**Health and Wellness Proposal: Assignment 4**

**Osteoarthritis Prevention and Disease Management Program**

**Statement of Need**

Arthritis is the most common cause of disability in the United States1. Osteoarthritis or OA is the most common type of arthritis, affecting nearly 27 million Americans2. The prevalence of this condition alone indicates a dire need for an effective symptom and disease management program for individuals suffering with this disease. This program addresses issues regarding our current healthcare system, costs, and risk factors associated with living with osteoarthritis today.

This program is structured around influencing a person on both an intrapersonal and community level. Intrapersonal motivation relates to motivation that comes from the individual based on their knowledge, behavior, skills, and self-concept8. Community level motivation relates to relationships among organizations, institutions and informal networks within defined boundaries8. Any effective behavior change and health and wellness program must contain these two components. Intrapersonal motivation is essential in order to empower the individual to take control of their disease and manage their condition in a preventative and protective manner. Additionally, if the person is not motivated on his or her own to achieve the desired change or result they are much less likely to adhere to the program. However, community resources and support are also critical in the success of a program, especially a disease management program. It has been noted that just like many other chronic diseases people with osteoarthritis often experience a wide range of emotions such as denial, anger, bargaining, depression and acceptance in regards to their disease7. It is especially important while experiencing these fluctuating emotions to have a community/ team approach to working through the problems. It is these factors that helped to shape this program and are what have been missing from other programs for osteoarthritis management.

Location is critical for the success on any program. This program will be conducted in Greenville, SC. Greenville is a rapidly developing city with a population of 56,002 as of the 2000 census12. The Center for Disease Control (CDC) estimated in 2009 that 1,022,000 South Carolinians had arthritis, a prevalence of between 26.0-34.1%24. Fortunately, South Carolina is one of the few states that receive funding for their state Arthritis Foundation. This foundation would be able to provide additional support and resources for startup programs of this nature24. In addition to population of people in South Carolina that have already been diagnosed with arthritis, there is an even larger section of the population at risk for developing arthritis secondary to age and obesity risk factors. Although the median age of individuals living in Greenville is 34. 6 years old, over 17% of the population is age 60 and older with approximately 25% of households having individuals over age 6512. With nearly 18% of the population of Greenville being age 60 and older there is a large group of people who could benefit from a program of this nature in the area. In addition to age, osteoarthritis is also strongly correlated with obesity. Data suggests that overweight people are more likely to develop osteoarthritis and that being overweight can accelerate the progression of osteoarthritis within the knee joint13. As of 2013 31.7% of South Carolinians were obese11. This number ranks South Carolina as the 10th most obese state in the country11. The demographics of Greenville in conjunction with the high rate of obesity across the rate of South Carolina make Greenville extremely vulnerable to the effects of osteoarthritis and an ideal location for this type of program.

Our current healthcare system is designed as a “disease management” system9. This means that the focus of our healthcare system is to help individual’s manage their chronic conditions, rather than preventing these conditions from occurring in the first place. For this reason, the care for people with osteoarthritis often includes prescription medication, devices, as well as surgical joint replacements to manage the symptoms of the disease10. This program will address risk factors for developing osteoarthritis as well as incorporate evidence based treatments designed to manage symptoms and slow the progression of the disease. Physical therapists are in the best position to administer this type of program due to their extensive knowledge of osteoarthritis disease progression, joint mechanics, neuromuscular control, and therapeutic exercise.

Osteoarthritis is a disease that is associated with older age. Symptoms of the disease emerge after age 40 and slowly progress from the point on2. This information is especially important considering our aging population. According to the US Census Bureau, the elderly population (age 65 and older) grew 11-fold from 1900 to 1994, compared a 3-fold growth in those under age 654. Data also suggests that by 2030 at least half of our population could be age 39 and older, compared to 1860 when half of the population was under 204. As our population continues to get older, the prevalence of osteoarthritis is going to continue to grow. For this reason, it is essential that we develop programs now that are designed to protect individuals from developing osteoarthritis and help those with the condition to manage their symptoms and stall disease progression.

Not only is osteoarthritis one of the most common causes of disability within the United States but living with this disease can also be one of the most expensive. Arthritis related conditions such as osteoarthritis, “cost the economy nearly $128 billion dollars per year in medical expenses and in-direct expenses.2” Additionally, individuals living with osteoarthritis spend $2600 on average in direct-related osteoarthritis costs and nearly $5700 total in OA related care2. In addition to all of these “standard” costs of living with OA, if a person requires a joint replacement the cost increases tremendously. Specifically, $28.5 billion and $13.7 billion are spent annually on hospitalizations associated with knee and hip joint replacements2. With the current cost of healthcare in the United States today the total cost to live with OA is going to continue to increase. It is imperative that cost-effective programs are developed to help an individual with OA to manage their condition outside of the traditional health-care setting. Programs of this nature not only benefit the individual but also reduce the burden on our over-saturated healthcare system. However, the physical cost of living with osteoarthritis may be far less than the psychological cost of the disease. In addition to the monetary cost of disease management people with osteoarthritis have difficulty with activities of daily living (ADLs), disability, interference with social and leisure activities, interference with personal relationships, increased need for assistance and reduced independence, and increase psychological complaints such as anxiety and depression6. All of these factors have a tremendous “cost” on that person’s quality of life. It is no wonder arthritis has such a significant impact on quality of life and psychosocial health that it is the leading cause for disability later in life6.

There is no known cause for osteoarthritis but there are several risk factors that increase a person’s likelihood of developing OA. These risk factors include: heredity, body mass index or BMI (obese or overweight), previous joint injury, repeated overuse of certain joints, lack of physical activity, nerve injury, and aging2. There are several known risk factors for developing osteoarthritis, many are modifiable and can be influenced by the person’s behavior. This information supports incorporating disease education and well as dietary recommendations into an exercise based program for people with OA or at high risk for developing OA. A program of this nature can have a significant impact on that person’s disease progression or development of that disease. The osteoarthritis program contained in this proposal is designed to address the modifiable risk factors for developing OA and teaching participants strategies for minimizing their risks.

In conclusion, osteoarthritis is already a huge problem in our society today and continues to get bigger as the population continues to age. The current cost of managing and treating osteoarthritis is astronomical and is focused around symptom management rather than prevention. Recent data has shown that there are multiple modifiable risk factors for developing osteoarthritis including body weight, lack of activity and repetitive overuse injuries. Evidence also shows exercise is an effective treatment for the symptoms of OA and protection against disease progression. There is a need for a program tailored specifically to the challenges of living with osteoarthritis including symptom management and prevention of further joint damage. A physical therapist is the ideal provider for this type of program due to their extensive knowledge of the body mechanics, exercises, orthopedic diseases and complications as well as systematic disease. This program is designed to use exercise as well as group dynamics, osteoarthritis education and current disease management techniques to empower the community to take control of their health and better manage their osteoarthritis.

**Background**

It is clear that there is a great need for a management and prevention program to combat osteoarthritis. This program was developed based on geographic trends in obesity and arthritis, group dynamics theory as well as current best evidence for exercise and intervention. This combination of information makes this program a comprehensive and effective solution for the management and prevention of osteoarthritis.

Osteoarthritis is a form of arthritis that generally affects the cartilage within joints20. Cartilage lines the ends of bones and when it is healthy allows the bones to move over one another. The cartilage can also help to absorb shock and distribute forces throughout the knee if needed20. In osteoarthritis, the surface of the cartilage starts to break down making it more difficult and painful for the bones to move over one another20. As the cartilage continues to breakdown the bone surfaces begin rubbing together causing pain, swelling, inflammation, and loss of motion20. Eventually, because of abnormal loading in the joint the joint may become deformed and even develop extra bone accumulations (osteophytes) that further inhibit movement and cause additional pain. Once the joint has reached this phase surgeons often must surgically remove and replace joint surfaces because it can no longer be effective in its role within the body20. It is imperative that people with osteoarthritis and participants in this program have a strong knowledge of what OA is and why they are experiencing their pain and functional restrictions. By having a strong knowledge of what is happening within their bodies, people are empowered to manage the disease and its progression.

Group interaction and group dynamics is another essential element of this program. A group is defined as “two or more individuals who are connected through social relationships18”. Dynamics systems theory presents groups as functioning entities that are designed to create organize and sustain interaction amongst its members. These interactions lead to a sense of interdependence that the group is all “in this together” and rely on one another to achieve their ultimate goal or purpose18. It is this interdependence that guides our behaviors and roles within the group. This program is structured to utilize the social structure of a group to promote adherence, participation, competition and camaraderie. In regards to adherence, research suggests that groups do have a significant impact on program adherence17. Adherence, which was measured in one study as attendance, lateness, early departure, and withdrawal, was significantly improved in the group that underwent teambuilding versus the control group17. The “team” had significantly fewer withdrawals and late arrivals because the members felt that they were a part of something bigger, that they had others to be accountable to17. In addition to general group dynamics community influences can have a major influence in a person’s behavior and lifestyle choices. The role of any healthcare or wellness program should be to provide and connect its members with resources available to them in their community. A program of this nature can begin to create awareness and change on a community level by providing resources and information to group members who can then share the resources with those outside the group creating a community shift towards education, health and wellness.

Exercise is the core component of this program. Exercise has long been supported as an effective way to manage the symptoms associated with osteoarthritis. There is currently an abundance of research supporting the use of exercise in the treatment of osteoarthritis. However, recent evidence suggests that not only is exercise effective in managing the symptoms of OA but also may help to protect affected joints from further damage. People who participated in moderate intensity exercise three days per week had a slower T1 relaxation time than the control group5. This data suggests an increase in glycosaminoglycan (GAG) content in the joint and thus improved shock absorption and distribution. All of which protect the person’s joints from further breakdown associated with OA. These studies have focused on utilizing strengthening exercises and well as neuromuscular control for the joints that were experiencing the symptoms of OA5. An additional study designed to identify the optimal exercise protocol from the management of osteoarthritis found that these programs should focus on improving aerobic capacity, quadriceps strength and lower extremity performance25. They stated that these programs should be supervised and conducted 3 times per week, and if designed properly should have similar effects regardless of patient characteristics, severity of disease progression, and baseline pain25. Another study focused on examining the effects of an exercise protocol on inflammatory markers, pain perception, and physical performance in people with knee osteoarthritis24. Their protocol included flexibility and muscle strengthening over 12 weeks with three 80 minute sessions per week. The results of this study found that this exercise protocol was effective in reducing IL-6 levels, managing pain, and improving function in people with knee osteoarthritis24. All of this information has guided the specific protocol developed for this program. However, the type of exercise is also very important to the success of the exercise program. Low-impact exercises will be the cornerstone of the exercise program because research has indicated that articular cartilage has some functional adaptation for exercise and some sports and activities, such as running and cycling actual decrease the amount of total knee cartilage compared to swimming and powerstriding26. Additionally, it has been shown that aquatic exercise, which is a recommended treatment from the Osteoarthritis Research society, is as effective as land therapy in the management of osteoarthritis and may be a good solution for those unable to achieve results in land based programs28. For this reason, this program utilizes both land based and aquatic exercise to maximize the results of participants. Beyond the specific elements of an exercise protocol, additional research studied exercise programs that were focused on general fitness, balance, coordination, stretching and lower extremity strengthening and also found a significant improvement in quadriceps strength, pain reduction, and walking speed at the completion of a 6 month study21. This data confirms that exercise appears to be beneficial in people with knee osteoarthritis. Furthermore, evidence suggests that land based therapy is beneficial in regards to pain management while also improving physical functioning in those while symptomatic knee osteoarthritis15. Specifically this program was structured after the Oxford Journal’s Recommendations for knee and hip osteoarthritis. Their recommendations included: the use of both strengthening and aerobic exercise to reduce pain and improve function and health status, general and local strengthening is an essential component for the management of every patient with OA, to be effective exercise programs should include education and promote a positive lifestyle change, group exercise can be equally as effective as individual exercise session, adherence is the principle predictor of long-term outcomes, and improvements in strength may reduce the progression of the disease21. As indicated by these recommendations there is much more to an osteoarthritis management program than exercise alone. Exercise by itself cannot address the multifactorial causes of osteoarthritis. For this reason, each week of the program focuses on a different osteoarthritis related topic that is discussed at the end of each exercise session. Education is essential in the management of any chronic disease, especially osteoarthritis.

Nutrition counseling and education have been incorporated into the program to promote weight loss and a healthier lifestyle. The combination of exercise and nutrition counseling has been shown to be more effective in improving overall function, pain and mobility in overweight individuals with osteoarthritis than either intervention alone16. Most notably a study conducted to evaluate nutritional intake and obesity in a multidisciplinary approach to the management of osteoarthritis found that 79% of the patients in the study had a body mass index that was classified as obese, and their dietary intake of vitamin D, folacin, zinc, vitamin B6, and pantothenic acid was 80% below recommended values30. Nutritional counseling can aid in the multidisciplinary approach to osteoarthritis management by helping educate participants how to prevent nutritional deficiencies and how to promote a joint healthy diet30. A study of overweight veterans found that nutritional counseling and depression were predictive of the veterans’ ability to succeed in a weight loss program29. Additionally, biomechanical data suggests that dietary changes may have an additional benefit on improving the gait of those with osteoarthritis more than exercise alone19. All of this data supports that nutritional education and counseling can play a key role in achieving the desired results of this program.

Based on this information presented above, this program has been designed to maximize results by utilizing current principles of exercise, education and nutritional counseling for the management of osteoarthritis. Specifically, this exercise program will be conducted three times per week, for 8 weeks and focus on moderate intensity cardiovascular and strength exercises to promote optimum joint protection and healing. Additionally, the exercise program will include weekly educational sessions on topics related to osteoarthritis to improve participant awareness and self-management of their condition. Finally, nutritional counseling will be incorporated into the program to assist in disease management and prevention efforts by helping participants to lower their body weight and reduce impact on their joints.

**Program Description**

***Program Objectives***

1. At the completion of the 8 week program, a majority of the participants (~75%) will reduce their body mass index (BMI) by at least 2 points to reduce their risk of developing or worsening their osteoarthritis.
2. At the completion of the 8 week program, participants will be able to list three risk factors for developing osteoarthritis to demonstrate an improved knowledge of the disease process.
3. At the completion of the 8 week program, participants will be able to independently complete an hour long low-impact strength training program to demonstrate their ability to continue exercising and manage their disease beyond the time in the program.
4. At the completion of the 8 week program, participants’ pain report will decrease by at least 2 points on the visual analog scale or their score on the Patient Specific Functional Scale will improve by 2 points for at least one activity to demonstrate effective disease management.

***Methods***

The Osteoarthritis Prevention and Management program will run out of the YMCA in Greenville, SC. The Verdae YMCA in Greenville is conveniently located between two of the most travelled roads in Greenville, while also being nestled right between interstate I-85 and highway 385. The program will be held every evening Monday- Friday from 6 p.m. to 7 p.m. in one of the gyms available group fitness rooms. Additionally, on Monday, Wednesday, and Friday the program will be conducted in the pool and on the pool deck of the facility at the same time. The program will primarily utilize body-weight exercises; however, when equipment is needed exercises will utilize low weight dumb-bells, steps, medicine balls, and kick-boards in the pool. The program will be over-seen by a licensed physical therapist who will be assisted by a certified personal trainer. Both the PT and personal trainer are CPR and lifeguard certified. This location was selected to host this program because of its convenient location, the wide variety of group fitness classes the program participants could join at the conclusion of the program, and the year around aquatics center that will be utilized by the program and could be used after the conclusion of the program.

Based on the research located on the optimum exercise protocol for the treatment of osteoarthritis, the program will last for 8 weeks and is designed to combine exercise with educational information to manage and prevent osteoarthritis in this population. New programs will begin every 4 months in order to reach the maximum number of participants .New programs will be limited to an enrollment of 10 people in order to ensure that the participants receive adequate attention during the program. A licensed physical therapist will over-see the entire program and develop all exercise progressions and educational material utilized during the program. However, individual classes will be led by a certified personal trainer with the PT supervising participant performance. Classes will be held each weeknight Monday- Friday from 6-7 p.m. for 1 hour. Participants are expected to attend 3 sessions per week. Finally, in the week prior to the beginning of the program the physical therapist will set up an initial meeting with each participant in order to determine their goals for the program, why they chose to participate in this program, their current pain score and rest and during activity, administer a patient specific functional scale and finally obtain body weight and leg, arm, waist, chest, and neck measurements prior to beginning the program. A similar final meeting will be arranged after the final week of the program to assess the progress the participant made on their goals, how they plan to continue their progress, their current pain score at rest and with activity, re-administer their patient specific functional scale, and final re-measure their body weight and leg, arm, waist, chest, and neck diameters.

The specific exercise portion of the program will be structured as follows. Monday, Wednesday and Friday classes will be aquatic sessions, and Tuesday, Thursday classes will be land sessions. The warm-up portion of the class will consist of a 15 minute low-impact warm up of either riding a stationary bike with low resistance or water walking, depending on if that day’s session is land or aquatic. The primary exercise session will last for 30 minutes and patients will be pushed to perform moderate intensity interval activities. In the first class sessions, the class instructor will take time explaining rate of perceived exertion (RPE) as well as how to use this principle with exercise. An RPE scale will be displayed on a white board during both pool and land sessions to help remind participants on the desired work level. Additionally, the participants will be provided with an RPE handout at the first class session they attend. RPE will be the measure used to dictate the intensity of the participants’ performance as it is not feasible to rely on heart rate monitors with the constant switching from land to pool sessions. Some exercises that would be involved in an aquatic exercise session would be underwater jogging, flutter kicks, calf/ heel raises, squats, resisted marching. Some of the land based activities would include: split leg lunges, squats, step-ups, modified wall squats, kettle bell swings, squat stance runs, and balance activities. All of the exercises will be progressively increased in intensity, either reps or duration, as the program continues. The initial starting level will be 3 sets of 10 repetitions of each exercise. Balance activities would include single limb stance with tapping targets, and single limb stance with and without visual cues. There is a much larger body of evidence supporting the use of strength training in the management of osteoarthritis; however, there is evidence available supporting the need for balance training as well. Based on this information, the first 4 week of the program will be split evenly into half the session of balance activities and half of strength training. This is done to help improve the participants’ balance levels prior to initiating the more advanced strength training exercises. The final 4 weeks of the program will be mostly (~75%) strength training and only 25% balance training, to ensure they are getting the maximum results from the program. Finally, each exercise session will end with a 15 minute cool-down which will include 5 minutes of active recovery, for example water walking or non-resisted bike riding, followed by 10 minutes of stretching and flexibility training.

The educational component of the program will take place during the cool-down portion of the exercise program. The target population for this program is residents of Greenville, SC who currently have or are at risk for developing osteoarthritis. Each week with the program will have a “theme” for the educational materials provided to not overwhelm the participants and promote information absorption. At the Thursday and Friday night sessions the instructor will provide the participants with a summary of the material covered that week, as well as answer any questions or concerns that participants may have developed related to that week’s educational material.

Below is a breakdown of the weekly educational topics as well as a brief summary of the information that will be discussed that week.

* Week 1: Introduction and what is Osteoarthritis?
	+ Define Osteoarthritis
	+ Explain biomechanical changes happening in OA (in laymen’s terms)
	+ Explain risk factors and causes of OA
* Week 2: Goals. Are you trying to prevent, manage, or delay osteoarthritis? What is your goal for this program?
	+ SMART goal setting
	+ Group discussion of goals, struggles, challenges and problem solving for solutions
	+ How to set goals for continued progress
* Week 3: Exercise: Why Exercise is Important in the Management of OA
	+ Discuss evidence supporting exercise for the management of OA
	+ Discuss preferred types of activities
* Week 4: Body Weight- How Body Weight Influences OA
	+ Discuss evidence linking obesity and OA
	+ Discuss evidence relating BMI to OA development
* Week 5: Symptom Management- Best Evidence
	+ Glucosamine Sulphate
	+ Condrotin
	+ NSAIDs
	+ Bracing/ Compression Sleeves
* Week 6: Current treatment options for OA
	+ Exercise and activity modification
	+ Injections and medications
	+ Surgical Procedures: resurfacing, total knee, etc…
* Week 7: Question and Answer week
	+ Participants ask any questions they have about OA that have not been answered
* Week 8: Wrap Up and Planning for the future
	+ Discussion about what participants have learned from the program and how they plan to continue to use the strategies learned in the future.

**Program Evaluation**

The success of this program is dependent on its effectiveness in helping participants manage and prevent osteoarthritis. For this reason, participant results and feedback are the most important evaluation tools for this program. At the conclusion of the program, all participants will complete a participant satisfaction survey in addition to having their final weight, pain score, functional scale score and other body measurements taken. Effectiveness will be measured by both goal achievement and scoring on the satisfaction survey. The data collected from the body measurements as well as the pain and function scores will be used to demonstrate the program’s effectiveness in helping the participants successfully manage their condition and achieve the goals of the program. Additionally, this data will demonstrate which if any goals or objectives are not being met. Goals and objectives that are consistently not being met indicate areas that need additional research and modifications to their current application. The participant satisfaction survey provides participants the opportunity to rank the program experience in terms of enjoyment, effectiveness, and self-efficacy in continuing their progress while also allowing them to describe strengths and weaknesses within the program. This will provide useful information about the participants’ perception of the program and reveal areas that need to be modified to improve the overall participant experience. As the ultimate goal of this program is to assist individuals in the management or prevention of osteoarthritis, it is essential that participants achieve results and feel successful in their ability to manage or prevent osteoarthritis. If this is not being achieved, the program needs to be modified meet this need. In addition to participant results and feedback it is also essential to evaluate the program from an administrative and financial perspective. Some of the criteria used to determine the effectiveness of this program from an administrative prospective include: number of participants, interest in the program, cost of the program, program sponsorship, and referrals. The goal of the program should be to reach as many people as possible in the community; therefore, if the group size is not progressively increasing and awareness and interest in the program is not increasing the program is not effectively reaching the larger population. Similarly, as participants successfully complete the program there should be an increase in the number of referrals and potential sponsors. Sponsorship and referrals provide the opportunity for off-setting the costs of the program as well as expanding the program to reach a larger portion of the community. For example a local physician may sponsor the program as a way to advertise his or her business to their target population, or a retirement community may request to host the program as an activity option for residents. Expansion by either of these methods helps the program to grow and create more community level change. A final administrative evaluation tool that should be used is the cost of the program. The program should be most expensive at the launch when all of the equipment is purchased or rented, additional certifications are attained, and any location rental fees are due. As the program continues to run the costs should plateau or even be off-set by incoming sponsorships. If the programs costs do not diminish and the participants are not achieving the desired results than the cost of the program may out-weigh the benefits and significant changes will need to be made to merit continuing the program. Evaluating all of these elements will program administrators the most comprehensive evaluation of the effectiveness of the program and reveal any areas that would benefit from additional development.

*Proposal Limitations*

Theoretically there is strong evidence to support the program introduced in this proposal. However, this proposal is lacking some information that would be essential for determining the overall success of the program. First is the availability and interest of the Verdae YMCA of Greenville, SC in hosting this type of program. The structure of the program would have to change dramatically if this location was unavailable or uninterested in hosting this program because they are one of the view facilities in the area with an indoor pool. Another possible limitation of this proposal is community interest. A community survey would need to be conducted to gauge community interest and support for this type of program. Additionally, it would be important to determine physician support and potential referral interest in this program. A final limitation of this proposal is the lack of identification or assessment of potential competitors. This proposal did not address if similar programs currently exist in this area and who may be hosting similar or competing programs. Although the evidence indicates a need for this type of program, if a similar program already exists in this area there may be no need for another program.

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