Contributing Factors to Surgical Decision-Making in Patients with Osteoarthritis

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Table of Contents

Abstract 3

Preface 4

Chapter 1: Osteoarthritis 5

Epidemiology 5

Treatment Options 5

Chapter 2: Surgical Decision Aid 7

What is a Decision Aid? 7

Biopsychosocial-Based Approach 8

Chapter 3: Biopsychosocial Model of Surgical Disposition 10

Proposed Model 10

Observed Health Behavior 11

Disease Severity 12

Mobility 13

Personality 15

Social Support 17

Chapter 4: Survey Effort 19

Introduction 19

Methods 19

Report on Effort 20

Chapter 5: Proposed Analyses of Results 22

Proposal #1 - Surgical Decisions According to the BPS Model 22

Proposal #2 - IPAQ Multiple Regression Model 23

Proposal #3 - Mobility vs. Disease Severity 23

Proposal #4 - Demographics Correlates with the TKI 24

Proposal #5 - Grit Scale Correlates with the PRETIE-Q 25

Proposal #6 - PASB-Q vs. IPAQ 25

Proposal #7 - Disposition Correlates with the MOS Social Support Survey 26

Chapter 6: Conclusion 27

References 28

Abstract

Osteoarthritis is a joint disease that can lead to severe pain for the millions of people that it affects. Osteoarthritis is the wear and tear of cartilage in the joints that happens due to everyday life. Persons with osteoarthritis decide from many treatment options such as medications, therapy, injections, or joint replacement surgery. Depending on many factors, joint replacement surgery may or may not be the preferred treatment option. Using clinical surveys, this study aggregates determining factors for patients with knee and hip osteoarthritis with respect to surgical decision-making. With the use of a biopsychosocial model-based approach to surgical disposition, determinants will be investigated. Findings from this study will provide significant indicators for physicians, and could possibly serve as decision aids during conversations about surgical treatment. Suggestions of future directions for this study will be provided, proposing ways in which components of this model could be analyzed. This work ultimately aims to bring new clarity to understanding the factors that go into optimizing health outcomes for persons with osteoarthritis. A well established decision aid may be beneficial in aiding patients to determine their most viable option and help mitigate the extreme costs of suboptimal disease progression and management.

Preface

Stephanie Grimshaw is a health sciences student with a concentration in pre-physical therapy. Upon completing her bachelor's degree at Oakland University, she will be furthering her education with training in physical therapy at University of Michigan - Flint, with the goal of obtaining a doctorate degree. The new knowledge she will obtain from this project will help set herself up for success while in physical therapy school. She will be able to apply this knowledge to new research that she will hopefully be participating in. After school, her ultimate goal is to become a successful physical therapist with a concentration in orthopedics. She wants to help people improve themselves physically, as well as make them feel comfortable with letting go of any built-up emotions from a hard day of work. She would like to make patients feel as though they are a team working together. This project will also further her future goals of contributing to the physical therapy field. She hopes that the results from this research can help physical therapists get a better understanding of the fear that osteoarthritic patients can experience. Physical therapists can then utilize this information to help patients overcome barriers that hinder their true potential for activities of daily living.

Chapter 1: Osteoarthritis

Osteoarthritis (OA) is a joint disease wherein the cartilage breaks down and bones abrade. Osteoarthritis can be detected through radiographic methods by measuring joint-space and presence of osteophytes (bony spurs that form at joint margins). Risk factors for OA include increasing age, lifestyle, genetics, and obesity (Zhang & Jordan, 2008). Advanced disease can lead to stiffness, pain, and lack of mobility in many patients. This can result in significant health costs if not mitigated. In the United States, osteoarthritis accounts for over $65.5 billion annually in incremental direct hospital costs, affecting over 32.5 million adults, which is expected to increase as the population ages (Hochberg et al., n.d.). When the pain starts to interfere with a patient's activities of daily living, this is when patients start searching for treatment options.

Persons with osteoarthritis may have a hard time deciding what treatment option may be best suited for them due to the variety of options available. Different treatment options include physical therapy, injections, medications, or total joint replacement. Disease severity, time and motives for care seeking, access to care, and care team resources and training all factor into what treatment options might be pursued.

Physical therapists may use modalities such as ultrasound and electrical stimulation to help relieve pain. They may also use manual therapy to help regain range of motion. Another step towards mobility maintenance and pain relief during physical therapy is through exercise. Unfortunately, there are many misconceptions about weight-bearing exercise causing wear and tear on the joint, and therefore patients tend to think exercise will cause more pain (Bunzli et al., 2019). However, more research is showing that exercise is very beneficial for those with osteoarthritis. Further study is warranted to add clarity to what types of exercise, and dose-response relationship, might lead to optimized health outcomes.

Another possible treatment option, cortisone injections, are commonly used for temporary pain relief. This compound is an anti-inflammatory steroid that is injected into the joint, providing instant pain relief. However, the effects of these injections only last for a few weeks to a few months, and is therefore not a permanent fix. It is often advised that a patient only gets them a few times a year because the medication can worsen the joint (Mayo Clinic Staff, 2020). Due to this fact, a patient with OA cannot receive this injection whenever their symptoms worsen. Readily available over-the-counter pain medication options, such as acetaminophen and nonsteroidal anti-inflammatory drugs (NSAIDs), are commonly used to treat mild to moderate osteoarthritis (Mayo Clinic Staff, 2020). However, narcotic use in patients with chronic pain can lead to long-term psychological and physiological side effects (Qureshi et al., 2018). Therefore, due to the ongoing opioid epidemic, these medications should be taken with caution when used long-term. In sum, although pharmacological agents might be good for initial and acute pain management, alternative treatment options are suggested for long term wellbeing (Qureshi et al., 2018).

Finally, total joint replacement (TJR) may be a viable option for many suffering from OA. TJR involves the surgeon removing the damaged cartilage and bone, inserting metal or plastic hardware into the affected joint (Mayo Clinic Staff, 2020). This surgery can be a very invasive procedure and may not be the best option for every person who suffers from osteoarthritis. Their pain may be so severe that they are willing to go to extreme measures in order to eliminate it. This is why making a surgical decision can be very difficult for these patients. With the use of decision aids, physicians would be able to better help their patients make the right decision for their osteoarthritis journey.

Chapter 2: Surgical Decision Aid

Surgical decision aids are tools that are used to help patients become more actively involved with their plan of care (Boland et al., 2017). They are essentially a set of guidelines that can be used to inform the patient of what may be considered during their surgical decision (Sepucha et al., 2019). They inform patients on their specific condition, tell them what treatment options are available to them, highlight the risks and benefits of each treatment option, and discuss potential repercussions of their values or preferences (Perestelo-Pérez et al., 2020). In order for a decision aid to be created, there are multiple steps that need to be considered. One must see what a patient's decisional needs are, complete an analysis of the different aspects of those decisions, look at all the treatment options, understand what the different outcomes and possibilities are, and how much information the patient needs to be given (Coulter et al., 2013). There is also a review process that is done to validate the decision aid, then a lot of testing should be done with patients to find out how effective the decision aid is. Afterwards, it finally goes through one last review process with people who were not involved in creating the decision aid (Coulter et al., 2013).

Decision aids have been shown to be very effective in increasing patients' knowledge, showing realistic expectations, resulting in better decision quality, and overall reduced uncertainty about the patients' decision (Bozic et al., 2013). In one study, orthopedic surgeons reported greater patient satisfaction with the use of decision aids (Bozic et al., 2013). However, decision aids aren't known to be well-integrated into upstream primary care and doing so may be more useful for these patients as primary care physicians have a better understanding of patient's health history (Hurley et al., 2020).

A major mistargeting of modern healthcare is that many physicians stick to a biomedical model when it comes to treating their patients (Wade & Halligan, 2017). They focus on treating the disease itself instead of looking at the whole person. Biologists Paul Weiss and Ludwig von Bertalanffy recognized gaps in care with this biomedical model, leading them to develop the biopsychosocial model (BPS; Engel, 1981). The BPS model takes the idea of the biomedical model and expands on it (Wade & Halligan, 2017). The BPS model is a "systems approach", meaning that humans are influenced by the whole system that is happening within themselves (being their biological makeup, their experiences, and their behaviors), and everything around them (their family, society, economic status, and the culture around them) (Engel, 1981). For instance, if someone decides to take a walk, the model describes this decision from a variety of perspectives. Not every decision made is going to be answered by one component, all of the components interact with one another to explain the decision. Along with treating the disease comes taking a look at the person's personality which is made up of that person's experiences, behaviors, attitudes, and expectations (Wade & Halligan, 2017). Adding onto this, the BPS model looks at a person's social context, which is made up of social position and interpersonal relationships (Wade & Halligan, 2017). This BPS model gives physicians a more holistic view of their patients. With a BPS model approach to healthcare, patient-reported outcomes may improve, as well as reduce healthcare costs (Wade & Halligan, 2017).

The following chapter describes our effort to leverage the BPS framework for developing a model of surgical disposition of persons with osteoarthritis, with the intent to develop decision aids to help guide this difficult choice. A multitude of factors were considered including the patient's pain, the patient's personality type, and if the patient has someone to take care of them

at home. These contributing factors may be likely to serve as indicators for decision making that physicians may use to optimize patient choice and wellbeing.

Chapter 3: Biopsychosocial Model of Surgical Disposition

The BPS was created with the intention of explaining health-related concerns. It was explained in a way that described how all events and circumstances in a patient's life could have contributed to the onset of cardiovascular problems (Engel, 1981). By looking at the patient as a whole person, physicians are able to better their plan of care. The BPS can also be looked at in a way that describes the health decisions that people make. Their socioeconomic status, the culture around them, and their persona can all contribute to a decision that one makes. With the original BPS model in mind, we researched surveys that could contribute to one's surgical disposition.

A set of surveys were gathered with intent of pursuing a biopsychosocial model when it came to determining key factors to surgical decision-making. Each survey below was chosen based on how prevalent it was in the literature and how well-known it was. Two questions were put into the final survey that had been created by the researchers in order to know which type of osteoarthritis the person had and what their surgical disposition was. Our proposed biopsychosocial model (**Figure 1**) was based on essentially four categories, with surgical decision preference being the main outcome based on their synthesis. The four categories are: disease severity, mobility, personality, and social support. The two categories of disease severity and mobility were grouped together to form the biological aspect of the BPS model. The category of personality forms the psychological aspect of the BPS model. Finally, the category of social support forms the social aspect of the BPS model. From these sets of surveys, determinants of surgical decision-making will be explored.

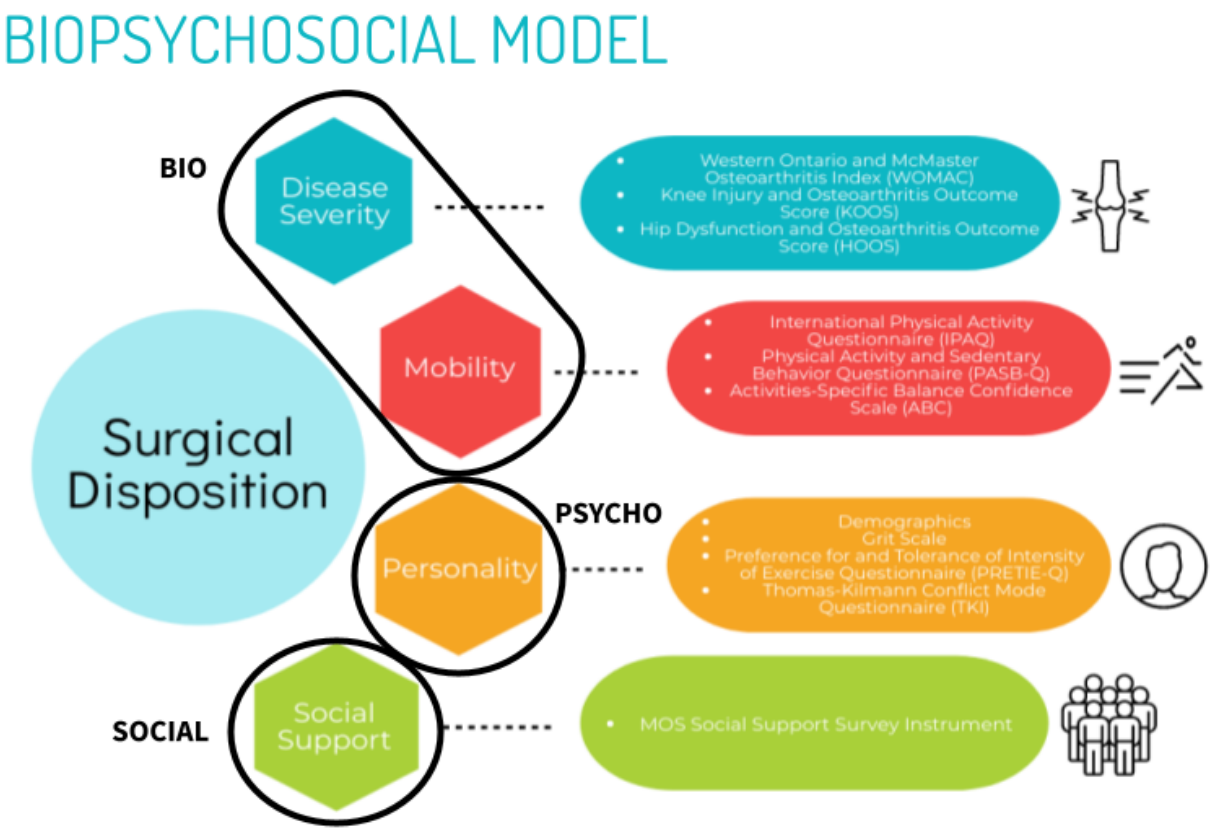

Figure 1. Proposed biopsychosocial model for surgical disposition.

Description of Model Components

The following are descriptions of each survey and/or question implemented into the proposed BPS model. In subsequent chapter(s), applications of the model and proposed statistical analyses will be discussed in detail.

Observed Health Behavior

Surgical Disposition

This was one of the questions that had been generated by the researchers. In order to know the effects of the BPS model on surgical decision-making, it must first be known how the patient feels about taking surgery or not. Therefore, the question asked was, "What is your current position on your decision about a total joint replacement?". A sliding scale type of

answer was then generated for participants, knowing that a person may still be unsure with their decision. The scale went from “I definitely do not want one” to “I am uncertain” to “I definitely want one”. Creating a sliding scale like this makes it easier for a person to truly pinpoint how certain they are about their decision.

Disease Severity

Western Ontario and McMaster Osteoarthritis Index (WOMAC)

The WOMAC is a widely-used questionnaire for those with hip or knee osteoarthritis. This survey was created with the elderly population in mind, and not so much younger populations (O’Neill et al., 2018). The WOMAC includes questions about pain, stiffness, and activities of daily living (ADLs). There are 24 items overall, with five items about pain, two items about stiffness, and 17 items about ADLs. Each question is based on a scale from 0-4, with zero being “none” and four being “extreme” (O’Neill et al., 2018). Higher scores reflect higher pain and more limited physical function (O’Neill et al., 2018). This test was estimated to take about 12 minutes to complete.

Osteoarthritis Type

The second question that was generated on its own by the researchers was a question on which type of OA the participant was diagnosed with. The question is straightforward and states, “Which have you been diagnosed with?”, with the only options being “Hip osteoarthritis” or “Knee osteoarthritis”. Since these two types are most commonly seen in OA affected joints, they were chosen as the main focus of this study. This question was asked in order to navigate the participant to the Knee Injury and Osteoarthritis Outcome Score (KOOS) questionnaire or the Hip Dysfunction and Osteoarthritis Outcome Score (HOOS) questionnaire, for further questions regarding their diagnosed type of OA.

Knee Injury and Osteoarthritis Outcome Score (KOOS)

The KOOS is a similar questionnaire to the WOMAC, except it is specifically designed for those diagnosed with knee OA. This questionnaire was created with the younger, more active populations in mind (O'Neill et al., 2018). The test is divided into five subscales: pain, symptoms, ADL function, sports and recreation function, and quality of life. There are 42 items total, with nine items about pain, seven items about symptoms, 17 items about ADL function, five items about sports and recreation function, and four items about quality of life (O'Neill et al., 2018). Similar to the WOMAC, questions are based on a scale from 0-4, with zero being "none" and four being "extreme" (O'Neill et al., 2018). Higher scores reflect more severe problems (O'Neill et al., 2018). This test was estimated to take about 10 minutes to complete.

Hip Dysfunction and Osteoarthritis Outcome Score (HOOS)

The HOOS is another questionnaire similar to the WOMAC but it is specifically designed for those diagnosed with hip OA. Just like the KOOS, this questionnaire was designed with the more active younger population in mind (O'Neill et al., 2018). The survey is also divided into five subscales: pain, symptoms, ADL function, sports and recreation function, and quality of life. There are 41 items total, with 10 items about pain, five items about symptoms, 17 items about ADL function, five items about sports and recreation function, and four items about quality of life (O'Neill et al., 2018). In parallel with the KOOS, questions are based on a scale from 0-4, with zero being "none" and four being "extreme", in which higher scores reflect more severe problems (O'Neill et al., 2018). This test was estimated to take about 10-15 minutes to complete.

Mobility

International Physical Activity Questionnaire (IPAQ)

The IPAQ was designed to measure levels and patterns of physical activity in adults (Hagströmer et al., 2006). It consists of 27 items that asks questions about the amount of time that individuals have been physically active in the past seven days. There are seven questions about job-related physical activity, six questions about transportation physical activity, six questions about physical activity around the home, six questions about sports, recreation, and leisure-time physical activity, and finally, there are two questions about time spent sitting. Totals are afterwards added up and scored. There are three categories of physical activity that an individual can fall under: low, moderate, or high. This questionnaire was estimated to take about 15-30 minutes to complete.

Physical Activity and Sedentary Behavior Questionnaire (PASB-Q)

The PASB-Q questionnaire is used to determine the amount of moderate to vigorous physical activity seen in older adults (Fowles et al., 2017). It measures how frequently these patients participate in muscle strengthening exercises per week, their perceived aerobic fitness, and their sedentary behaviors (Fowles et al., 2017). All of these factors give an indication of how often these individuals are active each week. There are seven questions total, two are about aerobic physical activity, one about muscle strengthening physical activity, one about perceived aerobic fitness, two about sedentary behavior, and one about taking breaks after prolonged periods of sitting. This test was estimated to take about 5-10 minutes to complete.

Activities-Specific Balance Confidence Scale (ABC)

The ABC Scale assesses confidence in performing activities without losing balance. This survey asks questions about how confident the participant is while doing certain daily activities on a scale from 0% meaning they have no confidence in themselves, to 100% meaning they are completely confident in executing the task without losing their balance (Powell & Myers, 1995).

The answers from the 16 items in this survey are taken and averaged in order to determine the subject's overall ABC score. If the average score is above 80%, then that individual has a high level of physical functioning (Powell & Myers, 1995). If the score is between 50-80%, then the individual has a moderate level of physical functioning (Powell & Myers, 1995). If the score falls below 50%, then the individual has a low level of physical functioning (Myers et al., 1998). Also, it was determined that if the individual has a score that's below 67%, then it is usually an indicator of an older adult who is at risk of a future fall (Lajoie & Gallagher, 2004). This test was estimated to take about 5-10 minutes to complete.

Personality

Demographics

There were four demographic questions asked: gender, age, highest level of education, and annual household income. Questions about age and gender were asked because these two items are risk factors for osteoarthritis. Highest level of education and annual household income are indicators of socioeconomic status and may be indicators of whether a person will take surgery.

Grit Scale

Another determinant of personality is grit. Grit means having the perseverance and persistence to achieve long-term goals (Duckworth et al., 2007). Usually people who are identified as having more grit, the more self-control they have (Duckworth & Gross, 2014). This Grit Scale, created by Angela Duckworth, is a 12 item questionnaire that is designed to measure how much grit a person has. A 5-point scale is used for all the questions, then in order to get the final score, the average of all the questions is calculated. A score of 5 means the individual is

extremely gritty and a score of 1 means that the individual is not gritty at all (Duckworth et al., 2007). This survey was estimated to take about 5-10 minutes to complete.

Preference for and Tolerance of Intensity of Exercise Questionnaire (PRETIE-Q)

The PRETIE-Q was created in order to measure how different individuals and their bodies respond to different exercise intensities (Ekkekakis et al., 2006). This questionnaire consists of 16 items, but the 16 items are categorized into two different (8 item) groups: preference for exercise intensity and tolerance of exercise intensity (Ekkekakis et al., 2006). The answers are based on a five-point scale that ranges from "I totally agree" to "I totally disagree" (Ekkekakis et al., 2006). Higher scores indicate preference for high-intensity exercise and high exercise tolerance (Ekkekakis et al., 2006). This survey was estimated to take about 3.5 minutes to complete.

Thomas-Kilmann Conflict Mode Questionnaire (TKI)

The TKI is an indicator of what an individual's behavior will be like when it comes to conflicting situations (Thomas & Kilmann, 2008). There are five categories of conflict-handling modes: competing, collaborating, compromising, avoiding, and accommodating. Competing usually means that the individual is assertive and uncooperative. Collaborating typically means that the individual is assertive but cooperative. Compromising means that the individual falls somewhere in the middle for both assertiveness and cooperativeness. Avoiding usually means the individual is unassertive and uncooperative. Finally, accommodating typically means the individual is unassertive but cooperative. The entire questionnaire consists of 30 questions where each question gives two behavioral responses and the participant must choose the one that represents their own typical behavior (Thomas & Kilmann, 2008). This survey may be an indicator of what type of person may have a harder time making a surgical decision or who may

be more stubborn when it comes to looking at different treatment options. This survey was estimated to take about 15-20 minutes to complete.

Social Support

Medical Outcomes Study (MOS) Social Support Survey Instrument

The MOS Social Support Survey Instrument was designed to assess the amount of social support a patient has (Moser et al., 2012). Social support is known to be very beneficial for individuals who have life stressors (like OA) and these individuals are less likely to have long-term negative effects (Moser et al., 2012). This survey consists of 19 items, but they are divided into four categories: emotional/informational support (eight items), tangible support (four items), affectionate support (three items), and positive social interaction (three items). There is also one additional item that asks if the participant has someone to do things with to help get their mind off things. The answers are on a five point scale with one being "none of the time" and five being "all of the time". Higher scores indicate having more social support. This survey was estimated to take about 5-10 minutes to complete.

Assessing the Model

The proposed BPS model for evaluating factors that influence surgical disposition in persons with osteoarthritis must be tested in order to first validate its design and second to optimize its components. Each of the component assessments is expected to contribute to a new understanding of the reasons why someone chooses to take surgery or not. When breaking down the BPS model, these surveys capture what it means to look at the whole patient, and not just the diagnosis itself. These items will be determinants of what actually matters to patients when they think about getting an invasive procedure done. This BPS model is intended to serve as the

blueprint of the different contributors of one's decisional needs, with the expectation that it could be incorporated in the process of creating decision aids. Further, targeted education could be developed, to improve the patient-centered care experience.

Chapter 4: Survey Effort

Introduction

We conducted a survey based study to vet the model proposed in Chapter 4. This biopsychosocial model will help figure out what matters to patients when they are making a decision to get a total joint replacement. Each survey chosen is a valid measure of the likelihood of determining a patient's surgical disposition. We sought out IRB approval before creating the survey; after approval, these surveys and questions were carefully put into Qualtrics. Then, the Qualtrics link to the survey was sent out to a variety of different platforms for a chance to be seen by a large audience. Even though large efforts were made, limited attention was gained overall on this survey.

Methods

The proposed biopsychosocial model was adapted into Qualtrics components. The estimated completion time of the entire survey was approximately 75 minutes. There was an incentive of the chance to receive a $75 Visa gift card for completing the survey. A grant of $500 was generously given for this study by the Oakland University Honors College. It was decided to split the money into six $75 Visa gift cards and we would conduct a raffle with six winners. There was a link at the end of the survey that directed participants to a second, separate survey that collected contact information so they could be put in the raffle. This step was completely optional. Regardless, the first survey was completely anonymous. Specific eligibility requirements were set in place as follows: participants must be at least 18 years of age, must have received a diagnosis of knee or hip osteoarthritis, must be at the point of considering total joint replacement surgery, and must have internet access. Participation was completely voluntary.

For distribution of the survey, an advertisement was posted on a variety of social media platforms such as Facebook, LinkedIn, Instagram, and Twitter. On Facebook specifically, the survey was posted to a group named “Osteoarthritis Support Group!”, which has approximately 16.6 thousand followers. The advertisement was also sent out to different physical therapy clinics, asking if they would post it somewhere in their clinic for patients to see. A variety of university members, including students and professors, were emailed about the survey and asked to help with distribution in any way possible.

Report on Effort

Despite large amounts of effort and support in the distribution of this survey, only two complete responses have been received to date. The Facebook posting in the support group had only received one like. On the other hand, the LinkedIn posting received 160 views. However, we think the post was perhaps being viewed by the wrong target audience. Many professors who may be less likely to be in contact with OA patients had viewed the post. At the same time, another explanation for the low response rate may have been due to the fact that this survey was distributed during the COVID-19 pandemic. Many people aren’t out socializing, and are unmotivated to complete any sort of work. Even with an incentive, many people unfortunately didn’t seem to think the survey was worth their time. Due to a low response rate, we are unable to discuss any specific results at this time. Although, we have some suggestions to better this study in the future.

In the future, the number of surveys used could be reduced in order to reduce the amount of time needed to complete the survey. This will likely increase the number of respondents. Additionally, instead of a raffle incentive, a direct payment incentive could be made instead. Instead of giving away six $75 Visa gift cards, we could’ve offered $10 to the first 50 people

who responded to the survey. Also, participants may have been limited based on the wording of our eligibility criteria. Instead of stating, “must be at the point of considering a total joint replacement”, it could have been stated “must have not yet had a total joint replacement surgery”. Participants may think that they have to be close to the point of actually getting a total joint replacement, when in reality, we wanted to know if they were leaning towards getting one or not getting one at all. Finally, when there is no longer a pandemic happening, this research would benefit from being presented at health fairs. At a health fair, we would be able to have face-to-face interactions with people in order to spread the word about this survey. In addition to this, we could have tablets set-up so that anyone who is eligible would be able to take the survey right there in front of us. Finally, we can look to contact and partner with different orthopedic surgeons in the area, as they are the main source for diagnosing and treating patients with OA.

Chapter 5: Proposed Analyses of Results

Proposal #1 - Surgical Decisions According to the BPS Model

Although the self-report of surgical disposition has potential confounds (person's self knowledge), we intend to conduct statistical analysis to assess the factor weighting of the various surveys to this reported intention. Strategies including principal component analysis, multiple regression, and discriminant function analysis will be explored.

Principal component analysis (Hotelling, 1933) can be used to simplify the number of model components. For example, when reducing the number of surveys in future studies, we must find out which studies are similar to each other or yield the same results. One of the goals of the principal component analysis is to keep the size of the data set reduced to only the important information (Abdi & Williams, 2010). Therefore, in order to find out which surveys to keep in this study, a principal component analysis would need to be completed. Instead of having six surveys that represent the bio model, these surveys could be tested to see which ones have an effect on surgical decisioning, then they could be taken out of the survey in future studies.

To determine the efficacy of the BPS model to predict surgical disposition, discriminant function analysis will be used. Discriminant function analysis uses a discrete outcome such as "yes/no" or categorical measure. It virtually answers whether a combination of variables (the dependent variables) can predict group membership (the independent variable) (Poulsen & French, 2008). The results from this strategy should determine whether the entire BPS model will accurately predict the outcome (yes or no) of considering a total joint replacement. The different components of the BPS model (biological, psychological, and social components) are tested with a Pearson correlation test to see how correlated each component is to the outcome of

surgical disposition. All of these components work together to decide what someone's surgical disposition will be, but this test will explain the weight that each component has on the model.

Proposal #2 - IPAQ Multiple Regression Model

Components of the IPAQ could be tested with a multiple regression model in order to find out if it leads to surgical disposition outcomes. Multiple regression must have a ratio-style number to compute. In this case, the number of days, hours, and minutes doing various activities within a week could all be tested to see if they correlate with a surgical decision. For example, if someone completes vigorous activities most days during the week, then that may mean that this person isn't experiencing enough pain that hinders their mobility, and therefore doesn't see total joint replacement as being necessary.

Additionally, these ratios of minutes per day spent performing various activities could be compared to different components of the HOOS and KOOS. There are different subscales within the HOOS and KOOS, such as knee- or hip-related quality of life. These quality of life questions ask things like if the person is typically aware of their joint problems or if they must change their lifestyle due to their condition. These can be related back to how active or how sedentary an osteoarthritic patient is. Taking the amount of time a patient was sedentary in a week may be a reflection on their lack of confidence in the joint and so this shows that the patient is always aware of their joint issue, resulting in higher IPAQ scores.

Proposal #3 - Mobility vs. Disease Severity

The proposed BPS model has two categories that fall under the biological aspect of the model: mobility and disease severity. However, it could be questioned if these two components have opposite outcomes in predicting surgical disposition. Disease severity may not have any effect on mobility, depending on the person. Someone who is motivated to push through their

pain and have always been reminded of the phrase “no pain, no gain”, may be very mobile, even with a severe disease. The way this can be tested is with the principle component analysis, and through the analysis, a t-test can predict how different the two categories are.

Adding onto the disease severity component, perhaps getting medical information about a patient’s Kellgran-Lawrence (KL) score could also contribute to this category. KL-scores are a radiographic indicator of the presence or absence of osteoarthritis with a range of 0-5 (zero indicating no osteoarthritis and 5 indicating severe osteoarthritis) (Kohn et al., 2016). Based on a patient’s KL score, it may or may not be a predictor of how mobile the person actually is. A KL score is supposed to predict how severe the disease is, but a patient may not be aware of how severe it is because they are able to perform daily tasks with no issue.

Proposal #4 - Demographics Correlates with the TKI

As discussed in Chapter 4, it is possible that people who have completed higher education are more likely to explore their treatment options. Also, it is possible that the more money a person makes, the more stubborn they may be and the less likely they will explore their options. The more money they have, the easier it is to make the decision to take surgery from a financial standpoint. On the other hand, the TKI observes peoples’ behaviors when it comes to conflict. Taking a look at the five categories of conflict-handling modes, the individual with a higher education may be more likely to fall under the compromising category. They would be likely to listen to other’s opinions while still holding onto their own. However, the individual with a lot of money may be more likely to fall under the competing category. They may be assertive with what they want and uncooperative because they already know what they want, so they would rather not hear about other options.

Proposal #5 - Grit Scale Correlates with the PRETIE-Q

The Grit Scale could be compared to the PRETIE-Q. One study suggests that grit can be an identifiable factor to exercise behavior (Reed, 2014). There is a chance that since grit means that a person has the perseverance to get through hard times in order to achieve a goal, then this means that the same person may more easily tolerate high-intensity exercise. When an individual is working out to the point of exhaustion, some may just give up as soon as they start to feel their muscles fatiguing. However, an individual with high amounts of grit will be more likely to push through the pain that they feel while exercising because they want to get to an end goal. In this case, the tolerance portion of the PRETIE-Q could be tested against the grit scale.

Separately, the preference portion of the PRETIE-Q could be tested with grit as well. If a person has a lot of grit, this means that they may be able to tolerate exercise, but they may not prefer it. If someone were to work hard for hours every day, this does not mean that they come home and want to keep working. Depending on the person, they may want to relax and watch television when they get home instead. Therefore, breaking down the PRETIE-Q into its separate subparts, similar to the Ekkekakis et al., 2005 study, will help yield more reasonable results as to why a grittier person may be able to tolerate exercise.

Proposal #6 - PASB-Q vs. IPAQ

The PASB-Q and IPAQ are two very similar tests. The main difference being, the IPAQ goes into further detail about exactly how many days and how many minutes an individual was physically active. Both tests were shown to at least have reliability and validity when it comes to measuring moderate to vigorous physical activity (Sattler et al., 2020). However, these two tests haven’t been tested against one another. A principal component analysis could address whether or not these two tests essentially yield the same results or if they are each unique enough in their

own way to each be needed. A Pearson correlation would reveal a coefficient that tells us how strongly correlated the two tests are. If there is a low correlation between them, then a t-test could explain differences between the two.

Proposal #7 - Disposition Correlates with the MOS Social Support Survey

The correlation between the MOS Social Support Survey and a person's surgical disposition may be tested using discriminant function analysis. There could be a strong correlation between the amount of social support a patient has and whether or not this increases the chances of taking a total joint replacement. Each subscale of the MOS survey (emotional support, tangible support, affectionate support, and positive social interaction) could be analyzed to learn which category has the strongest correlation towards determining what one's surgical decision may be.

All of these proposals are meant to contribute towards a better understanding of how patients with hip and knee osteoarthritis feel about their condition. We want to discover what factors make a difference in whether or not someone will take surgery and what matters most in these patient's lives. Each proposal contributes to how important the BPS model is, and how each individual component is crucial to our understanding. We can reduce the amount of surveys in each component, like looking at the IPAQ versus the PASB-Q, or mobility versus disease severity, but no components of the model as a whole are being dropped. This is because the entire model is needed to describe a person's surgical decision-making. Reducing the amount of surveys in the future will only help increase the amount of respondents, while still looking at the patient from a more holistic point of view with the BPS model.

Chapter 6: Conclusion

In conclusion, a biopsychosocial model-based approach to surgical disposition is important when it comes to the need for decision aids. We believe that these components are the driving indicators towards the reason why someone with hip or knee osteoarthritis says yes or no to a total joint replacement. The surveys making up these components ask important questions about how severe the patient's disease is, limitations and confidence in their mobility, what components of their personality motives their decisions, and what their social support system looks like. All of these factors reflect back to the original biopsychosocial model that was developed for health-related concerns. The original biopsychosocial model emphasized the importance of having physicians treat the whole patient rather than the illness (Engel, 1981). Knowing more about a patient will help the physician understand more about the disease and could possibly help to create preventative measures for the patient before an illness arises (Engel, 1981).

Implementation of the biopsychosocial model in creating decision aids will help physicians step away from the biomedical model that is always taught in medical school. Decision aids will help guide patients towards the right plan of care for themselves. There may be a sacrifice for the amount of patients seen in a day in order to be able to sit down and get to know each patient more holistically. However, it may be beneficial for practitioners and patients both in the long haul. Patients will be more satisfied with their decision and care overall and physicians will be able to create a more trustworthy relationship with their patients.

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