

Background:

While Parkinson's disease (PD) is a progressive disorder of the brain, it impacts the entire individual, to include the mind and body. Research has indicated that exercise is a critical component in the trajectory of PD, and the delivery of physical activity and educational wellness workshops through a community based approach could have positive effects on physiologic capacity while also facilitating the development of social networks.¹ "Be Well" is a community-based program for PD which will incorporate balance work, progressive resistance training (PRT), mindfulness yoga (MY), and self-management education (SME) guided by the social cognitive theory (SCT).

Postural instability is one of the most debilitating impairments associated with PD² and research has indicated that falls occur in nearly 60% of PD patients.³ Early identification of balance deficits, persistent monitoring, and progressive interventions which challenge the individual's postural control are fundamentals of the program.³⁻⁵ In an 8 week randomized control trial (RCT) comparing an indoor and outdoor balance training group to a control group, the balance group, which received two hours of multisystem and task specific postural control training per week, demonstrated significantly greater increases on the Mini-BESTest total score, sit to stand count, and other functional dynamic balance tasks.⁴ A 2017 RCT found 36% improvement in postural control for the one-legged standing position based on force platform center of pressure (COP) measurement and a significant increase in time in this position in the group that participated in balance training with directional exercises for postural control.⁵ Compared to the group that received only muscular training, the balance group additionally had significant improvements in sub-system scores of the BESTest, such as transition/anticipatory postural adjustment, gait stability, and overall score.⁵ A seminal

study found the Mini-BESTest to be highly correlated with the Berg, but avoided possible ceiling effects in individuals with mild PD and was more effective in predicting the Unified Parkinson's Disease Rating Scale (UPDRS) - motor score.² While the BESTest may be more comprehensive, it is lengthy to administer and not as practical,² whereas the Mini-BESTest can be conducted in 10-15 minutes, examines various postural control systems, has excellent interrater and test-retest reliability, and is highly recommended by the PDEDGE Task Force.⁶⁻⁸ This tool will be utilized as a means for discerning balance deficits, assessing progress, and discriminating fallers, with a minimal detectable change (MDC) of 3.5 points and minimal important change (MIC) of 4 points, indicating noticeable change in ability beyond measurement error and smallest benefit of value to patients, respectively.⁹⁻¹¹

Progressive Resistance Training (PRT) will be an integral component of the program due to the association of strength with physical capacities and disease time in the population of individuals with PD.¹² Across the literature PRT interventions vary with a duration of 1.5 to 24 months, a frequency of two to three times per week, and a follow up of zero to 4 months, all conducted with patients in the medication "on" state.¹³⁻¹⁶ In a RCT by Santos et al the exercise group participated in PRT of the main flexor and extensor muscles of the upper and lower limbs, with intensities individually determined by 1 repetition maximum (RM), and repetition and circuit training provided on non-consecutive days.¹⁴ Participants initially performed 1 set of 15-20 repetitions for each exercise at 40-50% of 1RM, and by week 8 performed 2 sets of 4-7 repetitions at 80-85% of tested max.¹⁴ The PRT group demonstrated significant increases in fast rhythm walking speed during the ten meter walk test (10MWT) at post-test and re-test, and

improved COP displacement and 39-Item Parkinson's Disease Questionnaire score at post-test.¹⁴ Significant time by group interaction for functional tests such as the timed up and go (TUG), 30-second chair stand (T30), and 10MWT have also been found when comparing PRT and control groups with mild to moderate PD, or Hoehn and Yahr stages I to III.¹⁵ The individuals allocated to the PRT group participated in training of major muscle groups, with exercises such as chest presses, knee extensions, and hamstring curls, for approximately 50-60 minutes beginning with 2 sets of 10-12 repetitions.¹⁵ The TUG is a well-established functional test to evaluate gait, functional strength, transfers, and falls risk, and will be utilized as an outcome measure in this program.^{16,18} Clael et al found a negative correlation of strength with the TUG in individuals with PD, more specifically the higher the TUG score, the greater the chance of falls and imbalance, but if strength is maintained, often agility and dynamic balance are preserved.¹² Psychometrics of the TUG specific to PD indicate a MDC between 3.5 to 11 seconds and a cut-off score greater than 7.95 seconds suggests risk of falls.¹⁹

Mindfulness yoga (MY) and self-management education (SME) will also be integral complementary interventions to more directly address non-motor symptoms of PD, such as anxiety, depression, concentration deficits, fatigue, and sleep disturbances.²⁰⁻²³ Typically the duration of MY interventions are 8 weeks, with a frequency of once or twice a week.²¹⁻²² A 2019 RCT found individuals with PD allocated to the MY group had significantly better improvement in anxiety and depressive symptoms, spiritual well-being, and disease specific health-related quality of life compared to the stretching and resistance training group.²¹ In this study Hatha yoga was introduced in a stepwise and progressive manner over weekly 90 minute

sessions.²¹ Another study incorporating Hatha yoga found after 8 weeks individuals had significant improvements in fatigue, Activities-Specific Balance Confidence (ABC) Scale scores, and Parkinson's Disease Questionnaire-8 (PDQ-8) scores.²² In 2017 an integrative literature review was published and concluded that self-management support as an adjunct to rehabilitation may help to better meet the diverse needs of individuals with PD.²⁴ Self-management interventions range from 3-8 weeks of once or twice-weekly meetings, to fully independent online modules.²⁴ Self-management scores have been found to be positively correlated with activities of daily living (ADL), self-efficacy and social support, but negatively correlated with various non-motor symptoms.²⁵ In one study 26.2% of the variance in self-management in people with PD was explained by demographic factors and non-motor symptoms.²⁵ There have been positive results for implementation of the SCT as it relates to the initiation of personal behavior changes, and how well an individual achieves and maintains these changes.²⁵⁻²⁶ Be Well will target the barriers of low outcome expectation²⁶ by empowering participants with the knowledge and tools to enhance their ability to live and enjoy life with PD.²³ Ellis et al addressed the cognitive and behavioral factors of the SCT to target exercise outcome expectations, with goal setting, feedback, and relapse prevention training to increase regular exercise participation in older adults.²⁶ To further enforce the behavior change, cognitive-behavioral strategies have been augmented with assistance of caregivers and the prioritization of activities and scheduling of exercise in one's daily routine.²⁶ The SCT is one of the most frequently applied models for understanding physical activity behavior in older adults, as it specifies a set of psychosocial determinants.²⁷ Research has indicated exercise settings can serve as social networks,¹ and lack of an exercise

partner, and negative perception of health and one's PD symptoms have been found as negative predictors of exercise.²⁸ The SCT addresses change on various levels and helps identify barriers and opportunities to exercise, which is pivotal when designing a feasible program as non-exercisers often endorse greater barriers.²⁶⁻²⁹ A quasi-experimental case control study on self-management education utilized health care professionals with experience in PD training to deliver the program, and themes and topics included anxiety and depression, stress, self-monitoring, communication, enriching activities, and discussion regarding future life with PD.²³ Often the outcomes of programs addressing non-motor symptoms are assessed through use of generic and Parkinson's specific questionnaires.²³ The final measure of significance in "Be Well" is the PDQ-8, a self-report questionnaire derived from the PDQ-39 to evaluate the impact of PD on quality of life.¹⁷ A 2015 longitudinal review found the PDQ-8 closely replicated results gained from the PDQ-39,³⁰ but only takes 5-12 minutes to administer according to Shirley Ryan Ability Lab.³¹ This measure is highly recommended by the PDEDGE task force to assess the participant domain of the International Classification of Functioning, Disability and Health (ICF) model³² in individuals in Hoehn and Yahr stages I-V.¹⁸ The anchor based MCID for this measure ranges between 5.78-7.4 points, indicating the smallest change identified as important, and normative values have been established for each stage.³¹ The aforementioned evidence-based interventions will be implemented under Be Well, and guided by the framework of the SCT to more comprehensively and effectively improve physical capacity, self-management, and adherence to physical activity amongst individuals with PD.

Program Goals :

Be Well is a community program designed to intentionally and comprehensively address the motor and non-motor symptoms of Parkinson's disease that may influence an individual's quality of life and perceived control over their health status.^{20,33} The objective of the program is to help participants meet functional and life satisfaction related goals and optimize functional independence and well-being, while minimizing future fall potential through the use of trained health care professionals with PD experience. Be Well aspires to enhance participants' self-management strategies, health-related knowledge, functional status and overall movement safety by the end of the 10 weeks.

1. By week 10 participants will improve their Mini-BESTest score by +4.0 points in order to meet the MCID and demonstrate meaningful change in dynamic balance.³⁴
 - a. Mini-BESTest can be found in Appendix A
2. By week 10 participants will perform the Timed Up and Go in less than 7.95 seconds, an established cut-off score for persons with PD to demonstrate improved gait speed for functional independence.³⁵
 - a. TUG can be found in Appendix B
3. By week 10 participants will improve their PDQ-8 score by -5.94 points in order to meet the MCID for smallest meaningful change for improvement in quality of life to decrease the psychosocial impact of PD on daily life.³⁶
 - a. If the participant does not improve their score by PDQ-8, participants should demonstrate a score increase less than +4.91 points, the MCID for worsening change in outcome.³⁶

4. By week 10 participants will have completed >90% of the sessions in order to demonstrate commitment and adherence to program attendance to meet functional goals.
5. By week 10 participants will indicate increased or maintained weekly physical activity through “exercise logging” in order to meet recommended physical activity guidelines for older adults of 150 minutes of moderate intensity aerobic activity and two or more days of muscle strengthening.³⁷
 - a. Example Activity Log can be found in Appendix C

Methods:

I. Personnel

The program director will play a significant role informing the local community about the program and the registration/enrollment process. The program director is a retired PT that now devotes much of her time volunteering at the Kiwanis Recreation Center. Two PTs that are board certified as neurologic clinical specialists (NCS) will be in charge of program assessments, exercise sessions, and the organization and planning of SME classes. One of these two PTs is a certified yoga instructor and will lead the MY sessions provided at the conclusion of weekly classes and as an optional class prior to self-management education courses held on Saturdays. Two personal trainers (CPT) with extensive experience working with individuals with PD have also volunteered to attend exercise sessions to assist with monitoring patient safety, correcting exercise form, and offering modifications. Any local PT and CPTs with work flexibility and experience with PD will be encouraged to volunteer their time to assist with the training sessions and provide social support to participants as reassurance from others is associated with success.³⁸ While the two physical therapists will be in charge of

organizing the SME classes, they will be taught by the following clinicians: a neurologist, two PTs, an occupational therapist, registered dietician, psychologist, and pharmacist. These providers will be selected before the program is initiated and a set calendar with the days and times of each class will be given to the participants at the pre-participation assessment. The clinicians will offer handouts and additional resources as a means of “informational support,” and have each agreed to remain after class to answer individual questions.³⁹

II. Location

All program events, to include exercise training and educational sessions, will be held at Kiwanis Recreation Center and Honeycutt Park located in Fayetteville, NC. This recreation center features a fitness room, outdoor track, and a senior adult open gym.⁴⁰ There is no fee to access the gym equipment, fitness rooms, and outdoor track.⁴⁰ Be Well will primarily utilize the outdoor track and senior adult open gym. In the case of inclement weather requiring all participants to exercise indoors, they will be socially distanced throughout the open gym and fitness rooms.

III. Enrollment and Program Schedule

The program will be publicized through flyers posted in local physician practices, physical therapy clinics, neurology clinics, senior centers, grocery stores, pharmacies, churches, and recreation centers. Clinician’s treating individuals with Parkinson’s Disease may recommend the program to their patients. The flyer will include a general overview of the program, duration, start date, the program website link, and contact information for the program director. The program director will speak to members of the “Parkinson’s Disease Support Group,” which meets on the 2nd Saturday of each month at Kiwanis Recreation Center, about the program and enrollment dates.⁴⁰ The director

will also encourage support group leaders to refer eligible members to Be Well. Cohort size will be capped off at 16 participants. The program will be open to individuals with Hoehn and Yahr stages I-III (indicating unilateral to mild to moderate bilateral disease) that are community dwelling and demonstrate no significant cognitive impairments.⁴¹ Participants will enroll by calling or emailing the local program director within a week of the program start date. The program will be offered four times a year, avoiding overlap with winter holidays and the extreme summer heat in mid to late July-August. Offering morning training sessions will support overlap with on-medication cycle.⁴ The training sessions will take place on Tuesdays and Thursdays from 10 – 11:30 am, and on Saturdays an optional mindfulness yoga class will take place from 9:30-10 am on weeks 1-10, followed by the required SME sessions from 10 – 10:45 am during the first 8 weeks. As the space permits participants will be encouraged to bring a family member/ caregiver to education sessions and as an “accountability partner” during training. As COVID-19 restrictions lessen family support will be reinforced to a greater degree.

Holistic Training – (Tuesdays + Thursdays)	Self-Management Education (SME) – (Saturdays)		
Active warm-up (10 minutes) - Stationary biking, treadmill walking, or track walking Balance training (BT) (25-30 minutes) - Various progressive stations - Altering conditions, environments, single and double limb support tasks - Weeks 1-2: Indoor, Weeks 3-4: Indoor, Weeks 5-6: Outdoor, Weeks 7-8: Outdoor, Weeks 9-10: transition to more independent balance training - Equipment: chairs, therapy balls, and speakers	Week	Topic	Primary Instructor
	0	Baseline Assessment at Kiwanis Recreation Center	PT and MD
	1	Basic pathophysiology and overview of PD	Neurologist
	2	Exercise and associated benefits specific to PD	Physical Therapists
	3	Activities of daily living, and cognitive behavioral strategies	Occupational Therapist
	4	Energizing foods, foods to ease	Registered Dietician

<p>Progressive resistance training (PRT) (25-30 minutes)</p> <ul style="list-style-type: none"> - 2 sets and 5-15 reps, 1-2 minute rest intervals - Increasing load beginning at 1-2kg; 11-15 intensity RPE - Chest press, knee extension, hamstring curl, seated row, etc - Weeks 1-2 introduction to exercises and circuit training, Weeks 3-8 progressive circuits and repetition training, Weeks 9-10 independent circuit training - Equipment: dumbbells, ankle weights, and an elevated bench, step, or box <p>Mindfulness yoga (MY) (15-20 min.)</p> <ul style="list-style-type: none"> - Breathing exercises (lion breath, cooling breath, and alternate nostril breathing), mindfulness practice (body scan), and yoga poses of sun salutation with modifications (mountain pose, upward salute, forward bend, lunge, cobra, knee to chest) <p>*Optional 30 minute Mindfulness Yoga class before SME courses*</p>		symptoms & increase medication effect		
	5	Mental health, coping strategies, sleep quality	Clinical Psychologist	
	6	Medication management, reporting adverse effects, adherence	Pharmacist	
	7	Navigating life with PD, community services, and available resources	Social Worker	
	8	SME closing discussion and review	Physical therapists & neurologist	
	9	No SME but optional MY at 9:30am		
	10	No SME but optional MY at 9:30am and reassessment		
	14	Follow-up reassessment		

Details of Interventions:

I. Pre-Participation Baseline Assessment

On the Saturday prior to the formal “start” of the program all participants will meet at Kiwanis Recreation Center at a pre-determined time to complete preparticipation health screening forms and baseline outcome assessments (i.e. MiniBESTest, TUG, and PDQ-8). The neurologist will perform a brief medical history and anthropometric intake, and symptom and medication review, and all performance measures will be administered by the 2 lead physical therapists of the program.⁵ Participants will also report information regarding current physical activity frequency and duration, and typical daily activities. Following the participant’s completion of the physician consult, functional tests and self-

report measures will be administered. They will be provided with the exercise log book, printed program schedule and summary (to include the SME lecture series topics and speakers), and contact information for the program director and two PTs. The physical activity log book is important to facilitate self-monitoring, a method proven effective in making health behavior change.³⁸ The cohort of participants will be divided into two groups to improve monitoring and social distancing during the exercise sessions. Groups will alternate starting with the balance or progressive resistance training work for each session. Participants will return at week 14 for a follow-up assessment.

II. Low Intensity Warm Up

All weekly training sessions will begin with a 5-10 minute warm up (depending on when participants arrive) of low intensity exercise. The participants will have the option to ride the stationary bike, walk inside, or walk on the track outside, with one lead PT and personal trainer stationed at the track and the other PT and personal trainer in the open gym area. After the warm up period has ended all participants and personnel will gather in the open gym area or under the outdoor awning, weather permitting.

III. Balance Training Intervention:

Postural instability is a cardinal sign of PD and a significant restrictor of mobility.⁴² Balance training with an “exercise therapist” has been found effective in improving stride length, stride velocity, and cadence, and participants in therapist-supervised programs often report being more motivated.⁴³⁻⁴⁴ Considering that psychosocial symptoms of PD may predate or accompany motor symptoms and facilitate withdraw from social roles and activities, the group-based setting will be promoted for socialization, emotional support, motivation, and to foster friendships. BT will be modeled after several 8-9 week balance studies found in the literature, but will be 10 weeks in duration, with weeks 9-10

focused on transition to more self-guided exercise to promote self-confidence in participants' abilities to continue to exercise once the program has completed.⁴⁻⁵ Be Well will employ a progressive balance structure intended to improve multi-directional stability, turning skills, perturbation response, and improved confidence with community exercise.⁴ For weeks 1-2 balance training will be performed in the "Senior Adult Open Gym," with anticipatory postural adjustments, sensory orientation, postural response, and biomechanical restraint as targeted balance domains.⁴⁶ Activities will include postural re-education in standing for verticality work and bilateral and single limb BT in the eye open condition with activities such as sit to stands, compensatory stepping upon perturbation, training on a foam pad, and stepping on/off an 8-inch step.⁴⁶ During weeks 3-4 participants will practice exercises from previous weeks at higher repetitions and sets, as well as eye closed conditions during single and double leg tasks, multi-directional reaching, rapid turns, tandem walking, head turning, and weight shifting to music, with an overall focus on stability in gait and limits of stability training. Weeks 5 – 8 will be progressed to outdoors with dual task walking on the track and functional training such as walking through doorways, pushing open doors, crossing a parking lot, negotiating stairs/slopes, and standing on various terrains. During weeks 7-8 the participants will additionally perform advanced gait training, such as walking at fast speeds on uneven ground, as well as obstacle negotiation and outdoor perturbation response training to improve coordination and agility skills.^{4-5,46} For the final two weeks participants will move through various training "stations" indoor and outdoor with exercise cards and less direct supervision. In these last weeks of the program self-

instruction will be encouraged to increase self-efficacy and adherence to activity related behavior changes.³⁸

IV. Progressive Resistance Training Intervention:

Due to the significant role of muscles of the upper/lower limbs and trunk in static and dynamic balance and gait activities, PRT will be another critical training component of this program.⁵ Studies have reported the specific and generalizable motor learning effects of progressive resistance exercise and associated reduction in neural effort required to move pretraining loads in short training periods of 3-4 weeks.⁴⁷⁻⁴⁸ PRT will focus on increasing intensity and number of repetitions through a circuit and repetitive training format, utilizing the principle of progressive overload.^{5,14} To avoid “accumulative fatigue” exercises will begin at 2 sets of 5-8 repetitions and work up to 2 sets of 12-15 repetitions, starting at a load of 1-2 kgs pounds.⁵ Weeks 1-2 the PTs will focus on familiarizing the participants with resistance exercises like knee extensions, knee flexion, seated chest press, front and rear lat pull downs, step ups, lunges, and arm rows with proper technique execution.¹⁵ PRT should be performed at intensities between 11-15 on the Borg Rating of Perceived Exertion (RPE).⁴⁹ PTs and personal trainers will assist in making any postural adjustments or exercise modifications.

V. Mindfulness Yoga Intervention

As mentioned, individuals with PD often experience psychological distress associated with social and work decline, increasing physical impairments, and sleep disturbances.²¹ Mind-body exercise has been found to improve motor dysfunction and mobility, and as well as decrease anxiety and depressive symptoms and increase spiritual well-being.²¹ It serves as a nonpharmacologic approach to stress and symptom management.²¹ Participants will participate in 15-20 minutes of mindfulness yoga at the

conclusion of Tuesday and Thursday training classes, and an optional 30 minute class will be taught before SME on Saturdays. Optional MY classes will occur on all 10 Saturdays of the program. The theme of weeks 1 and 2 will be “introducing to MY to our mind and body,” for weeks 3-6 it will be “mindfulness of the body and content of mind,” and theme for the final 4 weeks will be “kindness and compassion.”²¹ Each class will begin with guided and controlled breathing exercise, and then transition into mindfulness practice with full body scans, and poses of sun salutation with modifications.²¹ Weekend yoga courses will have a similar sequence with a slightly longer duration of mindfulness training and sun salutation yoga practice.²¹

VI. Self-Management Education Intervention:

The SME series will take place on Saturday mornings for the first 8 weeks of the program. As previously stated, each week a different topic will be presented by providers with extensive experience working with individuals with PD. The overall goal of these lectures will be to facilitate feelings of support, promote life satisfaction, and help individuals in their adjustment and acceptance of PD for managing daily life.⁵⁰ Family members and caregivers will be encouraged to attend as self-management is “intimately” linked within the context of the family. These lectures are designed to help participants handle different aspects of the disease, such as symptom control, medications, emotional reactions, and nutrition in daily life. PowerPoint will be utilized as the presentation platform and each presenter will provide handouts and any appropriate supplemental information or resources. The formal presentation will last 30 minutes but all presenters will remain after to answer additional questions. The SME course on week 8 will serve to consolidate information provided during previous lectures and promote a new outlook on their life situation. Patient’s will be encouraged to reflect

and write down any follow-up questions from the lecture held on the previous Saturday in their exercise log. All sessions will be recorded in case participants would like to view them again on a later date. Participants will be encouraged to perform low intensity exercise and physical activity on non-program days and record the activity type and duration in their exercise logs.

V. Sample Calendar

BE WELL: APRIL 2021

SUN	MON	TUE	WED	THU	FRI	SAT	
All activities will be held at the Kiwanis Recreation Center. BT = balance training PRT = progressive resistance training MY = mindfulness yoga (asterisk indicates optional MY session) SME = self-management education					01	02	03
	04	05	06	07	08	09	10
		10-11:30am: Warm-Up (10 min), BT (30 min), PRT (30 min), MY (20 min)		10-11:30am: Warm-Up (10 min), PRT (30 min), BT (30 min), MY (20 min)		9:30-10am: *Optional MY 10-10:45am: SME - overview and pathophysiology of PD (Neurologist)	
11	12	13	14	15	16	17	
	10-11:30am: Warm-Up (10 min), BT (30 min), PRT (30 min), MY (20 min)		10-11:30am: Warm-Up (10 min), PRT (30 min), BT (30 min), MY (20 min)		9:30-10am: *MY 10-10:45am: SME - Exercise and Associated Benefits (Physical Therapists)		
18	19	20	21	22	23	24	
	10-11:30am: Warm-Up (10 min), BT (30 min), PRT (30 min), MY (20 min)		10-11:30am: Warm-Up (10 min), PRT (30 min), BT (30 min), MY (20 min)		9:30-10am: *MY 10-10:45am: SME - Activities of daily living & strategies (Occupational Therapist)		
25	26	27	28	29	30	1	
	10-11:30am: Warm-Up (10 min), BT (30 min), PRT (30 min), MY (20 min)		10-11:30am: Warm-Up (10 min), PRT (30 min), BT (30 min), MY (20 min)		9:30-10am: *MY 10-10:45am: SME - Diet and Nutrition for PD (Register Dietician)		

Program Evaluation

I. Participant Outcomes

Participant outcomes will be assessed through the use of outcome measures and individual physical activity logs intended to promote self-monitoring through daily activity documentation. During the pre-participation baseline testing participants will complete

the Mini-BESTest, TUG, PDQ-8, a health screen, and provide general demographic information. Both PTs will assess and score the participants on the Mini-BESTest, TUG, and PDQ-8 at baseline, and an average score will be computed for each individual on each test. Additionally, average scores across all patients for each baseline test will be calculated.

The Mini-BESTest, TUG, and PDQ-8 will be administered again at week 10 (end of the formal program) and week 14 (follow-up). Average scores for each participant and the overall cohort at re-assessment and follow-up will be calculated. Statistical analysis of changes in the group mean from baseline to program completion (week 10) will be compared to monitor for progress and program effectiveness. By the end of week 10 participants should improve Mini-BESTest score by +4 points, PDQ-8 by -5.94 points, and perform the TUG in less than 7.95 seconds.³⁴⁻³⁶ They should also improve or exceed their previous level of physical activity to meet the recommended guideline for older adults, which includes 150 minutes of aerobic activity and two or more days of strengthening activities.³⁷ Statistical analysis of changes in group mean from program completion (week 10) to follow-up (week 14) will be assessed to see if scores began to diminish, potentially indicating the participants were not confident enough or did not see the value in continuing with the balance and progressive resistance exercises on their own. Participants will be encouraged to bring their activity logs to Saturday SME sessions and discuss facilitators and barriers to their physical activity over the previous week with their peers. Reassessments will be held on the final Saturday of the program (week 10), with testing beginning at 10 am (since there is no SME class scheduled), and 4 weeks following the conclusion of the formal program (week 14). Individuals will

be encouraged to continue to complete their activity logs until the follow-up assessment at week 14. Attendance will be taken at the beginning of each session as a means of accountability and will be analyzed along with the outcome measures to look for individual or overall participation trends.

IV. Evaluation Plan

In addition to examining program effectiveness based on participant outcome measures, a broader program evaluation will be performed following program completion. The program director will use the “CDC’s Introduction to Program Evaluation” as a guide to reflect upon how the program was influenced by real-world constraints.⁵¹ General questions the program director and two lead PTs will discuss are whether Be Well was able to put activities into place as originally intended, if there was appropriate use of resources and staff time, if there were any unintended costs, and if the program met goals and objectives.⁵¹ It will also be important to engage the stakeholders, which include the program director, two lead PTs, multi-disciplinary SME providers, participants, family/caregivers of participants, local clinicians that treat individuals with PD, and director of the Kiwanis Recreation Center, to ensure a more comprehensive evaluation from various perspectives.⁵¹ Open and close ended surveys uniquely created for the various groups of respondents will be utilized to gather feedback on specific aspects of the program. For example, online surveys will be sent to multidisciplinary providers regarding the structure, frequency, and topics of the SME sessions to inform future changes to be made.⁵¹ Participants will complete a survey in person as part of their re-assessment (final Saturday, week 10) with questions about whether they found the location, time, and frequency convenient, which aspects were enjoyable/displeasing, and how ready they currently feel to progress into individual self-

monitored exercise.⁵¹ The Kiwanis Recreation Center director or a representative from the parks and recreation center will also provide input on how well this location and space worked with the program and how to better plan in the case of inclement weather or overcrowded spaces during Be Well training sessions. Family members/caregivers, program drop-outs, and any individuals with PD that chose not to participate (such those from the PD Support Group) will also be encouraged to complete surveys. This may provide the program leaders with insight into whether incentives are needed to encourage participation, email or text reminders would be beneficial on class days, and how potential language barriers could be minimized.⁵¹ Reflecting and thoroughly evaluating all components of the program could help to increase future cohort compliance and maximize participant outcomes.

Conclusion:

Be Well intends to improve the lives of individuals living in the Fayetteville area with PD, both physically and mentally. While the triangle area of NC offers several programs for PD, they are not prevalent in the Fayetteville area. Since PD affects deep parts of the brain that control movement, it can significantly impact an individual's motor control and overall mobility, while simultaneously facilitating involuntary movements. The progressive nature of PD is associated with mounting impairments and motor control issues, often inducing problems with daily activities and restricting participation, which cumulatively can take an emotional toll on the individual.⁵² Many individuals also experience cognitive impairments and effects of aging, such as gradual loss of muscle mass and strength.⁵³ Studies have found between 45-68% of people with PD fall each year, increasing healthcare costs.⁵⁴ Under the guidance of Be Well's personnel, individuals with PD can improve their confidence and safety in mobility, and increase

their social interactions. Participants will gradually progress in their balance and resistance training levels and participate in mindfulness yoga to learn breathing and meditation techniques to manage anxiety. In the final 2 weeks participants will increase responsibility in self-instructing balance and resistance exercises to facilitate self-efficacy and behavior change. The SME courses will empower individuals with knowledge about their disease and the various providers that can help them navigate different aspects of PD. Under the guidance of the SCT, Be Well will address cognitive and behavioral factors that influence exercise outcome expectations and barriers, with goal setting, feedback, and increased participant responsibility.²⁶ Be Well's provider team is dedicated to helping participant's improve their physical capacity, self-confidence regarding exercise, and feelings of social cohesion with other individuals living with PD.

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Appendix A. Mini-BESTest⁵⁵

Mini-BESTest: Balance Evaluation Systems Test

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ANTICIPATORY

SUB SCORE: / 6

1. SIT TO STAND

Instruction: "Cross your arms across your chest. Try not to use your hands unless you must. Do not let your legs lean against the back of the chair when you stand. Please stand up now."

(2) Normal: Comes to stand without use of hands and stabilizes independently.

(1) Moderate: Comes to stand WITH use of hands on first attempt.

(0) Severe: Unable to stand up from chair without assistance, OR needs several attempts with use of hands.

2. RISE TO TOES

Instruction: "Place your feet shoulder width apart. Place your hands on your hips. Try to rise as high as you can onto your toes. I will count out loud to 3 seconds. Try to hold this pose for at least 3 seconds. Look straight ahead. Rise now."

(2) Normal: Stable for 3 s with maximum height.

(1) Moderate: Heels up, but not full range (smaller than when holding hands), OR noticeable instability for 3 s.

(0) Severe: ≤ 3 s.

3. STAND ON ONE LEG

Instruction: "Look straight ahead. Keep your hands on your hips. Lift your leg off of the ground behind you without touching or resting your raised leg upon your other standing leg. Stay standing on one leg as long as you can. Look straight ahead. Lift now."

Left: Time in Seconds Trial 1: _____ Trial 2: _____

Right: Time in Seconds Trial 1: _____ Trial 2: _____

(2) Normal: 20 s.

(2) Normal: 20 s.

(1) Moderate: < 20 s.

(1) Moderate: < 20 s.

(0) Severe: Unable.

(0) Severe: Unable

To score each side separately use the trial with the longest time.

To calculate the sub-score and total score use the side [left or right] with the lowest numerical score [i.e. the worse side].

REACTIVE POSTURAL CONTROL

SUB SCORE: / 6

4. COMPENSATORY STEPPING CORRECTION- FORWARD

Instruction: "Stand with your feet shoulder width apart, arms at your sides. Lean forward against my hands beyond your forward limits. When I let go, do whatever is necessary, including taking a step, to avoid a fall."

(2) Normal: Recovers independently with a single, large step (second realignment step is allowed).

(1) Moderate: More than one step used to recover equilibrium.

(0) Severe: No step, OR would fall if not caught, OR falls spontaneously.

5. COMPENSATORY STEPPING CORRECTION- BACKWARD

Instruction: "Stand with your feet shoulder width apart, arms at your sides. Lean backward against my hands beyond your backward limits. When I let go, do whatever is necessary, including taking a step, to avoid a fall."

(2) Normal: Recovers independently with a single, large step.

(1) Moderate: More than one step used to recover equilibrium.

(0) Severe: No step, OR would fall if not caught, OR falls spontaneously.

6. COMPENSATORY STEPPING CORRECTION- LATERAL

Instruction: "Stand with your feet together, arms down at your sides. Lean into my hand beyond your sideways limit. When I let go, do whatever is necessary, including taking a step, to avoid a fall."

Left

Right

(2) Normal: Recovers independently with 1 step (crossover or lateral OK).

(2) Normal: Recovers independently with 1 step (crossover or lateral OK).

(1) Moderate: Several steps to recover equilibrium.

(1) Moderate: Several steps to recover equilibrium.

(0) Severe: Falls, or cannot step.

(0) Severe: Falls, or cannot step.

Use the side with the lowest score to calculate sub-score and total score.

SENSORY ORIENTATION

SUB SCORE: / 6

7. STANCE (FEET TOGETHER); EYES OPEN, FIRM SURFACE

Instruction: "Place your hands on your hips. Place your feet together until almost touching. Look straight ahead. Be as stable and still as possible, until I say stop."

Time in seconds: _____

(2) Normal: 30 s.

(1) Moderate: < 30 s.

(0) Severe: Unable.

8. STANCE (FEET TOGETHER); EYES CLOSED, FOAM SURFACE

Instruction: "Step onto the foam. Place your hands on your hips. Place your feet together until almost touching. Be as stable and still as possible, until I say stop. I will start timing when you close your eyes."

Time in seconds: _____

- (2) Normal: 30 s.
- (1) Moderate: < 30 s.
- (0) Severe: Unable.

9. INCLINE- EYES CLOSED

Instruction: "Step onto the incline ramp. Please stand on the incline ramp with your toes toward the top. Place your feet shoulder width apart and have your arms down at your sides. I will start timing when you close your eyes."

Time in seconds: _____

- (2) Normal: Stands independently 30 s and aligns with gravity.
- (1) Moderate: Stands independently <30 s OR aligns with surface.
- (0) Severe: Unable.

DYNAMIC GAIT

SUB SCORE: _____ / 10

10. CHANGE IN GAIT SPEED

Instruction: "Begin walking at your normal speed, when I tell you 'fast', walk as fast as you can. When I say 'slow', walk very slowly."

- (2) Normal: Significantly changes walking speed without imbalance.
- (1) Moderate: Unable to change walking speed or signs of imbalance.
- (0) Severe: Unable to achieve significant change in walking speed AND signs of imbalance.

11. WALK WITH HEAD TURNS – HORIZONTAL

Instruction: "Begin walking at your normal speed, when I say "right", turn your head and look to the right. When I say "left" turn your head and look to the left. Try to keep yourself walking in a straight line."

- (2) Normal: performs head turns with no change in gait speed and good balance.
- (1) Moderate: performs head turns with reduction in gait speed.
- (0) Severe: performs head turns with imbalance.

12. WALK WITH PIVOT TURNS

Instruction: "Begin walking at your normal speed. When I tell you to 'turn and stop', turn as quickly as you can, face the opposite direction, and stop. After the turn, your feet should be close together."

- (2) Normal: Turns with feet close FAST (≤ 3 steps) with good balance.
- (1) Moderate: Turns with feet close SLOW (≥ 4 steps) with good balance.
- (0) Severe: Cannot turn with feet close at any speed without imbalance.

13. STEP OVER OBSTACLES

Instruction: "Begin walking at your normal speed. When you get to the box, step over it, not around it and keep walking."

- (2) Normal: Able to step over box with minimal change of gait speed and with good balance.
- (1) Moderate: Steps over box but touches box OR displays cautious behavior by slowing gait.
- (0) Severe: Unable to step over box OR steps around box.

14. TIMED UP & GO WITH DUAL TASK [3 METER WALK]

Instruction TUG: "When I say 'Go', stand up from chair, walk at your normal speed across the tape on the floor, turn around, and come back to sit in the chair."

Instruction TUG with Dual Task: "Count backwards by threes starting at _____. When I say 'Go', stand up from chair, walk at your normal speed across the tape on the floor, turn around, and come back to sit in the chair. Continue counting backwards the entire time."

TUG: _____ seconds; Dual Task TUG: _____ seconds

- (2) Normal: No noticeable change in sitting, standing or walking while backward counting when compared to TUG without Dual Task.
- (1) Moderate: Dual Task affects either counting OR walking (>10%) when compared to the TUG without Dual Task.
- (0) Severe: Stops counting while walking OR stops walking while counting.

When scoring item 14, if subject's gait speed slows more than 10% between the TUG without and with a Dual Task the score should be decreased by a point.

TOTAL SCORE: _____ / 28

Appendix B. Timed Up and Go⁵⁶

ASSESSMENT

Timed Up & Go (TUG)

Purpose: To assess mobility

Equipment: A stopwatch

Directions: Patients wear their regular footwear and can use a walking aid, if needed. Begin by having the patient sit back in a standard arm chair and identify a line 3 meters, or 10 feet away, on the floor.

① Instruct the patient:

When I say "Go," I want you to:

1. Stand up from the chair.
2. Walk to the line on the floor at your normal pace.
3. Turn.
4. Walk back to the chair at your normal pace.
5. Sit down again.

NOTE:
Always stay by the patient for safety.

- ② On the word "Go," begin timing.
- ③ Stop timing after patient sits back down.
- ④ Record time.

Time in Seconds: _____

An older adult who takes ≥12 seconds to complete the TUG is at risk for falling.

Patient _____

Date _____

Time _____ AM PM

OBSERVATIONS

Observe the patient's postural stability, gait, stride length, and sway.

Check all that apply:

- Slow tentative pace
- Loss of balance
- Short strides
- Little or no arm swing
- Steadying self on walls
- Shuffling
- En bloc turning
- Not using assistive device properly

These changes may signify neurological problems that require further evaluation.

Appendix C. Physical Activity Log⁵⁷

Record the time and activity each day.	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
Monday						
Tuesday						
Wednesday						
Thursday						
Friday						
Saturday						
Sunday						
TOTALS						