and facilitators to using digital health technology, from the perspectives of people with PD and physical therapists, before and after they use commercially-available sensors.		
Major Task 1: Exploratory Interviews		
Subtask 1: Recruit 12-20 people with PD from SRAlab, NM, and Chicagoland area support groups, complete interviews, and ongoing data analysis to determine when saturation is reached	3-4	Completed
Subtask 2: Recruit 12-20 physical therapists from SRAlab and surrounding area, complete interviews, and ongoing data analysis to determine when saturation is reached	4-5	Completed
Subtask 3: Recruit 12-20 technology stakeholders through SRAlab, NU connections, and mentors' connections, complete interviews and analyze data	4-5	Completed
Subtask 4: Final qualitative analysis codebook development	5-6	Completed

Milestone Achieved: Manuscript submitted comparing barriers and facilitators between stakeholder groups at baseline		In progress
Major Task 2: Knowledge Translation Resource Development		
Subtask 1: Draft and revise resources for participating people with PD and physical therapists in preparation for aim 2	4-6	Completed
Milestone Achieved: Final resources available to begin aim 2		Completed
Major Task 3: Exit Interviews		
Subtask 1: Exit interviews completed for a minimum of 25 people with PD completing the study (up to 32)	12-22	MR, JM
Subtask 2: Exit interviews completed with physical therapists related to their use of digital health technology and for a minimum of 25 people with PD completing the study (up to 32)	12-22	MR, JM
Milestone Achieved: Integrate exit interview qualitative data into final mixed methods paper, summing and comparing how the barriers and facilitators are different in people who used technology compared to the original codebooks in naïve participants		
AIM 2: To assess fidelity of digital health technology adoption (activity sensors and exercise tracking) by people with mild to moderate PD and their physical therapists.		
Major Task 1: Identify and train physical therapists		
Subtask 1: Identify physical therapist participants (approximately n=5) from the 8 therapists trained to complete Proactive PT evals	4-6	Completed
Subtask 2: Prepare clinic processes and documentation guides for digital health technology and behavioral strategy use in the clinic	4-6	Completed
Subtask 3: Train physical therapists on use of digital health technology and behavioral strategies to address nonmotor barriers of exercise using technology	5-7	Completed
Milestone Achieved: Prospective observational study begins		Completed
Major Task 2: Recruit 32 people with early PD from Proactive Physical Therapy to participate in observational study		
Subtask 1: Finalize processes for participant recruitment in Proactive PT evaluation scheduling pipeline	4-6	Completed
Subtask 2: Amend IRB protocol documents to include any new resources or processes to facilitate digital health technology and behavioral intervention use that were developed as a part of Aim 1.	5-6	Completed
Subtask 3: Recruit 32 participants from SRAlab, Northwestern Medicine, and Chicagoland community as needed using referral development procedures if needed.	6-16	MR, JM, SA, JG (ongoing)
Milestone Achieved: Recruitment completed and closed		
Major Task 3: Determine fidelity of digital health technology and behavioral intervention use by physical therapists		
Subtask 1: Develop fidelity checklist for physical therapy documentation inclusion/use of digital health technology and behavioral interventions	5-6	Completed
Subtask 2: Use historic data from Proactive Physical Therapy participants to assess pre-implementation digital health technology	10-18	MR, JM

and behavioral intervention use, matching historic patients to recruited patients		
Subtask 3: Compete fidelity checklist for recruited participants during their 6 month participation in the study	12-22	MR, JM
Milestone Achieved: Physical therapy fidelity data finalized		
Major Task 3: Determine fidelity of digital health technology and behavioral intervention use by people with PD at baseline and final		
Subtask 1: Complete baseline testing in 32 participants	6-16	MR, JM (ongoing)
Subtask 2: Complete final testing in 25-32 participants (survey and exit interview)	12-22	MR, JM
Milestone Achieved: Patient fidelity data finalized		
AIM 3: To determine whether greater use of digital health technology and behavioral intervention strategies are associated with changes in fitness and function 6 months after evaluation.		
Major Task 1: Clinical fitness, physical function, and nonmotor symptoms data collected		
Subtask 1: Complete baseline testing in 32 participants	6-16	MR, JM (ongoing)
Subtask 2: Complete final testing in 25-32 participants (survey and exit interview)	12-22	MR, JM
Subtask 3: Retain, track and schedule patients for data collection and compensation	6-22	MR, SA
Milestone Achieved: Clinical data collection complete and processed		
Major Task 2: Data analyses completed		
Subtask 1: Determine changes in fitness and physical function measures	18-22	MR, SA, JM
Subtask 2: Complete correlation and exploratory regression analysis	18-22	MR, SA
Milestone Achieved: Evaluate implementation and clinical outcomes complete		
Major Task 3: Project Wrap-Up and Dissemination of final results		
Subtask 1: Disseminate overall results and resources at clinical rehabilitation conference	22-24	MR, JM
Subtask 2: Disseminate overall results and resources to people with PD	22-24	MR, JM
Subtask 3: Disseminate overall results to technology researchers at conference	22-24	MR
Subtask 4: Close-out IRB and HRPO	24	MR, SA
Milestone Achieved: Project Complete		

3. Significant Results or Key Outcomes

Aim 1 data collection and analysis (initial qualitative coding) has been completed. These data were used to develop and refine training resources. Interpretation of qualitative data are underway as a part of preparation for dissemination (poster, oral presentation, and manuscript). Three key themes have preliminarily emerged from the data. One theme that was repeated by several participants was the issue of digital literacy, and making technology more accessible to people with varying levels of technology knowledge. Another prominent theme was the issue of health insurance policy, and developing procedures for clinical documentation

of digital health technology that is acceptable for third-party payers. A third theme was how important it is develop strategies to make technology use easy for PwP to use.

4. **Other Achievements:** Nothing to report

What opportunities for training and professional development has the project provided? This early career award includes specific training activities for the professional development of the PI related to digital health technology, nonmotor symptoms of PD, and behavior change interventions. This includes attending education, attending mentoring meetings, and providing education to others on the topics of interest, which requires research and self-directed learning.

- **Education Attendance**

Date	Speaker	Topic
7/29/2020	Jose Pons	Digital Continuum of Care
10/14/2020	VA HSR&D Cyberseminar	Machine Learning for Health Economics and Outcomes Research
10/16/2020	Rehabilitation Research 2020 NCMRR Presentations	Technology, Mobility, and the Future of Rehabilitation Research
October 2020	ACRM	Various technology presentations (see PDF)
November 2020	MDS Technology Task Force Education	Various presentations: recorded conference:

- **Mentoring Meetings**

  I meet with my mentors, Dr. Arun Jayaraman and Dr. Jennifer Goldman to discuss my professional development and the project process, or another designated team member from their labs/staff with relevant knowledge to share. I have at least one meeting per month with one of the mentors. I have at least 1 meeting every 4 months with both. This has resulted in 6 meetings with Dr. Jayaraman or representatives from his team to speak on a specific technology topic and 10 meetings with Dr. Goldman

- **Providing Education**

Date	Presenters/Authors	Topic	Audience
8/4/2020	Santiago Toledo, Erica Sieg, Miriam Rafferty (organizer: Dr. Goldman)	Motor and nonmotor problems related to sleep impairment in PD	People with PD and caregivers
11/10/2020	Discovery Moment: Pro in Proactive in Parkinson's Care (with Dr. Goldman and Dr. Jayaraman)	Role of Rehabilitation (I present programmatic changes, Dr. Goldman presented nonmotor symptoms	Community
2/6/2021	Daniel Corcos and Miriam Rafferty (organizer: Dr. Goldman)	Exercise and Nonmotor Symptoms	Community

Additionally, this study contributes to the professional development of the PTs enrolled as participants. Participating PTs were trained in an interactive session to provide education about digital health technology, use for individuals with PD; incorporation of previously listed resources and application in clinical sessions. Additional touchpoints with an implementation facilitator occur formally in monthly clinician meetings and informally at the request of PTs. Aim 1 results helped to inform the delivery of training and structure of supporting PTs during this process. Additional work to inform and gain leadership support occurred in this time frame. The results of Aim 1 are scheduled to be disseminated to PwP, PTs,

and researchers through local patient and family symposium and a national conference (Academy of Neurologic Physical Therapy; see section below on next reporting period).

How were the results disseminated to communities of interest? Thus far, our results from exploratory interviews from Aim 1 were disseminated through the knowledge translation resources and training session led by the clinical facilitator (see appendices). These resources and training session have reached 4 participating physical therapists. We have additional dissemination activities planned for physical therapists at a national conference and people with Parkinson's disease through local support groups and a patient/family symposium.

What do you plan to do during the next reporting period to accomplish the goals?

1. **Aim 1: Dissemination Schedule**
    a. August 4, 2021: Northwestern University Patient Support Group "Developing Healthy Habits Using Technology" by Miriam Rafferty
    b. October 2, 2021: Academy of Neurologic Physical Therapy Conference Presentation Segment in "Physical Therapist-Led Interventions to Facilitate Exercise Uptake in Early Stage Parkinson's Disease: In-Person and Remote Delivery" by Lori Quinn and Miriam Rafferty
    c. October 1-3, 2021: Academy of Neurologic Physical Therapy Conference Poster Presentation "Barriers and facilitators to using digital health technology in an outpatient clinic" by Bridget Fowler, Jillian MacDonald, and Miriam Rafferty
    d. October 9, 2021: Northwestern University Patient and Family Support Group "Developing Healthy Habits Using Technology" by Miriam Rafferty
    e. Manuscript Preparation
2. **Aim 2: Accelerate recruitment for participants with PD:** To date, we have received IRB approval from Northwestern University to adapt recruitment procedures by expanding eligibility criteria to current patients with PD, rather than just new patients. We also just submitted a subsequent modification to allow the research team to search the EMR and reach out to potentially eligible participants directly. After receiving approval from our IRB for both of these modifications, the PI will submit the modifications to the HRPO to approve. These adjustments will aid us with recruitment by: (1) providing a wider pool of eligible participants, and (2) speeding up procedures by allowing our team to manage recruitment rather than relying on outside sources.
3. **Aims 2/3:** Continue consent and baseline testing, and begin follow-up testing with participants with PD.
4. **Aims 2/3:** Continue ongoing training with PTs, and continue fidelity checking EMRs to ensure that PTs are successfully using their resources and training to execute the intervention.
5. **Aim 2:** Use historic data from proactive PT patients to assess pre-implementation digital health technology and behavioral intervention use, matching historic patients to recruited patients.
6. **Aim 3:** Complete preliminary data analyses by assessing changes in physical function measures among participants with PD.
7. **Aim 1 (Post):** Complete exit interviews with participants with PD and PTs to discuss their experience in the study, including barriers and facilitators to using technology in clinical care, and brainstorming best ways to scale the intervention.

Section 4: Impact

What was the impact on the development of the principal discipline(s) of the project? Nothing to report in this reporting period.

What was the impact on other disciplines? Nothing to report in this reporting period.

What was the impact on technology transfer? Nothing to report.

What was the impact on society beyond science and technology? Nothing to report in this reporting period.

Section 5: Changes and Problems

***Changes in approach and reasons for change*:** Nothing to report.

Actual or anticipated problems or delays and actions or plans to resolve them: Recruitment for Aims 2/3 has been slower than anticipated (approximately 20% of contacted individuals consented, rather than the anticipated 50%). We are approximately 1 quarter behind in recruitment. Plans to resolve recruitment delays include reducing the burden of recruitment efforts on the scheduler, increasing engagement of the participating PTs in enrolling their patients, and transferring more recruitment responsibilities to the research project coordinator. These changes were reviewed and approved by the local IRB and deemed non-substantive by HRPO.

***Changes that had a significant impact on expenditures*:** The project had a slow start due to COVID-19 working restrictions and changes in clinical processes, as well as delays due to staffing changes, preparatory activities, and regulatory approvals.

Significant changes in use or care of human subjects, vertebrate animals, biohazards, and/or select agents: Nothing to report.

Significant changes in use or care of human subjects: Nothing to report.

Significant changes in use or care of vertebrate animals: N/A

Significant changes in use of biohazards and/or select agents: N/A

Section 6: Products

Publications, conference papers, and presentations

Journal publications*: Appendix D* includes the full text of this publication:

> **Rafferty MR,** Nettnin E, Goldman JG, MacDonald J. Frameworks for Parkinson's Disease Rehabilitation Addressing When, What, and How. *Current Neurology and Neuroscience Reports.* 2021 In Press*. DOI: 1*0.1007/s11910-021-01096-0.

Books or other non-periodical, one-time publications: Nothing to report.

Other publications, conference papers and presentations: Nothing to report.

Website(s) or other Internet site(s): We have developed a web page for the study through our research lab website. This website provides a brief summary of the study, including recruitment information. As we begin to disseminate results externally, we will post our dissemination products on this website: https://www.sralab.org/research/labs/kteam/projects/digital-health-technology-physical-therapy

Technologies or techniques: Using stakeholder-identified themes from exploratory interviews, we developed a set of patient education and clinician resources, as well as a one-hour training presentation for participating PTs. The resources are described in *Section 3, Accomplishments*, and attached in Appendices A and B.

Inventions, patent applications, and/or licenses: Nothing to report.

***Other Products*:** Nothing to report.

Section 7: Participants & Other Collaborating Organizations

What individuals have worked on the project?

Name	Miriam Rafferty
Project Role	Primary Investigator
Researcher Identifier	0000 0002 3182 0314
Nearest person month worked	3 calendar months
Contribution to project	- Oversaw and completed all IRB and HRPO documents - Conducted all technology stakeholder interviews - Developed the coding scheme, reviewed transcripts and resolved discrepancies in coding, interpreted qualitative data - Planned for disseminating qualitative data including submitting poster and presentation abstracts to ANPT conference and communicating with neurology department regarding patient-facing presentations - Assisted with development of training resources for facilitation in Aims 2-3 - Planned recruitment and communicated with interdisciplinary team to improve recruitment for Aims 2-3

Name	Dr. Jennifer Goldman
Project Role	Mentor
Nearest person month worked	0 calendar months. Cost Share.
Contribution to project	- Provided PD-specific mentoring, particularly on treatment and clinical assessments of PD nonmotor symptoms that can be exercise barriers - Assisted with overall research professional development, including manuscript and grant writing - Helped Dr. Rafferty to connect with the international PD clinical and research community - Helped Dr. Rafferty to adapt education on nonmotor symptoms to the rehabilitation community - Served as physician monitor of the clinical aspects of the program

Name	Arun Jayamaran
Project Role	Mentor
Nearest person month worked	0 calendar months. Cost Share.
Contribution to project	- Provided mentoring, particularly on the use of digital health technology in research and the clinic - Helped to facilitate Dr. Rafferty's connections with the technology research and industry stakeholders - Assisted with overall research professional development, including manuscript and grant writing

Name	Bridget Fowler King
Project Role	Research Physical Therapist
Nearest person month worked	1 calendar month
Contribution to project	- Assisted with interpretation and dissemination of qualitative data - Blinded assessor for Aim 2/3

Name	Jillian MacDonald
Project Role	Research Physical Therapist
Researcher Identifier	0000 0002 5365 3385
Nearest person month worked	1 calendar month
Contribution to project	- Completed interviews with Physical Therapists - Completed qualitative coding of all transcripts of Aim 1.

Name	Laura Stoff
Project Role	Project Manager
Nearest person month worked	2 calendar months
Contribution to project	- Assisted with IRB and HRPO documents - Managed participants for all interviews including stipend payments - Oversaw the work of the research assistant, oversaw work of the team during Dr. Rafferty's maternity leave - Managed development of vendor relationship and communication with the transcription agency - Completed qualitative coding of all transcripts of Aim 1

Name	Ella Nettnin
Project Role	Research Assistant
Nearest person month worked	2 calendar months
Contribution to project	- Completed interviews with PwP and assisted with transcription prior to the vendor agreement

Name	Sydney Achler
Project Role	Project Coordinator
Nearest person month worked	0 calendar months
Contribution to project	- Was identified to replace the tasks of Laura Stoff and Ella Nettnin beginning 6/22/21

Has there been a change in the active other support of the PD/PI(s) or senior/key personnel since the last reporting period?

The Claude D. Pepper Older Americans Independence Center at Northwestern University (Previously Pending)
Performance Period: 07/01/2020 – 06/30/2022 (entire project runs to 6/30/2025)
Principal Investigator: Wolf
Role: Pepper Scholar (mini-K - junior faculty mentee) 2.4 calendar months per year for two years
Goal: The purpose of this P30 proposal is to generate innovative research that will enhance primary care for medically complex, older adults with multiple chronic conditions to achieve optimal health, function, independence and quality of life. I am funded as a Pepper Scholar with a "mini-K" award that supports my time to work on future grant submissions and the development of collaborations within the department of geriatrics.
Amount: over two years
Supporting agency: National Institute on Aging

Center for Smart Use of Technology to Assess Real-world Outcomes (C-STAR) (1P2CHD101899)
Performance Period: 5/1/2020 – 4/30/2025
Principal Investigator: Lieber, Rymer
Role: Co-Director of Clinical Outcomes Cores and Member of Implementation and Community Engagement Core. Supported for 0.6 calendar months per year for five years
Goal: The goal of the Center for Smart Use of Technologies to Assess Real-World Outcomes (C-STAR) is to equip investigators with the skills and know-how to accurately employ technologies to measure and interpret data relevant to sensorimotor and cognitive function in the lab, clinic, and real world.Amount: over 5 years (total award)
Supporting agency: National Institutes of Health, Eunice Kennedy Shriver National Institute of Child Health and Human Development

What other organizations were involved as partners?

Organization name	Transcription Star
Location of organization	53 Emerald Rd, Robbinsville NJ, 08691
Contribution to project	Transcription services (the company uses a HIPAA-compliant platform to transcribe interviews for us. We upload interviews as either mp4 or mp3 files onto the secure platform, and they return back to us each transcription in turn.)

Organization name	Northwestern University
Location of organization	259 E Erie St, 19th Floor, Chicago, IL 60611
Contribution to project	In kind support for assistance with recruitment and dissemination activities

Section 8: Special Reporting Requirements

Collaborative Awards: Nothing to Report.

Quad Chart: *See Attached.*

Section 9: Appendices

Appendix A: Resources for people with PD

(1) Comprehensive list of fitness trackers, including wearables and apps, which lists out price, type of tracking, battery life, and instructions
(2) Simple table of digital health technology options, which lists out the basic features of each device
(3) Worksheet designed to help patients use digital health technology with a partner
(4) Handout with solutions to address cost as a barrier to using technology
(5) Goal-setting worksheet designed for patients to use with their PT.

Appendix B: Resources for clinicians

(1) Documentation templates and tips for clinicians when documenting digital health intervention in the EMR
(2) Glossary of digital health terminology
(3) Organizational resources to improve practice based on their needs
(4) Informational handout about use of education in therapy sessions

Appendix C:

(1) Digital Health Technology Training for clinicians

Appendix D:

(1) **Rafferty MR,** Nettnin E, Goldman JG, MacDonald J. Frameworks for Parkinson's Disease Rehabilitation Addressing When, What, and How. *Current Neurology and Neuroscience Reports.* 2021 In Press*. DOI: 1*0.1007/s11910-021-01096-0.