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Program Proposal

**BACKGROUND**

 Osteoarthritis (OA) is a leading cause of disability in the U.S. and represents a massive burden on the health care system.1,2 The knee is a commonly affected joint, with OA present in the knee of 40% of individuals over 65 years old.3 Due to the chronic and progressive nature of the disease, Motion is Lotion: a health promotion program for OA, aims to bring about health behavior change resulting in long-term benefits as opposed to short-term relief. Integrating the social cognitive theory (SCT), originally proposed by Bandura, into this program seeks to improve self-efficacy and promote this long-term health behavior change.4,5,6 The SCT is predicated on the idea that an individual’s belief in their capabilities to manage a disease is a better predictor of outcomes than their actual capabilities. A systematic literature review and meta-analysis by Brand et al concluded that self-efficacy scores were more closely associated with performance outcomes, pain and disability than demographics or medical variables in patients with OA.4 A review of 25 studies by Marks et al recommends that self-efficacy be assessed and used to assist a program deliverer in setting goals and monitoring progress during an intervention program for OA.5 The Arthritis Self Efficacy Scale (ASES) will be used to measure participants’ self-efficacy throughout Motion is Lotion. The ASES is a valid and reliable measure developed by Lorig et al to assess an individual’s confidence in their ability to manage arthritis. The ASES is a 20-item scale that is divided into 3 categories: pain, function and other symptoms. Each sub-scale is scored individually with scores ranging from 10-100 with higher scores indicating greater self-efficacy.7 Improvements on the ASES are correlated with improved functional outcomes and decreased pain.4 Using the SCT as a framework, the concept of self-efficacy will be assessed and integrated into all aspects of this program for adults with knee OA.4,5

*Educational intervention*

Self-management programs have been shown to be effective in treating chronic illnesses including OA and therefore will be a key component of Motion is Lotion.8 These programs often combine group exercise with discussion groups aimed at providing patient education, problem solving, reducing barriers and improving self-efficacy.4-6,8 A study by Coleman et al,6 examined the impact of an SCT-based self-management program on pain, function and quality of life in 146 patients with knee OA. The intervention group attended six weekly sessions led by healthcare professionals focused on patient education on knee OA, exercise recommendations, nutrition and weight loss, goal setting strategies and generally improving self-efficacy. The program sought to identify and overcome barriers to adherence. At eight weeks and six month follow up, the intervention group showed statistically significant improvements in pain, function and quality of life compared to the control based on the Western Ontario and McMaster Universities Arthritis Index (WOMAC) Pain and Function subscales.6 The success of this intervention in the short-term as well as six month follow up indicates that health behavior change occurred after the SCT-based educational intervention. Motion is Lotion will utilize weekly discussion groups focused on providing patient education in problem solving and reducing barriers to exercise and functional tasks.

The WOMAC will be used to measure OA-related pain and functional impact. It is a widely utilized self-reported measure for patients with knee and hip OA divided into 3 domains: pain, function and stiffness.6,9,10 It has scores ranging from 0-96 with greater scores indicating greater impairments in pain and function. The measure has excellent psychometric properties and established standard error of measurement (5.1), minimal detectable change (14.1), minimally clinically important difference (8.8) and cut off scores for knee OA9 making it an appropriate tool for tracking change and setting goals in this population.

*Exercise intervention*

Individualized exercise programs will be the second component of Motion is Lotion. While the above evidence suggests the benefits of educational interventions in patients with knee OA, exercise is widely considered to be an effective treatment method for individuals with OA.1-4,10 A randomized controlled trial on 418 people with chronic knee pain by Hurley et al10, found that exercise in combination with patient education on self-management strategies significantly reduced pain and costs associated with knee pain. The PT-led intervention was spread out over two sessions per week for six weeks for a total of 12 sessions. Each 60-minute session was divided into two portions: group discussion on barriers and coping strategies and progressive, individualized exercise programs focused on lower extremity strengthening. Improvements in knee pain and function were measured with the WOMAC and continued to remain statistically significant at the 30-month follow up indicating health behavior change occured.10 The efficacy of a combined exercise and educational intervention in promoting health behavior change was mirrored in a 2018 study by Jönsson et al.11 The intervention included two informational group sessions led by a PT designed to explain the benefits of the specific exercises and increase patients’ motivation to exercise and be physical active. These were followed by six weeks of individualized, PT-supervised exercise programs focused on strengthening and neuromuscular control. Barriers to incorporating physical activity were continually discussed throughout the program and recommendations were given on an individual basis. The intervention group was found to have significant improvements in pain, QOL and self-efficacy immediately after the intervention and at 12-month follow up despite no improvements in amount of physical activity measured by accelerometer.11 Motion is Lotion will implement an exercise program that is individualized to each participant’s preferences, physical and environmental barriers, and fitness level focused on lower extremity strengthening and neuromuscular control.

*Nutritional intervention*

The third component of Motion is Lotion will be nutritional counseling and weight management. This will be incorporated into the patient education for self-efficacy. Obesity is considered the greatest modifiable risk factor for OA.12 Research suggests that individuals with a BMI greater than 30 kg/m2 are 6.8 times more likely to develop knee OA than normal weight individuals.12 Additionally, as little as 5% weight loss has been shown to demonstrate clinical improvement in OA symptoms.13 Morris et al14 identifies nutrition as a primary tool physical therapists can utilize to help a patient manage their weight. They recommend PTs screen for obesity and nutritional deficits, provide education interventions and resources, and provide referrals to registered dieticians when appropriate.14 To screen for obesity and track weight loss, PTs can utilize the body mass index (BMI). BMI is a highly reliable estimate of total body fat and disease.14 Any patient near or over the threshold of 30 kg/m2 may be appropriate for nutritional and weight loss interventions. A review by Gill et al15 recommends a combination of exercise and diet to promote weight loss in older adults. Their recommendations also include working with the individual to identify personal, financial and environmental barriers to adhering to a weight loss program. Motivational interviewing has been shown to be effective at improving adherence in this patient population as well.15 A reduction of as little as 500-1000 kcal per day has been shown to result in 8% weight loss.14,15 Morris et al recommends reduction in calorie dense foods and a balance between the various food groups to improve nutritional intake and manage weight. Motion is Lotion will provide basic but important nutritional guidance as discussed above. The physical therapists delivering the program will be responsible for making referrals to a registered dietician when appropriate.14

*Summary of evidence*

 Motion is Lotion, a group-based, PT-delivered health promotion program, can be effective at reducing pain and improving quality of life in adults with knee OA.4-6,8,10,11 This program will involve patient education on focused on the benefits of exercise for OA,11 perceived barriers and strategies to overcome them,6,10 and improving self-efficacy.4,5,8 A nutritional intervention will be integrated into patient education during the program focused on weight loss for reducing pain associated with OA.12-15 The program will also include an individualized exercise program focused on lower extremity strengthening and neuromuscular control.1-4,10,11

 The SCT provides a framework for promoting behavior change through self-efficacy.4,5,6 The literature supports utilizing concepts of the SCT to promote self-management of OA.4,5,6 Therefore, techniques to promote self-efficacy will be integrated in the educational, exercise and nutritional components of Motion is Lotion.4,5,6

 To measure progress and set goals throughout the program, the ASES,4,7 WOMAC6,9,10 and BMI will be utilized.14,15 These measures have been found to be reliable and valid for this patient population and correlated to improved outcomes in pain, function and quality of life.4,7,6,9,10,14 A program duration of six to eight weeks has been effective at creating both short term and long term improvements in pain and quality of life indicating that behavior change may have occurred.6,10,11

**PROGRAM GOALS**

 The overall goal of this program is to reduce pain and improve quality of life for older adults with knee OA by encouraging long-term behavior change. Specific goals to be achieved by the end of the eight-week program are:

1. Participants will improve their self-efficacy scores on each of the ASES sub-scales to at least 90/100 by the end of the eight-week knee OA community program to demonstrate improved belief in their ability to reduce their pain, improve their functional abilities and manage their knee OA.7
2. Participants will reduce their WOMAC total score by 15 points (greater than the minimal detectable change (14.1) and the minimally clinically important difference (8.8)) by the end of the eight-week knee OA community program to demonstrate decreased pain and improved function.9
3. Participants with BMI greater than 30 kg/m2 will record at least a 5% reduction in body weight by the end of the eight-week knee OA community program to demonstrate clinical improvement in OA symptoms.12,13
4. Participants will report at least 150 minutes of moderate-intensity exercise per week to meet the Physical Activity Guidelines for Americans recommendations by the end of the eight-week knee OA community program to demonstrate adequate levels of exercise for improved health and long-term health behavior change.2,16

**METHODS**

*Personnel*

1. Three physical therapists will be in charge of weekly discussions and exercise classes. One physical therapist will run the discussion group and two will be in charge or supervising and adjusting the exercise programs. These physical therapists will be the program coordinators and manage the other personnel.
2. Five local therapists will be recruited to volunteer for the initial evaluation and initiation of exercise programs, re-evaluation and final assessment. These therapists will be given a brief training prior to the initial evaluation intended to guide exercise prescription.
3. Two student volunteers will be recruited to assist in guiding patients through exercises each session. Ideally, these will be students in a local Doctor of Physical Therapy program. Emails will be sent to the directors of local programs to recruit volunteers. These students will receive instruction regarding their role and goals of the program.

*Location*

The program will be delivered at the local YMCA. Participants will be required to purchase a two-month membership for $80. Discounts are available for couples and financial assistance is available through the YMCA.

*Enrollment and Program Schedule*

1. Flyers and brochures will be placed throughout the community (gyms, churches, physical therapy offices, doctor’s offices) advertising the program. Additionally, emails will be sent to mailing lists for current YMCA members advertising the program.
2. Participants can enroll online or by calling the program coordinators directly. Enrollment will be capped at 24 participants to ensure adequate supervision and instruction during exercises and optimal group dynamics for discussion.6
3. All evaluations will be scheduled by the program coordinators over the course of two consecutive days. Each physical therapist will evaluate three participants.
4. Program sessions will start the week after evaluations are completed. The program will meet from 7:00am – 8:30am on Tuesdays and Thursdays for eight weeks. Midterm assessments will occur on the Wednesday of the fourth week. Final assessments will occur on the Friday of the eighth week. All evaluations, assessments and program sessions will be carried out at the YMCA.

*Initial evaluation*

1. The initial evaluation will consist of a one-on-one two-hour session performed by one of the volunteer therapists or program coordinators.
2. Each participant will have height and weight taken, BMI calculated, be assessed using the ASES and WOMAC and given a comprehensive PT evaluation to identify any major impairments limiting exercise or function. Each therapist will then prescribe an initial exercise program based on the patient’s deficits and preferences and guiding by the concepts outlines by the program. The evaluating therapist will also give initial recommendations regarding reducing barriers to exercise, incorporating exercise into daily routines, weight loss or any other patient education deemed necessary.
3. Each therapist will work with each participant to identify short-term goals. Overall long-term goals for each participant will be the same as the program goals but other goals may be added on an individual basis.
4. Each participant will be oriented to the gym and use of equipment at the YMCA. They will perform their exercise program under the supervision of the physical therapist.
5. Each participant will be given a handout on basic dietary recommendations from the Department of Agriculture’s Choose My Plate.17

*Intervention Specifics*

 At the first program session, the group of 24 participants will be split into two groups of 12. These groups will alternate having their discussion session first or exercise session first. Each session will last 45 minutes for a total of 90 minutes.

 The discussion sessions will be led by a program coordinator and focus on: benefits of exercise for individuals with knee OA, benefits of weight loss for overweight individuals with knee OA, identifying barriers to exercise, strategies to overcome barriers, dietary recommendations, and progress and barriers towards personal goals.4,6,8,10-13 The goal of these discussions will be to educate participants and motivate them to exercise and make dietary changes11 while reducing fear of exercise and catastrophiing.4 While education is key, these discusses also to allow participants to discuss their progress with other participants and offer interpersonal support. This will allow for group problem solving crucial to improving self-efficacy.4,6 Each educational session should allow for 15-20 minutes of group discussion. A sample of topics and talking points for each week are provided below:

Week 1: Introduction and general information on OA

Week 2: Benefits and Barriers to exercise for people with OA

Week 3: Benefits and Barriers to weight loss for people with OA

Week 4: Self-efficacy: what is it and why does it matter?

Week 5: Goals check-up and discussion of midterm assessments

Week 6: Incorporating exercise into daily routines, making exercise a habit

Week 7: Strategies for long-term weight management

Week 8: Program review and resources for continued success

 Exercise programs will be carried out in the YMCA gym and be supervised by two program coordinators and two student volunteers. These personnel will answer questions and modify form as needed to address barriers and empower participants to exercise.11 As mentioned, exercise programs will be individualized to each participant as this has been shown to be more effective than a generic program.4 Exercise programs will sufficiently challenge patients but avoid any sharp pain or increased joint pain that last more than 24 hours.18 Exercises will be performed at 40%-60% of the participant’s one repetition maximum for 8-10 repetitions for optimal strength gain and minimize pain for adults with OA.19 It is crucial that the therapists and student volunteers ensure proper muscle activation for all exercises and do not allow muscle substitution.11 An example of a potential exercise program is detailed below:

* 5 minute warm up on stationary bike to promote increased synovial fluid in affected joints.18,19
* Hip press, 3x10
* Standing hip abduction18 with theraband resistance, 3x10
* Mini goblet squats19 (holding dumbbell with two hands) 3x10
* Calf raise,18 3x10
* Stretching for cool down18,19 including major lower extremity muscle groups, holding for 30-60 seconds each

The program coordinators will progress and adjust exercise programs as appropriate. It is important to note that participants may vary greatly in fitness levels. Therefore, it is important that health care professionals, such as physical therapists, design and progress these exercise programs to ensure the safety of the participants.6,11

 Participants will also be provided with a shorter home exercise program to perform one time per week in addition to program session attendance or in the event they need to miss a session. Participants will also be encouraged to walk 20-30 minutes three to four times per week18,19 to promote continued exercise throughout the week. By encouraging independent exercise throughout the program, Motion is Lotion hopes to address barriers and problem-solve in real time to develop long-term habits.

 Assessments (BMI and weight, WOMAC, and ASES) will be assessed at initial evaluation, on the fourth week of the program and at the conclusion of the eight-week program. Weight will be taken on scales provided at the YMCA. Height will be measured using a measuring tape fixed to a wall. BMI will be calculated using the following formula:14 weight (kg)/height (m2). Copies of the WOMAC and ASES will be printed and provide to participants. The same physical therapist will assess each participant at evaluation, midterm and final assessment.

**PROGRAM EVALUATION**

 After midterm and final assessments, the program coordinators will calculate all BMIs, record all weights, and score all WOMACs and ASESs. These scores will be compared to the previous assessment to evaluate whether participants reduced their BMI, lost weight, reduced their WOMAC scores and improved their ASES scores. By the end of the program, participants should have lowered BMIs below 30 kg/m2 or have reduced their body weight by at least 5% and reduced their WOMAC scores by 15 points to demonstrate meaningful change as defined in the literature.9,12,13 Participants will also have a goal of scoring at 90/100 or higher on all three subscales of the ASES. While sensitivity measures have not been established for the ASES, scoring 90 or higher indicates that participants are “very certain” that they can perform the activities on the questionnaire indicating that they are confident in their abilities.7 Participants also have a goal of exercising at a moderate intensity for 150 minutes each week. If all of these goals were met, it can be assumed that the participants made meaningful improvement in self-efficacy, pain, and function and the overall goals of the program were met. If outcomes did not demonstrate improvement, analysis of the program and its participants might reveal an opportunity to improve the program in the future.

 To gather information on strengths and weaknesses of the program throughout the 8-weeks of implementation,20 surveys will be filled out by therapists, student volunteers, and participants during weeks two, four and six of the program. These surveys will evaluate satisfaction with the program, aspects that motivate participation and aspects that make participation difficult. These aspects will also be discussed with participants during discussions each session. Suggestions from surveys and those mentioned during weekly discussions will be considered by the program coordinators and will adjust implementation of the program if they deem appropriate.20 A survey will be given to participants at the end of the program assessing satisfaction with each of the three interventions provided (educational, nutritional, and exercise), perceived benefits from each, perceived value (cost-effectiveness) of the program, and if they felt their time was well spent.20 This will allow an analysis of which components were seen as most effective by participants compared to objective measures of each component through outcomes. Finally, dropout rates will be tracked by tracking attendance each session and reasons for missed sessions.

**CONCLUSIONS**

Motion is Lotion has the potential to reduce pain and improve function for adults with osteoarthritis in Chapel Hill. Knee osteoarthritis is a debilitating, chronic condition that represents a major economic cost to individuals as well as the health care system. Thankfully, a strong body of evidence supports improved outcomes for these individuals with interventions laid out in this program: educational interventions, nutritional interventions, and exercise interventions. By providing the program in a group setting that facilitates open discussion, Motion is Lotion seeks to allow each participant to empower each other to stay compliant with the program and problem solve together. Integrating concepts of the social cognitive theory improves each participant’s confidence in managing their disease. Research shows this to be an effective method not only in improving self-efficacy but also in improving outcomes related to pain, function and quality of life. As musculoskeletal experts, physical therapists are the ideal deliverers of this program, providing the safe, skilled educational interventions and exercise prescription to optimize patient outcomes. This program will provide individuals suffering from knee osteoarthritis will the knowledge, skills, resources and confidence to self-manage their disease, reduce their pain, improve their function, maintain a healthy weight and improve their quality of life.

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