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Engaging Older Adults With Parkinson's Disease in Physical Activity Using Technology: A Feasibility Study

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Abstract

Parkinson's disease (PD), a progressive neurodegenerative disorder, presents unique and daily challenges. Living with PD may limit one's physical activity and negatively affect quality of life (QOL). No studies were identified that utilized online technology to promote health in this population. The purposes of this study were to (a) assess the feasibility of an intervention that requires wearing a physical activity tracker and participating in an online support group, and (b) examine the effect of this intervention on the self-efficacy for physical activity and QOL of older adults with PD. A 12-week longitudinal pretest/posttest design was used to assess physical activity, engagement in an online support group, self-efficacy, and QOL. A postintervention questionnaire was used to capture the participants' (n = 5) experience using the physical activity tracker and an electronic tablet to engage in an online support group. The sample size of this feasibility study precluded robust quantitative analysis of QOL or self-efficacy. Findings from the open-ended questionnaire suggest technology was challenging for most participants, yet it did provide social support. Teaching effective interventions to promote self-management for increasing physical activity, and consequently improving QOL, is recommended. While technology can assist, older persons with PD may experience technological challenges.

Keywords

Parkinson's disease, physical activity, quality of life, self-management

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Parkinson's disease (PD) is the second most common neurodegenerative disorder, affecting about 1 million Americans annually (Parkinson's Foundation, 2019). The risk of PD increases with age, and approximately 1% of the population aged above 60 years are living with PD (Pringsheim, Jette, Frolkis, & Steeves, 2014). It is estimated that by 2030 PD will increase by 50% to 100% (Dorsey et al., 2007). In addition, navigating a noncurable disease of unknown etiology (Marshall & Willett, 2018), uncertain progression, functional limitations, and potential for disability that is dictated by a strict medication regime present unique and daily challenges for those living with PD. Disease progression thus limits physical activity and may negatively affect quality of life (QOL; Hermanns & Haas, 2014; Stanley-Hermanns & Engebretson, 2010).

The physical and emotional symptoms of PD tend to promote a sedentary lifestyle (van Nimwegen et al., 2013), resulting in lower levels of physical activity and decreased strength and functional status compared with the healthy population (Goodwin, Richards, Taylor, Taylor, & Campbell, 2008; Speelman, van Nimwegen, Bloem, & Munneke, 2014). Studies to promote physical activity highlight the importance and benefits of exercise in persons with PD (Dashtipour et al., 2015; Ellis et al., 2013; LaHue, Comella, & Tanner, 2016; Paillard, Rolland, & de Souto Barreto, 2015; Prodoehl et al., 2014; Schenkman et al., 2012; Sheehy, McDonough, & Zauber, 2017; Tomlinson et al., 2012). A 2-year randomized control trial, with a multifaceted intervention titled ParkFit, was designed to promote physical activity in persons with PD. Results indicated the ParkFit program

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was an effective program to promote physical activity (Speelman et al., 2014).

The United Nations Sustainable Development Goal 3 (United Nations Department of Economic and Social Affairs, 2018) emphasizes the need to focus efforts on healthy living and health promotion across the life span. This is important in the older population, particularly among persons with PD, which has no cure. Although there is no cure for PD, studies suggest that exercise may have neuroprotective effects and/or delay progression of the disease (Ahlskog, 2011; Paillard et al., 2015), ultimately leading to improved physical and emotional health outcomes. Furthermore, physical activity has been associated with lower levels of anxiety (Strohle, 2009), greater self-esteem, and improved QOL (Gill et al., 2013). Exercise increases dopamine production in the brain, which is critical in PD as there is a significant reduction in dopamine (Goodwin et al., 2008). Furthermore, exercise has been shown to enhance short-term memory and long-term potentiation, as well as facilitate synaptic plasticity in the hippocampus and frontal cortex (Bugg & Head, 2009; Erickson & Kramer, 2009; Erickson et al., 2011; Pereira et al., 2007). This is thought to be done by brain-derived neurotrophic factor (BDNF), insulin-like growth factor-1 (IGF-1), and vascular endothelial-derived growth factor (VEGF). This increase in dopamine production has been shown to decrease PD symptoms and increase functional independence.

Literature Review

Adherence to an exercise program and fear of falling can be a challenge for the older adult population and of concern for persons with PD. A seminal study by Ellis and colleagues (2013) explored perceived barriers to exercise in ambulatory persons with PD. Low outcome expectations from exercise, lack of time to exercise, and fear of falling were identified as the major barriers to engaging in exercise.

The scientific literature supports the development of a tailored physical activity program for persons with PD (Borrione, Tranchita, Sansone, & Parisi, 2014). O'Brien, Troutman-Jordan, Hathaway, Armstrong, and Moore (2015) examined the use of activity trackers in community-dwelling older adults; results suggested the usefulness of such a monitoring system is helpful in promoting physical activity. Beekman et al. (2017) conducted a mixed-methods pilot study that helps shed light on the importance of identifying an appropriate activity tracker for persons with a chronic disease; they also examined the validity, reliability, and feasibility of using trackers for persons with a chronic disease who were engaging in physical therapy. Only two studies were located that examined the accuracy of wearable physical activity trackers in persons with PD (Lamont, Daniel, Payne, & Brauer, 2018; Wendel et al., 2018) and one feasibility study in which a peer coaching and peer walking program was developed using mHealth technology (Colón-Semenza, Latham, Quintiliani, & Eillis, 2018).

Although the logistics to attend an exercise program may not be a viable option for everyone, advocating for health-promoting behaviors of physical activity through self-managed exercise using an activity tracker and participation in an online support group at home may be feasible. In this feasibility study, effort was made to minimize PD symptomatology, and self-management was encouraged to increase confidence as recommended by Eriksson, Arne, and Ahlgren (2013), thus helping individuals better understand and manage health-promoting behaviors. The purposes of this study were to (a) assess the feasibility of an intervention that requires wearing a physical activity tracker and participating in an online support group, and (b) examine the effect of this intervention on the physical, emotional, and social well-being self-efficacy for physical activity and QOL of older adults with PD. While other studies examined the use of physical activity trackers in persons with PD, this study combined wearing a physical activity tracker with participation in an online support group. In addition, QOL and self-efficacy for physical activity were assessed, addressing an identified gap for this population. Finally, this study addressed the need for sustainable interventions that promote healthy living in older persons with PD.

Method

A longitudinal pretest/posttest design was used to assess physical activity, engagement in an online support group, self-efficacy, and QOL. A postintervention questionnaire was used to capture the participants' experience using the physical activity tracker and an electronic tablet to engage in an online support group. Following approval by the university's institutional review board, convenience and snowball sampling were used to recruit potential subjects to the study. For this feasibility study, a sample size of five (n = 5) was sought. As the use of technology to promote physical activity in the PD population had not been established, it was deemed critical to ensure the intervention was feasible prior to implementing on a large scale.

The target population was persons with Stage I to IV PD living in East Texas. All individuals were required to meet the following inclusion criteria: (a) diagnosis of PD, (b) Stage I to IV, (c) age ≥ 65 years of age, (d) able to speak and read English, (e) ambulatory with or without assistance, (f) have access to the Internet/Wi-Fi, and (g) have written physician approval to engage in a large muscle exercise program. Exclusion criteria included inability to perform large muscle physical movements and cognitive impairments that prohibited participation in an online support group. Inclusion and exclusion criteria were reviewed with each interested participant in a phone conversation, and physician approval was received to ensure they met the inclusion criteria and was eligible to participate in exercise.

Table 1. Descriptive Statistics: Categorical Demographic Variables (*N* = 5).

Demographic variable	Category	Frequency (*n*)	Percentage
Gender			
	Male	3	60.0
	Female	2	40.0
Race/Ethnicity			
	Caucasian, non-Hispanic	5	100.0
	Black, non-Hispanic	0	0.0
	Hispanic	0	0.0
	Asian or Pacific Islander	0	0.0
	Native American or Alaskan Native	0	0.0
	Mixed	0	0.0
Marital status			
	Never married	0	0.0
	Married/Living with significant other	4	80.0
	Divorced	1	20.0
	Widow/Widower	0	0.0
Living conditions			
	Lives alone	1	20.0
	Lives with spouse or significant other	4	80.0
	Lives with friend or family member	0	0.0
	Lives in community housing	0	0.0
Level of education			
	Less than high school	0	0.0
	High school graduate or GED	0	0.0
	Some college	2	40.0
	College graduate	3	60.0
Physical activity level			
	Inactive	0	0.0
	Active	4	80.0
	Very active	1	20.0

Note. GED = general education development.

Table 1 shows participant characteristics. Two (40.0%) females and three (60.0%) males participated in the study. Participant ages ranged from 69 to 81 years, with a mean age of 73.00 years. All five participants self-identified as Caucasian, non-Hispanic. Four were married; one participant was divorced and living alone. All self-reported being active (*n* = 4) or very active (*n* = 1). Participants self-identified as being in the beginning stages (Stage I and Stage II) of PD; stage was confirmed by the principal investigator (PI) using the Hoehn and Yahr (1967) scale. All had been diagnosed 4 to 5 years prior to enrolling in the study (see Tables 1 and 2).

Measures

A researcher-generated demographic survey collected standard demographic data along with PD-specific questions. The Physical Activity Assessment Inventory (PAAI), a 13-item Likert-type type scale, was used to measure self-efficacy for physical activity (Haas, 1999; Haas & Northam, 2010). Items are scored on a 0- to 100-point scale and summed for a total score; higher scores indicated higher self-efficacy; reliability of the PAAI is reported at .95. The Functional Assessment of Cancer Therapy–General (FACT-G) was used to assess QOL (Cella et al., 1993). Although the FACT-G was originally developed for use with cancer patients, this QOL instrument was used based on its reliability and validity that have been well established in chronic disease samples. The FACT-G (Cella et al., 1993) is a 27-item instrument with four primary QOL domains: Physical Well-Being (PWB; seven items), Social/Family Well-Being (SWB; seven items), Emotional Well-Being (EWB; six items), and Functional Well-Being (FWB; seven items). Each item is rated on a scale ranging from “0” (“not at all”) to “4” (“very much”). Items are reverse scored as indicated, summed, multiplied by number of items in the subscale, and then divided by the number of items answered. Subscale scores range from 0 to 24 (EWB) and 0 to 28 (PWB, SWB/FWB, and FWB). Subscale scores are summed to provide a total FACT-G score. Higher scores are indicative of better QOL. At the beginning of the study, participants were also asked to measure and record their resting heart rate. The Postintervention Feasibility Evaluation was used to query participants about their use of the physical activity tracker, electronic tablet, and online support group in the study. Feasibility was

Table 2. Descriptive Statistics: Continuous Demographic Variables (*N* = 5).

Demographic variable	*M*/*Mdn* (*SD*)	Range	Frequency
Age (years)	73.00/72.00 (4.95)	69-81	5
Year diagnosed with Parkinson's disease	2013/2014 (2.99)	2010-2017	4
Stage of Parkinson's disease	1.70/1.50 (0.57)	1.00-2.50	5

determined based on engagement in the private social media support group using the electronic tablet and compliance in using the physical activity tracker.

A physical activity tracker, specifically a Fitbit Alta HR, one of the most popular wearable activity trackers, was given to each of the five participants to wear on their wrist for the purpose of assessing their physical activity. Physical activity trackers are designed to help motivate individuals to be physically active. It works by utilizing an accelerometer to measure acceleration forces (i.e., steps and intensity), yielding real-time feedback of activity to the user. The tracker can be connected to an individual's computer or smartphone to view detailed data using the Fitbit app. In this study, the participants connected the tracker to their individual iPad to monitor activity over the course of the study. The iPad Wi-Fi 32-gigabyte tablet given to each participant was also used to view exercise videos and access the online support group. Participants could share physical activity, resources, and other information in the private forum.

Procedures

A longitudinal pretest/posttest design was used to determine the feasibility and effectiveness of an intervention using Fitbits and iPads for persons with PD. Feasibility was determined based on engagement in the private social media support group using the electronic tablet and compliance in using the Fitbit. Flyers were distributed at a local neurologist's office, and a facility liaison invited the primary researcher to present to a local church in East Texas. Interested participants contacted the PI, and a mutually identified meeting was arranged in a private location. In this initial meeting, the PI explained the study purpose and procedures, potential risks and benefits, and protection of confidentiality. Following eligibility, documentation of physician release to participate in the study, and written informed consent, baseline measures using paper/pencil surveys were performed, including demographic data, PAAI, FACT-G, and assessment of participants' resting heart rate. Participants were provided a physical activity tracker (Fitbit) and an electronic tablet (iPad). Instructions were given for proper use. Specific large muscle exercise applications were available on the tablet with specific instructions for participation. Three videos were preloaded and available for viewing: A warm-up and two additional videos included specific exercises designed to improve balance, rigidity, and gait. Participants were instructed to exercise 3 times per week, always beginning with the seated warm-up video performed by a physical therapist that included stretching. They were instructed to select one of the two remaining videos for large muscle exercise. In addition, all participants were instructed to engage in a private online support group where participants would share what exercises and/or other physical activity they performed, their overall perceived health, and other PD resources with the other study participants. Participants were encouraged to participate in the online support group a minimum of 3 times per week. Measurements were taken at baseline, weekly, and at the end of the 12-week study period. Over the 12-week study period, participants were asked to watch educational videos and access the online support group a minimum of 3 times per week. At the end of 12 weeks, the PI met with the participants to pick up the physical activity trackers and the electronic tablets, and the PAAI, FACT-G, and the Postintervention Feasibility Evaluation posttest surveys were administered.

Data Analysis

Data analysis was performed in consultation with the departmental statistician. Data were entered into the SPSS© version 25.0 statistical software program. Descriptive statistics (means, frequencies, percentages) were calculated to analyze demographical data. Differences in self-efficacy and QOL were reported as percentage of change, given the small sample size and inability to employ parametric statistical analyses. Data analytics from the physical activity tracker were also downloaded into the SPSS program.

Each participant was interviewed and the interview was audio-recorded. The recordings were transcribed verbatim. The typed recordings were read and reread line by line for commonalities, and themes were identified. The participants' comments in the online support group were also read and reread for common themes.

Results

Effectiveness of Intervention

Participants' posttest scores on the FACT-G instrument and PAAI instrument were compared with the same participants' pretest scores following the 12-week intervention

Table 3. FACT-G Subscales, FACT-G Total Score, PAAI Individual Items, and PAAI Total Score Pretest and Posttest Percentage of Change.

Variable	Items	Pretest sum score	Posttest sum score	Percentage change in sum scores
FACT-G, PWB subscale score		118.00	113.00	−4.24
FACT-G, SWB subscale score		118.00	115.00	−2.54
FACT-G, EWB subscale score		101.00	101.00	0.00
FACT-G, FWB subscale score		103.00	97.00	−5.83
FACT-G total score		440.00	426.00	−3.18
PAAI instrument: Confidence to perform usual physical activities when/during. . .				
	feeling tired	325	320	−1.54
	feeling pressure from work/school	475	220	−53.68
	bad weather	485	380	−21.65
	experiencing personal problems	490	340	−30.62
	feeling depressed	385	360	−6.49
	feeling anxious	460	380	−17.39
	physical discomfort with activity	395	250	−36.71
	too much work at home	430	320	−25.58
	have visitors	435	370	−14.94
	other interesting things to do	440	320	−27.27
	don't have support from family/friends	455	320	−29.67
	have other time commitments	430	320	−25.58
	do not feel well	370	230	−37.84
PAAI total score		4,585.00	2,620.00	−42.86

Note. Percentage change = (Posttest score–Pretest score/Pretest score) × 100; negative (–) percentage change means percentage decrease in score; positive (+) percentage change means percentage increase in score. FACT-G = Functional Assessment of Cancer Therapy–General; PAAI = Physical Activity Assessment Inventory; PWB = physical well-being; SWB = social well-being; EWB = emotional well-being.

using physical activity trackers and electronic tablets to answer the research question. Given the very small sample size ($n = 5$), differences in QOL and self-efficacy among preintervention and postintervention surveys were evaluated and reported as percentage of change of sum scores (a tally of all scores from participants) for the FACT-G subscale scores, total FACT-G instrument, and total PAAI instrument (see Table 1). While the very small sample size minimized power and the confidence to use nonparametric Wilcoxon signed-rank tests to compare the difference between pretest survey and posttest survey scores, test findings were still evaluated to lend support to the percentage of change findings. All comparisons among the four pretest and posttest FACT-G subscales and the two FACT-G and PAAI total scores using Wilcoxon signed-rank tests maintained nonsignificant ($p > .05$) findings (see Table 3).

Percentage of change findings, as delineated in Table 3, suggests that the physical activity tracker and electronic tablet intervention did not have a significant effect on participants' QOL or self-efficacy for physical activity. More specifically, the four subscales (PWB, SWB, EWB, and FWB) of the FACT-G instrument measuring QOL either maintained a negative percentage change or no change. The majority of participants' scores decreased following the intervention, with the FWB subscale decreasing the most at 5.83%. The FACT-G total score also decreased 3.18% from the preintervention surveys to the postintervention surveys. The PAAI total score also decreased considerably at 42.86%, suggesting lower self-efficacy for physical activity following the intervention.

An evaluation of the data analytics from physical activity tracker demonstrated that only one participant's activity level increased from preintervention to postintervention. Preintervention is identified as "Week 1," whereas postintervention is "Week 12." While baseline data on Day 1 were also examined, participants required some time to become acclimated to the physical activity tracker and the electronic tablet, which was not included in the analysis.

Finally, examination of the data retrieved from the physical activity tracker and electronic tablet demonstrated that four out of five participants were willing and able to wear the activity tracker and all five were willing to participate in the online support group. However, it is important to note that three of the five participants traveled during the study period. One participant visited family, while two traveled to a free educational seminar out of state to learn about PD. While these participants did wear their physical activity tracker during their travel time, they fell behind schedule with watching the required videos and participating in the online support group.

Qualitative analysis. Content analysis was used to interpret the transcribed audio recordings and written text gathered from participants' electronic tablets in the online support group. Transcripts were read word by word. Themes were drawn from participants' responses to derive general conclusions from the raw textual study data. Content themes were verified by both researchers who have experience in qualitative research.

Qualitative findings. Two themes were identified from the men and women who had PD in this study group—encouragement and support.

The origin of the term *encouragement*, or route term *encourage*, is defined as inspiring others with courage, hope, spirit, or confidence ("Encourage," 2018). In this study, participants shared responses that were not only inspiring but also reflected courage and hope among fellow group members. One participant reported,

> Just remember that the mountain we climb has many sides. We struggle to get to the top can slide down any of the sides. Just remember the goal is to get to the top and stay there, not to slide back down. (P4, 69, male)

Two of the group members encouraged others to maintain their mobility. One participant wrote, "Back to walking this evening about a mile, still exercising twice a day . . .," (P3, 69, male), whereas another stated, ". . .let's keep moving, let's keep moving" (P1, 73, female).

The term *support* is defined as sustaining or providing help for an individual who is afflicted or challenged with an ordeal ("Support," 2018). Support was the second theme identified from content analysis in this study. This theme was most prominent with regard to use of the physical activity tracker and physical activity. Many of the participants posted their daily exercise. Support was evident when one participant posted about a technical issue encountered with the physical activity tracker device:

> I'm trying to figure out how to get Fitbit to credit me for the 20 minutes each day I spend on the treadmill and the 10 minutes on the elliptical . . . Problem solved—wore in sock and the Fitbit registered the steps. . .I heard another on the iPad and several people told me to put it on my, around my ankle, which I did . . . Yeah, I put in my sock held it in place. (P3, 69, male)

The physical activity tracker was worn by four of the five study participants. One participant (P1, 73, female) was unable to wear it due to skin sensitivity, but elected to continue to participate in the study. The four participants reported wearing the physical activity tracker the majority of the time. For example, three participants stated that they wore the activity tracker ". . . constantly" (P2, 72, female), "All of the time" (P5, 80, male), and "Every day except one day," (P3, 69, male), whereas one participant remarked, "Yes, as often as I could. Couldn't wear when recharging" (P4, 69, male). Participants reported both likes and dislikes with wearing the physical activity tracker. All four of the participants relayed comments that the experience was beneficial to their health. Their likes and dislikes as well as their biggest obstacle in wearing the physical activity tracker are presented in Table 4.

While obstacles were reported, the physical activity tracker did have an overall positive impact on participants and made them more aware of their physical activity level. All participants (P2-P5) who wore the tracker provided a "yes" response when queried whether the physical activity tracker made them more aware of their physical activity level at the conclusion of the study. For example, two participants stated, "It did," or "yes," whereas another responded, "I didn't know my strength. . .I'm gonna get 100 thousand things going" (P3, 69, male). Another participant who suffered with chronic pain from two herniated vertebra and five compressed vertebrae remarked,

> . . .it keeps track of what you do. And obviously, I sit on my butt a lot. It made me want to do more. Physically, I, I don't think I could have done any more. (P4, 69, male)

Yet, another participant reported that

> Oh it definitely did, yeah. . .Brings it to mind every day, you know, have that thing on your wrist and you think what activity to do to stay active. (P5, 80, male)

Discussion

Overwhelming evidence to support the benefits of exercise on symptoms associated with PD suggests health professionals should encourage exercise and physical activity for this population. While the sample size in this feasibility study was small, the benefits shared are consistent with other studies (Ahlskog, 2011; Borrione et al., 2014; Dashtipour et al., 2015; Ellis et al., 2013). Similarly, this feasibility study supports the findings of Lorig and colleagues (1999) and highlights the importance of a self-management program to improve the health status of persons with a chronic disease. Furthermore, Stuifbergen (2006) highlights the importance of designing health-promotion interventions specific to a chronic illness. O'Brien and colleagues (2015) found that activity trackers helped promote physical activity in community-dwelling older adults, thus suggesting the usefulness of such monitoring system. Challenges with wearing the physical activity tracker reported by participants in this study were similarly reported in Gualtieri, Rosenbluth, and Phillips's (2016) study, yet the findings of using a tracker were viewed as a motivator. Although trackers may be motivating, a recent study by Ummels et al. suggests the trackers are not a reliable measure of actual activity (Ummels, Beekman, Theuniesen, Braun, & Beurskens, 2018).

Effectiveness of Intervention

Although statistical analyses of the quantitative data demonstrated that the physical activity tracker and

Table 4. Likes and Dislikes With Using the iPad for the Online Support Group.

	Age/gender	Likes	Dislikes	Obstacles
Participant 1	73/female	"So I thought it was, it's a very valuable tool. Some of the videos were really good. I read the articles. . ."	"I would have liked it better if we could have gotten everybody on it and more involved."	"Right at the beginning was getting my login correct. But after that well, I really didn't have one."
Participant 2	72/female	"I seen several things they were talking about actually online." "The videos, of course were helpful and I, I did the warm-up exercises."	"Well frustration was just that I never felt like I got on and communicated and had a back and forth with anybody."	"Like when I finally got it to work, I must have missed a page or something cause I went back and I did whatever I was working on trying to get that how to set up that. . ." ". . .I'd hit the wrong button. . ." ". . .and I had, you know, we got it set up; then I lost it."
Participant 3	69/male	". . .liked and learned it and would get an iPad"	"I didn't have any trouble with it once I figured it out."	Difficulty with "working the iPad," "learning the iPad," and "learning the language of it." "It was just last night or night before las, I had a saved password in there and I lost it. But I put the password in and I can't find out how to save it."
Participant 4	69/male	"I did not like the iPad!"	"Terrible. I could never get into it. I could never open it up unless I had the support of you. . ..The problem is I, I think, is that I don't have an interest in, like I don't have an interest in computers. . .I did not like the iPad!"	"I could never get into it. I could never open it up unless I had the support of you." "I didn't grow up with computers—And we used to use punch cards when I was going to college. I mean that's just, that's what we did. We used real pictures and said, 'Yes, no, yes, no, yes, no'. And uh then we would pun, put in the punch card order and see if the computer made it work. I mean it's. . ."
Participant 5	80/male	"Well it could have been better if I'd have used it more."	"I never got very good with it (iPad)."	"I guess just getting it to tell me what I wanted to learn. . . .if I'd been more familiar with it. But I know I have the same trouble with my phone and my computer."

electronic tablet intervention did not have a significant effect on participants' QOL or self-efficacy for physical activity, the results were not surprising given the small sample and the intent of the study to establish feasibility of the intervention. Participants' health issues, personal commitments, and perception of the FACT-G instrument instructions could have also skewed or affected postintervention results. For example, one participant experienced back pain, knee pain, and had cardiac catheterization, while two other participants experienced flu-like symptoms. Along with health challenges, two participants traveled out of state to learn about PD, whereas another participant visited a family member. Traveling ultimately took participants off schedule with watching the videos and participating in the online support group. No definitive trends were observed in the physical activity tracker data over the 12-week period. Data from Week 1 to Week 12 demonstrated that there was only one participant who showed improvement. As with other quantitative findings, health issues, personal commitments, and travel obligations also likely affected these results.

Self-efficacy for physical activity scores as measured by the PAAI also decreased over the 12-week study. The lower PAAI scores may also be related to factors as noted above. Contrary to the quantitative data, qualitative evidence in this study demonstrated that interaction among participants in the online support group supported behavioral change, as posited by Bandura's (1986) social cognitive theory (SCT). One participant who had a technical issue with getting the physical activity tracker to register steps posted a question to members of the support group. After receiving many suggestions from group members, the participant was inspired to fix the problem. He then moved forward with his exercise on the treadmill and elliptical, and finally registered and received credit for his steps. Two other group members encouraged participants to maintain their mobility. After doing so, one participant replied that he was going to begin walking again in the evening. This support inspired a sense of self-efficacy, which in turn resulted in human accomplishment, as theorized by Bandura (1986). While these accomplishments may seem small, they are commitments to action. As activity can benefit overall QOL and functional independence for individuals living with this neurodegenerative disease, these outcomes should not be dismissed.

Feasibility

Participants in this study were born from 1937 to 1949—members of the G.I. Generation or Silent Generation. According to findings from the Pew Research Center's Internet & American Life Project (Zickuhr, 2011), 30% or less of individuals from these generations typically own laptops and 1% or less typically own tablets. Given that participants in this study were not digital natives, their commitment to participation in this research was admirable. However, careful review of the participants' documentation revealed one common challenge among group members—accessing the course. Four of the five participants had difficulty with their password and one participant began late due to email issues. This was not surprising, as research has demonstrated that technology, specifically Internet accessibility and usability, can be challenging for individuals in these generations (Hussain, Ross, & Bednar, 2018). Given time, all five participants eventually utilized the electronic tablet; however, only four participants actively engaged in the online support group. The participant who was less active had difficulty navigating the technology and ongoing medical issues, which may have contributed to a decrease in online participation.

Limitations and Recommendations for Future Practice

Given the small sample size ($n = 5$) of this feasibility study, statistical analysis was not possible. The fact that some of the participants were not able to fully adhere to the program for a wide variety of reasons such as travel as previously discussed is also a limitation. It is important to mention that members in this group were physically active prior to the study; hence, it may explain their interest in participating in the study. Perhaps, a different sample, with participants who were not otherwise physically active, would have rendered different results. Several participants in this sample reported that the physical activity tracker did not register steps on a treadmill or elliptical. Decreased arm swing was one initial hypothesis, which was quickly ruled out as the steps were accurately calculated while walking on the ground without upper body movement. Suggestions for future practice include placing the physical activity tracker in a pocket or strap to the ankle while on the treadmill or elliptical.

Accessing the course also presented challenges for study participants. Remembering the password was a common occurrence that caused period delays. While hard copy instructions were helpful, meeting one-on-one when problems arose and asking participants to perform return demonstration were the most effective resolutions. The researcher also worked one-on-one with one participant who experienced Internet issues. Required videos were downloaded to this participant's tablet so that he could study materials without difficulty. Further research is warranted using a larger sample size.

Lessons Learned

In this study, the use of technology was instrumental in enhancing the physical, emotional, and social QOL among the group members. The physical activity tracker served as a motivator; as it helped participants carefully monitor their steps, and they were happy to share their physical activity with the group. However, the selection of the activity trackers is also important to determine the most appropriate for this population. The physical activity tracker, worn on the wrist, did not register the steps on the treadmill and elliptical. Peer support in the online support group in this study was beneficial. Participants shared comments about being grateful to receive advice and help in their online community. For these reasons, it is recommended that health care providers encourage the use of technology to promote physical activity and peer support groups for individuals with PD. However, introducing technology to the older participant should be done with caution as the participants in this study were challenged by the technology. Lessons learned include the need for multiple one-on-one sessions with each participant with returned demonstration to assist seniors with navigation in online settings. Different teaching strategies to make navigation easier and to help bridge the digital divide should be the aim. Providing education about technology to decrease intimidation and fear is paramount. Prior to offering education, it is important to first ask individuals about any potential concerns with using technology. According to Hussain et al. (2018), many seniors avoid technology because of anxiety about Internet security and the fear of being victimized. Knowing and understanding these feelings in the beginning may alter the teaching strategies that are selected. Ultimately, one-on-one teaching and sharing methods for remembering passwords and email addresses are highly recommended, when feasible. Perhaps, the use of another learning platform such as a private social media group rather than the university's learning management system would have proven more user-friendly. A DVD of the exercises may have been more suited for this population given the challenges in navigating the electronic tablet. Although printed material was provided, additional copies of the exercises would be appropriate for this age group. A larger sample size would have permitted greater dialogue in the online support group. Opportunities for in-person social groups may have also helped facilitate discussions without the constraints of the technology but would have added the challenge of travel. Finally, teaching effective interventions to promote self-management for increasing physical activity, and consequently improving QOL, is also recommended.

Conclusion

It is well documented that exercise or physical activity is an important part of health care for persons with PD. The benefits are plentiful, as physical activity has been shown to enhance the physical, emotional, and social QOL among those who are confronted with this disease. Emerging evidence that physical activity may delay or reverse the progression of PD is noteworthy of study. In this study, the social component of support groups was highlighted, along with its benefits for people with PD. Incorporating the lessons learned may help foresee and prevent challenges with using technology in the older adult with PD. Comorbidities among participants affected their participation and should also be taken into consideration. More research needs to be conducted using a larger sample size. Overall, it is important to continue to encourage self-efficacy, self-management, and activity among older persons with PD and to identify interventions that address the barriers to engaging in physical activity. Advancing health-promoting behaviors will ultimately improve overall health outcomes in this population.

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