

A Comparative Case Analysis of Parkinson's Disease Patients' Experience with Boxing for Exercise

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ABSTRACT

Parkinson's Disease is the second most common progressive neurodegenerative disease, affecting about 10 million people worldwide. This case study aims to examine the different effects of boxing as a treatment for Parkinson's Disease (PD) in men and women with the disease. There are two times as many men as there are women with Parkinson's disease, and women are overlooked in many studies because of this. This study aims to understand how exercise affects women differently than men and to amplify their voices and experiences for the rest of the community to better assist them. Method. Four men and four women with Parkinson's Disease were interviewed after classes at Rock Steady Boxing, and cross-case analysis was implemented to compare the results. Thirteen questions and sub-questions were asked, ranging from simple to thought-provoking and complex. Answers to questions were analyzed separately, in the male case and the female case, as well as together to compare the analyses. Results. Women appeared to reap physiological benefits of boxing, like increased confidence and decreased anxiety. Men and women alike reported the alleviation of some symptoms due to boxing. Discussion. This study allows the community to understand the many reasons why someone with PD may want to exercise, as it benefits both physical and mental health, making a progressive and debilitating disease more livable, improving quality of life in patients.

Literature Review

Introduction

Imagine a life where all of a sudden, you're experiencing shaky hands, you're trying to walk but you just can't get your feet off the ground, and your whole body feels stiff and immobile. As your conditions worsen, you're trapped in your body because your mind is still active. This, to an extent, is the reality of over 10 million people worldwide who are living with Parkinson's disease (Parkinson's Foundation). Parkinson's disease (PD) is the second most common progressive neurodegenerative disease in the world and was first noted by Dr. James Parkinson in 1817 (Ross). This disease is usually noticed in people over 40 years old and develops because of a loss of the neurotransmitter dopamine in the brain, creating a wide range of symptoms including tremors, rigidity, muscular weakness, and declining cognitive function, such as symptoms of depression and anxiety (Ross). The most notable symptom for most patients is rigidity while moving, causing what is known as Parkinson's gait (Alberto et al. 2). This is characterized by a lack of mobility, causing a shuffle or limp when walking, as well as decreased speed and range of motion, allowing the disease to impact an individual's ability to move (Alberto et al. 2). Another characteristic of the disease is that there are twice as many male Parkinson's patients as there are female, but women have a higher mortality rate and faster disease progression (Cerri et al. 501). Parkinson's is unique and presents differently in every person, fueling incentive to learn more about it, especially prevention and a cure.

Causes

Although PD has a widespread presence in society, little is known about what causes the disease. According to a study published in the *Journal of Microbiology*, it is accepted in the medical field that Parkinson's disease stems from a mix of genetic and environmental factors. However, due to its widespread nature, it is unlikely to be exclusively genetic or environmental, but it is unclear what the exact triggers for the disease are (Chen and Lin 2). The study conducted by Chen and Lin focuses on the evidence of gastrointestinal involvement in causing Parkinson's. Their results led to the conclusion that maintaining and stimulating an individual's gut microenvironment can ultimately stop or slow the progression of Parkinson's disease, noting it as a probable cause of the disease (Chen and Lin 12). In contrast, another study found a correlation between a thyroid hormone and PD, concluding that Parkinson's disease has an immune aspect contributing to its development, as well (Xu et al. 378). The potential triggers for PD that the two studies noticed are very different, however they complement each other by providing the medical world with a more comprehensive idea of possible factors triggering PD. With only medications available, prescribed to manage symptoms, preventing Parkinson's disease before it begins is vitally important. Therefore, the findings of these two studies are foundational in the future of medicine and PD.

Movement/Therapy and Gender

The difficulties in movement experienced by most PD patients heavily impact their life. According to a study in *The Official Journal of the Movement Disorder Society*, the ratio of men and women with Parkinson's disease, approximately 2:1, proves that there are gender differences in the disease (Miller and Cronin-Golomb 1). As seen in numerous clinical studies, women performed worse on functional tests compared to men at the same stage of the disease (Medjainen et al. 4). These findings reveal significant gender differences, which are not discussed further. As with many Parkinson's disease studies, significant findings about gender differences are discovered, but extended research or explanation is not provided. Furthermore, another study reveals that women experience higher levels of pain with the disease (Gao et al. 2) but once again, the findings were not reviewed any further. There is a significant lack of in-depth research on how or why there are symptomatic differences in men and women with Parkinson's disease. Despite men and women having different experiences with Parkinson's, mobility can be improved with exercise regardless of gender. Exercise has the capability to reduce tremors in PD patients, granting them more autonomy in everyday actions (Farashi et al. 2). Through understanding of the benefits of exercise, further research shows that boxing in particular increases balance and gait (Combs et al. 133). Exercise also helps to delay the progression of cognitive decline (memory and attention) (Gobbi et al. 9). The physical benefits of exercising and boxing, coupled with its cognitive benefits, allows for Parkinson's patients to experience a higher quality of life by slowing the progression of the disease naturally.

Quality of Life

Due to the range of symptoms experienced by Parkinson's patients as their disease continues to develop, their quality of life can be diminished. A study by Meng et al. demonstrates that multidisciplinary rehabilitation through different types of therapies creates an overall increase in the quality of life of most patients (Meng et al. 6). While exercise works for many, overall support is a huge factor in quality of life because every patient is different. Due to the number of symptoms that can occur, the longevity of the disease, and age of the patient, caring for patients is more difficult. In a study by Fischer in the *Journal of Community Health Nursing*, increased support from the US healthcare system can increase quality of life in PD patients because of the higher quality of care that they are receiving. This includes medical personnel staying up to date with new research about Parkinson's and keeping up with their patients to make sure they have what they need. Health insurance that covers medication and therapy expenses would also be beneficial

(Fischer 200). Many different factors play into quality of life, so increasing it for everyone in a straightforward manner is not feasible. Factors include age and cognitive function, as age often equates to slightly lower quality of life, while cognitive function, like depression and memory loss, merely change the methods to approach an increase in quality of life (Schönenberg and Prell 6). Through individualized support of the patient and encouraging exercise and other therapies, quality of life in PD patients can increase, making the disease more livable.

Gap

Given what is known about Parkinson's disease, this study aims to amplify the voices of women living with Parkinson's disease. Mostly due to the fact that there are more male patients than female with the disease, women are severely underrepresented in research. Studies that focus on gender, such as the study by Cerri et al., state that there are biological differences in the disease because of gender, but do not focus on how these differences affect the daily lives of women specifically, even when they speak of the effects on men. Studies that focus on female perspective focus on women as caregivers to PD male patients, not as the patients themselves (Vatter et al.), only further reveal the lack of research that includes female lived experience with the disease. Especially given the symptomatic differences, like women experiencing more pain (Cerri et al. 504), rehabilitation methods, exercise, and daily movement will be affected, making it even more important to discover how to best support women with Parkinson's disease. Given this, a thorough analysis of female PD patients is necessary to examine how the effects of the differences in Parkinson's compare to the effects on men. All of this leads to the question, how does the experience with physical ability to exercise differ from male to female patients with Parkinson's disease as their disease progresses?

Method

Overview

In order to answer the research question, it was decided that case study with cross case analysis is the best methodology. A case study enables the results to be both complete and cohesive, as well as then be able to be grouped together to analyze similarities and differences between groups. According to Professor Sharan B. Merriam in the novel *Qualitative Research: A Guide to Design and Implementation*, a case study "offers a means of investigating complex social units consisting of multiple variables of potential importance in understanding the phenomenon" (Merriam 50). In relevance to this study, it aims to understand experiences which are complex and ever-changing. Case studies are also important in advancing the existing knowledge base in a field (Merriam 51), which this study completes as there is a gap in how women perceive their ability to exercise with Parkinson's disease. Once data is obtained, cross case analysis is used to analyze it. According to Miles and Huberman in their 1994 sourcebook *Qualitative Data Analysis*, "By looking at a range of similar and contrasting cases, we can understand a single case finding, grounding it by specifying how and where and, if possible, why it carries on as it does. We can strengthen the precision, the validity, and the stability of the findings" (Miles and Huberman 29). Cross case analysis through this lens is invaluable to this study as it allows for a more in-depth understanding of multiple perspectives. Without the use of cross-case analysis, the data will be left isolated and not useful to the community, as a cohesive conclusion cannot be made.

Participants

The subjects of this study are all clinically diagnosed with Parkinson's disease, and are enrolled at Rock Steady Boxing classes in West Hills and Encino, CA. All participants must be doing similar types of exercise in order to better understand their experience with exercising, in this case they are all in boxing class. Both men and women will be used for this study, in equal numbers.

Research Instruments

This study was conducted at the conclusion of a boxing class, once at each location. Interviews were administered and recorded, with permission. Some interviews were conducted through email due to participants having time constraints at the conclusion of classes. Emails were sent with the same questions that would have been asked had the interview been conducted in person, and participants sent their answers back. The interview consisted of thirteen questions, ranging from basic information to in-depth open-ended questions about their experience (Fig 1). From there, data was transcribed and sorted before analysis. iPhone Voice Memos was used to record the audio from the interview in order to be transcribed with bias elimination from memory lapse.

Interview Questions
1. What is your name?
2. How old are you?
3. At what age were you diagnosed with Parkinson's Disease/how many years ago were you diagnosed?
4. Do you take levodopa or other drugs to alleviate symptoms of Parkinson's disease?
a. If so, do you feel like these drugs have any adverse effects relating to movement ability/pain?
5. How do you feel your disease is progressing? Since diagnosis, what are your main symptoms and have they worsened severely or minimally?
6. On a scale from one to ten, one being the lowest and ten being the highest, what would you rank your average pain on a daily basis?
a. If pain is experienced, can you elaborate on the types of pain that are experienced/location? i.e. sharp, dull, shooting, ache, etc.
7. Do you feel that the amount of pain experienced daily changes on a day-to-day basis? If so, how?
8. Using this same scale, what would you rate your average pain when doing physical activity, like the boxing classes you attend?
a. How does this pain level compare to normal pain levels? Is it a different type of pain?
9. How long have you been attending boxing classes, and were you/are you doing any other types of supplemental exercise?
a. If so, when did you begin doing regular exercise as a therapy for the disease?
10. Do you feel that since you've been exercising, has it become easier or harder to continue exercising?
a. Does [answer] change your motivation to continue exercising?
11. Do you feel like exercise has provided any benefits to your daily life, like alleviation of any symptoms?
a. If so, what are these benefits/symptoms that have been alleviated?
b. If not, why do you think this is?
12. Is there a specific area of your life that you feel is affected more than others? i.e. ability to keep up with friends/family, fatigue, participation in events, etc.
13. Do you feel like you receive the amount of support you need from family/friends/medical professionals?

Figure 1

Study Design

In order to begin the study, participants were gathered together to learn about the research being conducted and what they are being asked to do (Appendix A). Individual consent forms (Appendix B and C) were administered. Interviews were not anonymous, but the participants are guaranteed confidentiality in the final report. In the final study, participants are labeled as "Participant F1" or "Participant M3", for example, to clarify their sex, as this is a crucial study component. If consent is given, individual interviews are conducted. For participants who are not able to wait after class for their interview, they will write their emails on the consent form and questions will be sent to them for them to answer. For interviews, introductions are made, audio recording permission is asked once again, and given consent, the interview may continue. Eight people were interviewed, four men and four women.

Later, the transcripts (Appendix D) are sorted into their respective male and female categories. Once in categories divided by sex, the transcripts are broken down and answers are sorted based on the question they are asking. In order to code, an Excel spreadsheet was created, sorting responses into columns based on the question being answered. Deductive codes were used to simplify answers to responses such as 'yes' and 'no' where applicable, and other simplified one-word answers. Then the answers were separated into groups based on their response (e.g. "disease has progressed steadily since diagnosis" as a category). This continued until all possible groups were made, without oversimplifying answers in order to avoid bias. After all responses have been sorted under their respective themes, inductive coding is used to develop a complex relationship between all data. Male and female responses were combined in this step to see if the codes differ between men and women. Using this, codes were examined for patterns,

similarities, or differences. The results are then analyzed and explained, emphasizing the importance of the findings to the wider community.

Delimitations

The participants of this study are limited to classes at Rock Steady Boxing. Bias will be eliminated in the analysis process through the data being transcribed directly from the audio recordings, and not oversimplified into groups. If an answer does not fit in a group with other responses, it will be left as an outlier and still analyzed in final data.

Results

Data

After the eight interviews were conducted, data collection was complete. Transcripts of the data were created for coding purposes. At face value, the data between participants seems very similar. However, through in-depth analysis, differences are found and connections between responses came to light. Below is a representation of the coding process and the similarities and differences found in responses (Figure 2). Figure 3 depicts a simplified version of the codes and their connections to one another.

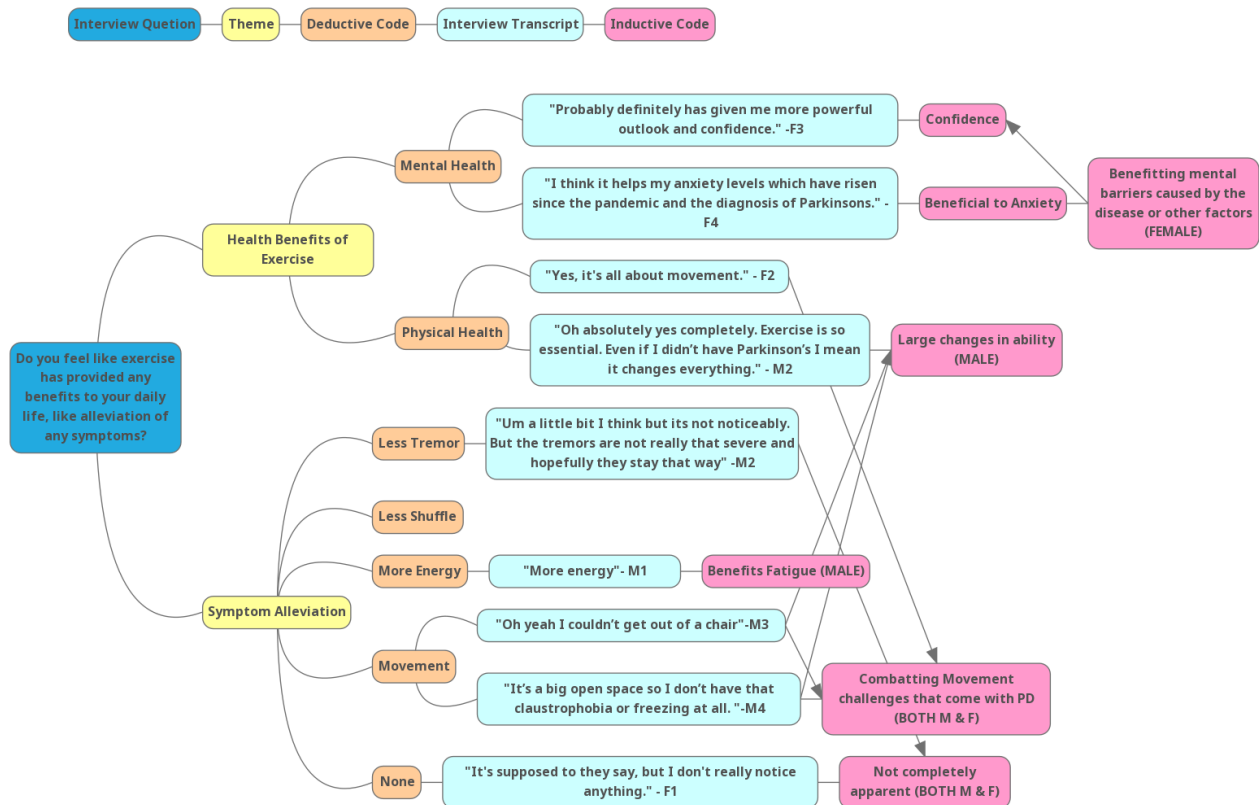


Figure 2

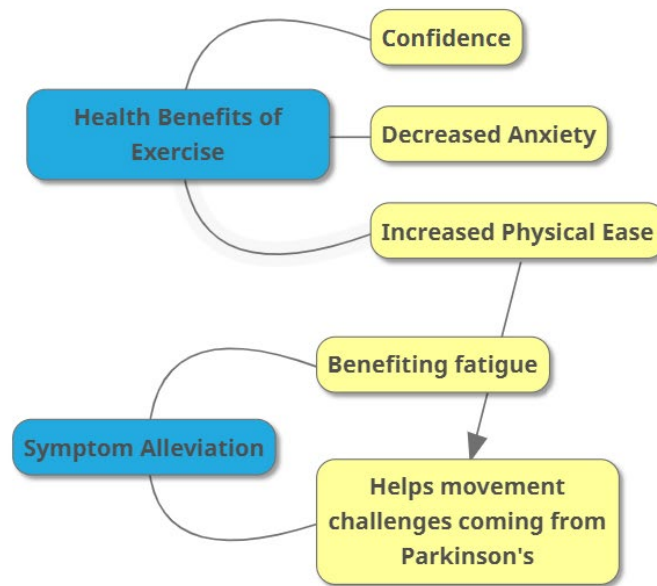


Figure 3

The Male Case

The four male participants in this study ranged in age from 64 to 91, with three of the participants being over 70 years old (Participant M2 is 64 years old and M3 is 91 years old). Participants M2 and M3 were diagnosed between 1-2 years ago, and Participants M1 and M4 were diagnosed 8-9 years ago. The men in this case had variation in their response to disease progression. Two of them stated that their disease has progressed minimally, M2 explained that his disease has not progressed, and M4 said his disease has changed. When male participants were asked to rate their pain on a scale from 1-10, the average was 3.25 out of 10, with two experiencing no pain. The men also had variation in their response to pain levels while exercising. M1 reports the same amount of pain compared to his daily levels, and M2 and M3 did not have any pain to begin with, which continues into their exercising. All of the participants started boxing at different times, but the average time for men was 0.67 years ago. The benefits of exercise are crucial to continue exercising consistently, with M1 reporting it has benefited energy and M2 and M3 reporting a benefit of movement abilities. The men noted that the biggest impact Parkinson's has on their life is their speed (M3, M1, M4) and conversational skills (M4).

The Female Case

The female participants in this study were much closer in age, with all of them being 65 to 70 years old. Two participants have had a diagnosis for 2 years and the other two participants for 5 years (F2) and 8 years (F3). Furthermore, all of the women take medication to help their disease, and F3 and F4 both explained the beneficial effects that medication has on their lives, with F4 stating, "I believe that they mostly work on the movement issues that go along with Parkinson's, such as the tremors. I think it has lessened my tremors." In contrast with the male participants, all four women stated that their disease has only progressed minimally. However, one woman said a symptom she is experiencing is a decreasing of memory. In using the same pain scale as the men, the women reported an average daily pain of 3 out of 10, with all of them experiencing some pain, most commonly in the neck, back, and arms. Most of the women reported feeling better after exercise, as discussed below, but one said that she has more pain; however, she

clarifies it to be exercise and muscle pain from working out. As with the men, the amount of time that the women have been boxing for varies, but the average time is 1.29 years. 3 out of 4 women walk daily for supplemental exercise as well. Women experienced a higher level of psychological benefits from exercising, with one reporting an increase in confidence and another a decrease in anxiety. One woman states that the biggest impact on her life that Parkinson's has is decrease in event participation because of an increased risk of falls (F1).

Cross-Case Similarities

Both sexes conveyed the potentially harmful effects of medication, with the hindering of movement, dyskinesia (F1), and nausea (M4). Both men and women in this study reported symptoms surrounding movement, including tremor (F2, F3, M1, M2, M3), stiffness (F1, F2, M4), and shuffle when walking (M2, M3). While the average amount of pain differed, seven out of the eight total participants experienced very minimal or no pain and only one male participant experienced a high amount of pain, raising the male average. All of the participants that experienced pain conveyed the notion that it is difficult to distinguish pain from Parkinson's disease or pain from other causes like old age or other health conditions, which made picking a number on the scale difficult. To continue, both men and women stated that they have less pain than their daily levels while exercising, stating, "I'd say it's minimal amount of pain. And I just finished a class and I feel so much better" (F2) and "It's like a whole new world here" (M4). 3 of the women and 1 of the men supported this response. While the length of attending boxing classes varies between the sexes, both men and women reported doing other sports like biking (F1), golf/softball (M2), and training/physical therapy (F4, M1, M3). As an individual continues to exercise, their ability to continue exercising can change. In this case, 3 women and all men reported that it has become easier for them to continue exercising since they have started. Motivation stemming from ease over time is a huge factor in the longevity of exercise in the future. All of the women and 3 of the men reported that they are more motivated to exercise because of its ease over time. Participant M2 added, "Yes. It motivates you to keep going when you feel good about it" and F4 stated, "I do it [exercise] because I enjoy it and I enjoy it because it keeps me motivated to fight this disease however I can." Two women and two men reported fatigue as one of the biggest impacts on their life. Lastly, when asked about the overall support they receive, all participants said they feel they have the support they need from family, friends, or medical professionals.

Discussion

Analysis

The overall results of this study are consistent with Farashi et al.'s findings stating that exercise can reduce symptoms in Parkinson's disease, since all of the participants conveyed that exercise has benefitted their movement abilities, tremor, stiffness, and shuffle, as well as minimizing pain. However, this study was inconsistent with Gao et al.'s study finding women experience higher levels of pain from Parkinson's disease. As stated in the results, the variation in levels of pain is partially due to the fact that pain from Parkinson's is hard to distinguish from other causes of pain. All participants stated that they experience less pain while exercising than normal daily levels, which is consistent with the study by Gao et al., revealing the importance of exercise to symptom alleviation and disease control. In terms of the research question, all of the participants stated that their disease has only progressed minimally in the time since they have been diagnosed, a few with only minor changes. While this makes it more difficult to analyze exercise experience throughout disease progression, the time variable still stands as patients were asked to compare their experiences exercising now versus when they first began or were first diagnosed. Furthermore, the relatively similar lengths of time between the two cases that the participants have been diagnosed with Parkinson's disease helps to eliminate differences between the cases. If major differences were present, the data for one case would not be as

comparable to the other case since the longer a person has been diagnosed, the more experiences they will have and therefore more information they would be able to provide.

At first glance of the data, there does not seem to be any difference between the male and female cases. However, with cross-case analysis, the women reap psychological benefits of exercise as well as physical, in comparison to the solely physical benefits for men. Along with reporting that continuation of exercise has become easier over time, they are all much more motivated to continue exercising, as well. This reveals a slight difference from the male case, since they only reported physical benefits of exercise, not psychological. They, too, reported that exercise has become easier since beginning it, however only three of the men report that this motivates them. All participants report being motivated by the alleviation of symptoms that they experience, which is supported by Combs et al.'s research stating that boxing can alleviate many symptoms including tremor and stiffness (Combs et al. 133), common symptoms experienced by these participants.

Through analysis, the female experience with physical ability to exercise over time is that it is easier to exercise now in comparison to when they started because of the motivation that comes from the benefits experienced, especially the mental health ones. Similarly, the male experience with physical ability to exercise over time is that they find benefits from it, making it easier, which motivates continuation.

The other goal of this study is to amplify the female experience as it is heavily underrepresented in research. For participants at Rock Steady Boxing, they feel that they are supported by family, friends, and medical professionals in their lives. Support through chronic diseases is crucial because it helps patients feel less alone and more understood (Fisher), overall increasing quality of life. By doing what they can to help themselves, like exercising, the women explained that it allows them to be there for others, which is a large factor in why they do it. The ability to participate with people in their lives and not miss out is a motivating factor to control what they can about the disease. This relates to the quality of life increase that exercise provides, as studied by Meng et al. Through being able to participate more in everyday actions with the people around them, quality of life increases while the loneliness, isolation, depression, doubt, and fear that come from this physically isolating disease begin to decrease. The confidence and decreased anxiety the women reported are important to consider as they are factors that affect every aspect of life, whereas physical symptoms affect some experiences, and people, more than others. Helping female Parkinson's disease patients by supporting their mental health and assisting them through encouragement would be widely beneficial to the Parkinson's community as a whole.

Implications

This study informs the wider community of the effects on life that exercising with Parkinson's disease has. Through the finding of the many benefits both men and women experience, it is clear that when exercise has benefits to one's daily life, it makes the experience more positive, further contributing to health benefits. The increased physical ease of exercise as time continues also contributes to motivation, helping people without Parkinson's disease create a picture of the many factors that go into the motivation to exercise more. As stated perfectly by participant F4, "I do it because I enjoy it and I enjoy it because it keeps me motivated to fight this disease however I can... I have control over these things and focus on what I can do." This theme can be applied to other aspects of life for Parkinson's patients, as well: in analyzing aspects like diet, sleep, or relationships with others, all of which PD patients have some degree of control over. The definition of autonomy revolves around control, especially with a progressive disease such as Parkinson's disease, having control is an important step. This finding creates the initiative for continued support of Parkinson's patients, especially women, through their journey with this disease. This study is influential in creating a more supportive and empathetic community that understands every aspect of exercising with the disease, including the physical, psychological, and their motivating factors, for both males and females.

Limitations

The small sample size of this study limits the accuracy of the results. For example, the pain scale question provided average pain levels that are not in conversation with existing research because one participant from the men brought the average up. Had the sample size been larger, there would have been more data to balance out the means, possibly allowing the data to agree with existing research. A larger sample size was not pursued in order to uphold the quality of the responses and degree of manual coding due to time restraints. It is to be expected that a larger sample size would provide slightly different results, as a wider range of perspectives opens the doors for more differences and similarities in opinions through the two cases. Findings are also limited to participants in Rock Steady Boxing classes in Los Angeles and may not be accurate to the wider population of Parkinson's patients throughout the world.

This study was also limited by participant willingness and time constraints. While there were more than eight people in the two classes visited, only eight were willing to respond to the interview either in person or over email. The interview questions themselves were also limited to being short and not requiring long, drawn out responses so that many interviews may be conducted in a small window of time. This limits the study to simpler answers instead of stories. While this simplifies the data, more clarifications could have been made and more data could have been obtained had the interview been longer and asked more probing questions. Nevertheless, the study still resulted in comprehensive data that was still able to provide enough information to accurately compare men and women.

The specificity of this study also limits the findings. The study requires that all of the participants are actively participating in boxing classes in order to eliminate the variable of what their main type of exercise is and how that affects them. Due to this, the results of this study and all experiences analyzed are only in relation to boxing classes as the primary form of exercise. This study also aimed to focus on the female perspective of exercise and did not analyze the bigger picture of the male case as was done with the female case, choosing to only analyze the male case in comparison to the female. While this limits this study to a more comprehensive understanding of the female experience, existing research can fill in the experience of the male case, as it is more widely discussed.

Further Research

In continuation with this study, further researchers can repeat it with a larger sample size to understand the wider understanding of experience with exercise, as stated in the limitations. This would be beneficial for greater understanding of the universal female experience with exercising, in order to prove the accuracy of this study to a wider population or to find changes on a larger scale. Furthermore, future studies can analyze other factors in one's life that might affect their experience exercising, like a deeper understanding of supplemental exercise, what specific medications they are taking, and their diet, since these factors were left out of this study in order to keep it specific and manageable within the time constraints. All of these listed factors can also be made into completely separate studies comparing male and female experiences, as the gap in this area is extensive.

As more is discovered about Parkinson's disease, for example a cause and a cure, research should be done to take into account the female experience. While it is more difficult to find female participants due to their smaller quantity, their perspectives matter and understanding how they perceive different aspects of the disease in contrast to men is crucial in developing a wholesome understanding of Parkinson's disease. Similar case studies to this one can be done in the future to develop a comprehensive understanding of all aspects of this disease, beyond just the physical or quantitative, for both men and women.

Further research for Parkinson's is invaluable to the community because of the limited knowledge in most aspects of the disease. Learning more about the cause, cure, effects on the patients, and more can help the community live in the shoes of people with Parkinson's disease in order to fully understand what life is like for them and how to best support, encourage, and ease their time with the disease.

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