The Willingness of Parkinson's Patients to Consider Meditation as an Adjunct to Apathy-Inducing Medication

Lily Mefford

Abstract

This quantitative study aimed to examine the relationship between the willingness of northeastern Tennessee Parkinson's patients to participate in meditation as an adjunct to their apathy medication and their self-diagnosis-of-drug-induced-apathy. A survey was administered to 26 Parkinson's patients in northeastern Tennessee who were taking medication for apathy. Fifteen of the results were omitted, and 11 were analyzed. The survey included questions about willingness to participate in meditation and self-diagnosis of drug-induced apathy. Data were analyzed using a Chi-Square test for association. The results of the study indicated that there was *no* statistically significant relationship between the willingness of Parkinson's patients in northeastern Tennessee to participate in meditation as an adjunct to their apathy medication and their self-diagnosis of drug-induced apathy ($p \leq .05$). These findings suggest that while many Parkinson's patients may be open to using meditation as an adjunct to their medication, no evidence indicates that patients diagnosed with drug-induced apathy are more willing than other populations of Parkinson's patients. Future research could explore other potential interventions that may be more effective in addressing the willingness to participate in naturopathic adjuncts for Parkinson's patients experiencing drug-induced apathy.

Introduction

There is an issue regarding psychotherapy treatment for apathy symptoms in individuals living with the neurodegenerative illness Parkinson's Disease (PD). The ingestion of various medications by PD patients used to combat motor-inhibiting[1] symptoms has spurred research regarding naturopathy[2] within the context of PD. The medicines used to aid in the motor-inhibiting symptoms of PD cause some of the patients' mentally hindering traits. The most prevalent symptom inflicting the minds of PD patients is *apathy*. Apathy may be defined as *the loss of care and concern for others*—directly caused by a brain's loss of dopamine[3] (DA) neurotransmitters. The degeneration of nerve cells causes PD in the part of the brain called the *substantia nigra*[4] (SN), thus leading to the brain's inability to produce DA neurotransmitters. Consequently, causing 60% of patients with PD to experience clinically significant apathy (Zahodne et al., 2012).

Recent research by the American Association of Neurological Surgeons suggests that individuals who experience 80% or more of the DA neurons[5] in the SN develop symptoms of PD (Parkinson's Disease – Symptoms, Diagnosis and Treatment, n.d.). One of the signs of the dwindling amounts of DN in PD patients' brains is *apathy*. This same symptom exists in Alzheimer's and Dementia patients. Considering existing literature suggesting more research is needed regarding solutions to apathy symptoms in PD patients, the application of the proposed study was highly feasible. The application of this data is not only relevant within PD, however. The proposed meditative adjuncts that this data collection may provide within the context of other neurodegenerative illnesses, such as Alzheimer's and Dementia, is substantial, thus contributing to PD research and the body of knowledge that is medical research.

Apathy has proven to be the most notable PD symptom, compared to others, such as dyskinesia[6], due to its lack of naturopathic[7] treatment options. Numerous pharmaceutical drugs exist to combat this symptom caused by the brain's depletion of DA (e.g., Levodopa); however, multiple adverse side effects from medications paired with specific pharmaceutical treatments accompany the success of other drugs involved in PD patients. Most notably, the pairing of Levodopa[8] and Carbidopa[9] has been shown in recent research to affect PD patients' apathy (MD, 2019) negatively. These two drugs are often prescribed together because Carbidopa is "the plasma enzyme that metabolizes[10] levodopa peripherally" (Levodopa, 2021). The American Parkinson's Disease Association states that, when used by itself, Levodopa "breaks down in the

bloodstream before it crosses into the brain," hence its common pairing with Carbidopa (Gilbert, 2019). An undertone of using this drug used to increase DA neuron quantities is known as Levodopa-induced dyskinesia (Dizon, 2018b).

In Western medicine, it is often encouraged to treat symptoms immediately, only paying attention to symptom relief rather than taking a more holistic approach to treatment. Alas, the prevalent style of modern medicine has put patients' health at risk. Popular drugs have been shown to cause adverse reactions in PD patients and symptoms experienced through the disease. Individuals must develop naturopathic solutions—used as adjuncts to their medication—to alter apathy symptoms in PD patients via a more integrative approach to medicine. Slightly less than 40% of all countries and regions implement naturopathic medical treatments (Steel et al., 2020). The positive implications that come of naturopathic treatments for the minds of people *not* dealing with PD are evidence to implement future therapies for PD patients; however, it must be known, by researchers, which demographics of PD patients would be most willing to participate in future clinical trials before said treatments are tested. This raises a question: Is there a relationship between Southeastern American Parkinson's, dealing with drug-induced apathy, and their willingness to participate in meditative adjuncts for their apathy symptoms? It is hypothesized that results will show that patients will be willing to participate in the proposed meditative adjuncts to combat their drug-induced apathy. Naturopathic treatments cease to exist in large quantities for this sect of individuals; therefore, I believe participants will uphold the contribution of research to the field.

Literature Review

Following the vulnerability of recent medical studies detailing the cons of allopathic[11] medicine, nearly 98 countries worldwide possess practicing naturopathic physicians. Considered within the context of neurodegenerative illnesses, naturopathy is becoming increasingly prevalent due to the recent findings of researchers. A study by M.P. Caligiuri and J.B. Lohr, researchers associated with the National Library of Medicine, details the worsening of specific PD symptoms within the context of "Levodopa-induced dyskinesia" (Caligiuri & Lohr, 1993). This study found that *Levodopa*, a prevalent drug used to replace the missing DA in PD patients' brains, worsened additional symptoms associated with PD (i.e., tremors, dyskinesia, etc.). Naturopathy used as an adjunct to medication is not entirely uncommon in movement

disorders. A specific study examined the effects of Chinese herbal medicine on PD symptoms. Researcher Bai-Yung Zeng, a London's King's College researcher, found that naturopathic herbal medicine was highly effective when used as an adjunct to patient medication. While Zeng did not examine naturopathy as an adjunct within the context of a PD patient's state of mind, the results of his study provide promising data applicable to my research.

Crucial academic research in the field, conducted by E.M. Neiworth-Petshow and C. Baldwin-Sayre, examines the effectiveness of naturopathic treatment on gastrointestinal (GI) complications caused by PD as an allopathic alternative without lasting side effects (Neiworth-Petshow, E. M., & Baldwin-Sayre, 2018). In PD and numerous other neurological diseases, GI issues are present and "may be managed via foundational dietary changes with natural symptom control with similar outcomes as pharmaceutical management," but *without* causing additional discomfort for patients. The findings of Neiworth-Petshow and Sayre suggest that allopathic medicine is, in many cases, the culprit of many secondary (medication-caused) symptoms. Studies like Neiworth-Petshow and Sayre's have been conducted; however, the critical difference between the research of these studies is the *mode* of naturopathy chosen to test and the part of the body affected by PD. Originating from the *American Academy of Neurology*, researchers examined neuroprotective strategies and alternative PD therapies. While some recognize mental exercise via meditation or other means as being *neuroprotective*, some researchers examine a different approach. Exercise has also been recognized as a naturopathic alternative or adjunct to traditional PD medication (Suchowersky et al., 2006). While the exercise was not considered an aid for the brain of PD patients, it did, however, show promise in altering the physical symptoms that many PD patients experience (i.e., muscle tightness, etc.), thus providing a further understanding of naturopathic therapeutics.

A critical research contributor for PD, the Michael J. Fox Foundation—an accredited organization committed to finding solutions to PD—found that 40% of PD patients experience apathy as a reaction to their medication. These drugs—meant to increase dopamine levels and further provide an absence of apathy symptoms in PD patients—can sometimes cause symptoms that, for some patients struggling with PD, are worse than the disease itself (*Ask the MD: Apathy and Parkinson's*.), thus, pointing to recent discoveries of effective psychotherapies for specific PD symptoms. Depression is among the PD symptoms for which naturopathic treatments exist. As the Parkinson's Foundation examined, 50% of patients living with PD will

experience symptoms of depression, and extensive research has been conducted regarding nonconventional depression treatment options (Depression, n.d.). Meditation and music therapy are suggested, among many others. Considering this surplus of information regarding treatments for depression in PD patients, little research exists regarding the treatment of patients' apathy symptoms. The Michael J. Fox Foundation states, "Further research is needed to [better understand] apathy and develop better treatments to target it" (Ask the MD: Apathy and Parkinson's, n.d.). Extensive research by the American Psychological Association suggests that "Psychotherapy is more effective than medication" when dealing with conditions affecting the human body's nervous system.

It is widely understood that some individuals are hesitant about naturopathic treatment options. The International Journal of Naturopathic Medicine examines this concept. It discusses the perceptions of [naturopathic] research" among individuals (Goldenberg, J et al.). Many individuals have voiced feelings against naturopathic approaches to medicine out of denial of effectiveness. While naturopathic research such as this has been applied to symptoms of other diseases and disorders, research examining this construct has not yet been applied to PD. With careful consideration to determine if PD patients truly yearn for naturopathic treatment options, researchers may begin to move forward with possible beneficial psychotherapy options, specifically for patients with apathy.

As the previously discussed research suggests, a deficit of research is available regarding *how* naturopathy may be able to affect the mental state of PD patients. Research correlating meditation to apathy symptoms has been undertaken and has been marginally successful. N. N. Dissanayaka and other researchers, originating from the peer-reviewed journal *Hindawi*, researched kindness meditation as a means of altering symptoms of "motor and non-motor dysfunctions [(depression, anxiety, etc.)]" (Dissanayaka et al.). When dealing with *any* individual experiencing apathy, conducting a self-examination of one's thoughts via meditation may be considered highly beneficial. In a recent study, researchers associated with the University of Miami conducted a study on yogic meditation, studying through a survey whether this practice held merit in altering PD symptoms. Yoga is an ancient practice comprised of awareness through "physical postures, breath control, and *meditation*" (Cherup et al., 2021). Results of the study displayed that "training modalities such as [meditation]" used to help

movement control are limited in prevalence. Therefore, a broader scope of data is explicitly needed regarding the perception of future naturopathic alternatives to their medication.

Though existing literature suggests a deficit in naturopathic treatment options for treatment, and before treatments can be tested, more information must be uncovered about what PD patients may be willing to do regarding treatment. By collecting data displaying how PD patients truly feel about approaches to their disease, a contribution to medical research may be reaped. By paving the way for actual treatment options in the future, my study aims to fill an area of thinking previously untouched for the contribution of knowledge to the medical field and the lives of *current* and *future* PD patients.

Materials and Methods

This study explores the willingness of individuals dealing with PD, drug-induced apathy, to participate in meditative adjuncts to their current medication— with the hopes of altering their symptoms of apathy. The goal is to decide if individuals with PD apathy would also be willing to participate in future trial therapies. In doing so, future medical researchers may draw upon this data and examine the possibility of implementing adjunctive meditation into the lives of PD patients dealing with apathy. Obtaining these statistics is imperative for the stimulation of apathy-centric PD research. This is because the apathy will remain unknown without knowing if patients are *willing* to adopt specific therapies.

For this study, I employed a quantitative method via a survey using my institution's subscription to REDcap (a survey software). The analysis of the data was fulfilled using the Chi-Square Test.[12] To do so, a null hypothesis was tested.

Questions dichotomous[13] in nature, in addition to questions on gender, age range, and PD staging, were considered in the quantitative analysis of the results; however, the study acquired the bulk of the data via survey questions using four and five-point Likert scales. Most notably, these previously mentioned factors (gender and disease staging) have proven to be critical stakeholders within the context of PD. Pertaining to gender, pre-existing research shows that a PD patient’s gender significantly affects his or her development of the disease (Cerri, 2019). The Library of Medicine found that the "risk of developing PD is twice as high in men than women."

The pre-existing literature shows no evidence of researchers using a survey to test the willingness of PD patients to participate in naturopathic actions to combat their apathy symptoms. However, a study on which I based this study's method examined the willingness of Parkinson's patients to participate in research using internet-based technology ("Shifting Attitudes towards Research and Evidence-Based Medicine within the Naturopathic Medical Community: The Power of People, Money, and Acceptance," n.d.). This paper employed the instrument of an anonymous survey and analyzed results using a Chi-Square test. Considering this study's method success, I was equipped to devise a method of analysis via the Chi-Square test that would be successful. This study's use of specific statistics informed my research and aided in creating a structure for the method. However, research *has* been conducted using naturopathy to alter various additional symptoms presented by PD—other than apathy. Applying a quantitative survey within the context of willingness is feasible due to its promise of furthering possible PD treatment options; the study results display statistics indicating whether implementing naturopathic solutions is a viable direction of inquiry. Furthermore, by employing an analysis using the Chi-Square Test, I could decide whether certain variables had more merit in willingness than others.

Subjects

Subjects used in this study were patients dealing with PD. Participants were gathered from two focus groups in Eastern Tennessee which remain anonymous in this paper to maintain the complete privacy of survey participants.

The survey organized participants by multiple items from which, previously mentioned, existing literature suggests hold merit on patients' experience with PD. Questions asked in the survey (Appendix B) were given on account of participants' answers to previous questions; the survey was custom for every participant. Moreover, participants who answered certain answers to specific questions may not have fit the criteria to answer another question. Survey logic allowed participants to answer only questions that pertained to their previous answers.

A critical limitation to be addressed in this study is that in this data collection method (i.e., the anonymous survey), participants' answers were based on what they *think* is occurring due to their current medication. For example, one of the survey questions asked if patients felt that they were experiencing drug-induced apathy. Medical professionals had not diagnosed survey patients as *experiencing drug-induced apathy*. Since this was the case, the study's results did

not extrapolate concrete results but rather results based on inference. Additionally, because the surveyed population was only gathered from a specific area of the United States, it cannot be inferred that the interests of PD patients will mirror those present in the Southeastern United States.

Instruments

As mentioned previously, the survey used in this study used questions dichotomous in nature in addition to questions answered on four- and five-point Likert scales (Appendix A)—all of which were approved by my institution's Institutional Review Board (IRB). I collected data from an anonymous survey according to the constraints under which this study operates. Surrounding the topic of *willingness*, using Likert scales is highly regarded among existing literature (Loureiro & Umberger, 2003).

Procedure

Following the survey assembly in REDcap, a recruitment email was distributed to focus group participants in a weekly newsletter. Participants were given two weeks to complete the survey; however, an extra week was accounted for in planning the method if the participant response rate was low. Focus group leaders, who distributed the study, had access to participant emails; however, I did *not* to maintain the complete anonymity of survey participants. The IRB approved all survey items to ensure the ethical security of associated research methods. Supplemental questions (Appendix B) were also approved by the IRB and added to the survey's Likert scale questions.

Results

Data Characteristics

The data collection yielded 26 records, 11 of which were eliminated due to the participant's completion of the consent form *only* or solely of questions pertaining to demographic, which did not qualify responses for analysis due to their lack of response to the supplemental questions the survey. Additionally, records that did not report an experience of drug-caused apathy symptoms were omitted to answer the research question accurately. This results section describes the demographic characteristics of survey participants. This data manipulation enabled me to conclude which demographic held the most merit in PDa participant willingness to participate in meditative adjuncts.

Demographics

Of the 15 analyzed results, 64.3% were female, and 28.6% were male. 7.1% of participants did not fill out the question pertaining to gender; however, they did choose to answer the following demographic questions related to their age range and clinical staging of PD. For this explanation, the records where this scenario arose were *not* omitted; they were still needed for their use in the Chi-Square Tests involving participant age and clinical staging of PD. As for the ages of participants, the outlying age range among participants was 65 to 74 years, which comprised 64.3% of the responses. The age range of 75-84 years included 21.4% of the results, followed by 7.1 percent of individuals between the ages of 45-65. The remaining 7.1% of responses did not fill out the question pertaining to the age range. The statistic garnered on participant age is viable within the existing literature. The National Institute on Aging found that most individuals with PD are over 60 (*Parkinson's Disease: Causes, Symptoms, and Treatments*, n.d.). The last demographic collected was the clinical staging of PD. The most collected responses stemmed from individuals dealing with early-stage PD (stages one and two). 28.6% of participants were experiencing mid-stage PD, and 7.1% advanced stage PD. The remaining 14.3% of participants chose not to answer the question pertaining to their PD staging.

This demographic summary is vital to this study's data analysis. By recognizing which combination of variables most responded to in the survey, I was equipped to infer aspects of the data once Chi-Square Tests were run on said variables. It was previously hypothesized that there would be a relationship between gender, age, and disease staging among PD patients and their willingness to participate in meditative adjuncts. Given the previously discussed demographic summary, it is clear how analyzing these variables using the Chi-Square Test may be beneficial for future professionals to interpret for PD research.

The Chi-Square Test was applied in this study to determine whether participant willingness to participate in meditation adjuncts to their PD medication had a relationship to a self-diagnosis with drug-induced apathy.

Analysis Using the Chi-Square Test

A Chi-Square test was run for each of the three demographics examined in the survey. Each respective variable was tested for association with question *one* of the survey (Appendix A) to determine whether participant willingness to participate in meditative adjuncts to their PD medication had a relationship to a self-diagnosis with drug-induced apathy.

A null hypothesis (H_0) was developed to test this association: There is no relationship between participant willingness to participate in meditative adjuncts to their PD and a self-diagnosis of drug-induced apathy. An alternative hypothesis (H_a) was also needed for comparison to the H_0: There is a relationship between participant willingness to participate in meditative adjuncts to their PD and a self-diagnosis of drug-induced apathy. As part of the Chi-Square test, the p-values[14] for each Chi-Square had to be considered. The following equation was considered for variables to be deemed associated: $p \leq 0.05$. In this equation, 0.05 was regarded as the significance value[15]. A p-value less than or equal to .05 indicates a less than 5% probability that the null hypothesis is correct. To apply this equation to this analysis, I derived the p-values of each Chi-Square test given question one of the survey (Appendix A). An online calculator used to calculate p-values utilized the Pearson Chi-Square value and the degrees of freedom[16] derived from each test (*Quick P Value from Chi-Square Score Calculator*, n.d.). The Pearson Chi-Square value and the degrees of freedom were considered when calculating the p-values of every association analyzed (Figures 2, 3, and 4). Figure 1 depicts the calculated p-values for each Chi-Square test.

Figure 1: Table depicting the p-values for each corresponding category.

Category Examined in Chi-Square Test	P-value
PDa Gender and Willingness	.766705
PDa Age Range and Willingness	.42319
PDa Clinical PD Staging and Willingness	.42319

PDa Gender and Willingness

The p-value for the Chi-Square test analyzing the association between patient willingness to participate in meditation as adjuncts to their current meditation *and* gender proved statistically insignificant. Figure 2 references the extrapolated Chi-Square table derived. This table shows the Pearson Chi-Square value and the degrees of freedom used to obtain the p-values for this association. Figure 1 states that the p-value for this test was .766705, thus rendering a rejection

of the H_a (.766705 ⩽ .05). Because .766705 is *not* less than or equal to .05, no effect was observed. Considering this statement, it may be inferred that gender cannot be associated with PD patients' willingness to participate in meditative adjuncts to their PD medication. Therefore, gender would not be a vital stakeholder for future naturopathic therapy trials. It is essential to acknowledge that the sample size for this study was minimal, so the conclusions that I reached in my study regarding this association are not generalizable to a larger population; however, when compared to the p-values of the remaining demographics tested (age range, and clinical PD staging), the p-value of the gender-considering kindness meditation Chi-Square Test was marginally more prominent than the p-value of the age range and clinical PD staging Chi-Square tests. Of the three demographics tested, age appeared to hold the most merit upon patient willingness within the sample population.

Figure 2: Chi-Square test between *gender* and *participant willingness*.

Rows: Gender Columns: Considering Kindness Meditation

	1	2	3	4	Missing	All
Female	3	2	1	1	2	7
	37.50	25.00	12.50	12.50	*	87.50
	3.5000	1.7500	0.8750	0.8750		
	0.07143	0.03571	0.01786	0.01786		
Male	1	0	0	0	3	1
	12.50	0.00	0.00	0.00	*	12.50
	0.5000	0.2500	0.1250	0.1250		
	0.50000	0.25000	0.12500	0.12500		
Missing	0	0	0	0	1	*
	*	*	*	*	*	*
All	4	2	1	1	*	8
	50.00	25.00	12.50	12.50	*	100.00

Cell Contents
Count
% of Total
Expected count
Contribution to Chi-square

Chi-Square Test

	Chi-Square	DF
Pearson	1.143	3
Likelihood Ratio	1.530	3

6 cell(s) with expected counts less than 1.
Chi-Square approximation probably invalid.
8 cell(s) with expected counts less than 5.

PDa Age Range and Willingness

The p-value for the Chi-Square test analyzing the association between patient willingness to participate in meditation as adjuncts to their current meditation *and* age range proved statistically insignificant. The p-value of this Chi-Square Test was marginally lower than the p-value of the previous test (Figure 1), with an assessment of .42319. It was previously mentioned that for the test to be considered *associated*, the significance value had to be less than or equal to .05. Because .42319 was not less than or equal to .05, an association was not deduced. Figure 3 references the extrapolated Chi-Square table derived. This table shows the Pearson Chi-Square values and the degrees of freedom used to obtain the p-values for this association. Figure 1 reads that the p-value for this test was .42319, thus rendering a rejection of the H_a (.766705 ⩽ .05). Because .766705 is *not* less than or equal to .05, a relationship between the two variables was not observed.

Figure 3: Chi-Square test between the *age range of participants* and *participant willingness*.

Rows: Age Range Columns: Considering Kindness Meditation

	1	2	3	4	Missing	All
45-65 years	1	0	0	0	0	1
	12.50	0.00	0.00	0.00	*	12.50
	0.5000	0.2500	0.1250	0.1250		
	0.5000	0.2500	0.1250	0.1250		
65-74 years	3	1	0	1	4	5
	37.50	12.50	0.00	12.50	*	62.50
	2.5000	1.2500	0.6250	0.6250		
	0.1000	0.0500	0.6250	0.2250		
75-85 years	0	1	1	0	1	2
	0.00	12.50	12.50	0.00	*	25.00
	1.0000	0.5000	0.2500	0.2500		
	1.0000	0.5000	2.2500	0.2500		
Missing	0	0	0	0	1	*
	*	*	*	*	*	*
All	4	2	1	1	*	8
	50.00	25.00	12.50	12.50	*	100.00

Cell Contents
Count
% of Total
Expected count
Contribution to Chi-square

Chi-Square Test

	Chi-Square	DF
Pearson	6.000	6
Likelihood Ratio	7.133	6

9 cell(s) with expected counts less than 1. Chi-Square approximation probably invalid.
12 cell(s) with expected counts less than 5.

PDa Clinical PD Staging and Willingness

Similar data was reaped in the company of PDa age range and willingness. The p-values for the clinical PDa staging-willingness Chi-Square Test and the PDa age range-willingness Chi-Square test generated equal p-values; therefore, the conclusion for the third Chi-Square test mirrored that of the second test. The p-value for the Chi-Square test analyzing the association between PDa patient willingness to participate in meditation as adjuncts to their current meditation *and* clinical PD staging proved statistically insignificant. The p-value of this Chi-Square Test was marginally lower than the p-value of the previous test (Figure 1), with an assessment of .42319. It was previously mentioned that for the test to be considered *associated*, the significance value had to be less than or equal to .05. Because .42319 was not less than or equal to .05, an association was not deduced. Figure 3 references the extrapolated Chi-Square table derived. Written in Figure 4 are the Pearson Chi-Square value and the degrees of freedom used to obtain the p-values for this association, 6.000 being the Pearson Chi-Square value and 6 being the degrees of freedom. Figure 1 states that the p-value for this test was .42319, thus rendering, again, a rejection of the H_a (.766705 $\nless$ .05). Because .766705 is *not* less than or equal to .05, a relationship between the two variables was not observed.

A critical lurking variable must be acknowledged within the third Chi-Square Test (Figure 4). In part two, question one of the survey (Appendix B) reads, "What is your current clinical staging of Parkinson's disease?" This poses an issue because it cannot be known that the stage that participants reported was the actual clinical staging of their disease; therefore, even if the sample population had been more significant and the variables had displayed associated, it would not be feasible to conclude due to the self-diagnosis of participants. For future studies to evaluate this issue within a larger population, physician confirmation of patients' clinical PD staging would be helpful.

Figure 4: Chi-Square test between *clinical staging* and *participant willingness*.

Rows: Clinical Staging Columns: Considering Kindness Meditation

	1	2	3	4	Missing	All
Advanced stage (stages 4 and 5)	1	0	0	0	0	1
	12.50	0.00	0.00	0.00	*	12.50
	0.5000	0.2500	0.1250	0.1250		
	0.5000	0.2500	0.1250	0.1250		
Early stage (stages 1 and 2)	3	1	0	1	2	5
	37.50	12.50	0.00	12.50	*	62.50
	2.5000	1.2500	0.6250	0.6250		
	0.1000	0.0500	0.6250	0.2250		
Mid-stage (stages 2 and 3)	0	1	1	0	2	2
	0.00	12.50	12.50	0.00	*	25.00
	1.0000	0.5000	0.2500	0.2500		
	1.0000	0.5000	2.2500	0.2500		
Missing	0	0	0	0	2	*
	*	*	*	*	*	*
All	4	2	1	1	*	8
	50.00	25.00	12.50	12.50	*	100.00

Cell Contents
Count
% of Total
Expected count

Chi-Square Test

	Chi-Square	DF
Pearson	6.000	6
Likelihood Ratio	7.133	6

9 cell(s) with expected counts less than 1.
Chi-Square approximation probably invalid.
12 cell(s) with expected counts less than 5.

Discussion

Overall, the p-values of this study displayed information concluding that the three demographics tested did *not* hold merit upon patient willingness to participate in meditative adjuncts to their PD medication. A rejection of the H_a was observed, and an acceptance of the H_0 was recognized—the H_0 being *there is not a relationship between the gender, age, and*

disease staging of participants and their willingness to participate in meditative adjuncts to their medication.

While a rejection of the H_a was recognized, examining the p-values of each Chi-Square test, a different inference was made by looking at the Pearson Chi-Square values of each test. These values point to a *rejection* of the H_0. The Chi-Square Test comparing gender and patient willingness supported the H_0. The Pearson Chi-Square value of the test was vastly smaller than the Pearson Chi-Square values of age range-willingness and clinical PD staging-willingness Chi-Square Tests, thus pointing to a statistical leaning towards the second and third Chi-Square Tests analyzed (figures 3 and 4).

The limitations of this study hinder the versatility of this study's results. In my literature review, I addressed the study of Joshua Goldenberg and his colleagues, which also examined naturopathic perceptions among individuals not within the context of PD. I drew similar results to this study but within a different population. While Goldenberg's analysis applies to a broader population, using my results may benefit a niche sect of individuals. Like the limitations recognized in this study, I also examined that "[my] sampling scheme was purposive and was not exhaustive" (Goldenberg, J et al.). Considering this, the issues encountered in my research are not entirely uncommon within the field. The sample size analyzed in the Chi-Square tests was not significant enough to draw any concrete conclusions equipped to be executed by future researchers; however, the study's format may prove helpful for future researchers to carry out within a larger sample size. Also, to be acknowledged, the questions in the survey pertaining to the Likert scale were not ordered like typical Likert scale questions. The "most likely" value was "1," but in a standard Likert scale question, "1" would be labeled as the "least likely," and "5" would be the "most likely." Because of this, it cannot be known if PD patients interpreted the questions correctly. The small sample size also lends itself to an inquiry as to whether the p-values would have been lower had the response rate been more scrupulous.

Suppose future researchers replicated this study. If this study was conducted within a larger population, an acceptance of the H_a might be realizable. In that case, it might be feasible to gather responses from more than two focus groups across a particular region of the United States instead of being concentrated in a specific area. This may garner a more diverse extrapolation of results.

In the literature review section, I recognized that a broader scope of data was needed regarding the willingness of PD patients to participate in future meditative alternatives to their current medication.

While the results of this study are not significant within a larger population, the extrapolated data may prove helpful for future researchers of naturopathic adjuncts for PD patients. By recognizing if patients *are* willing to participate, trial therapies may prove easier to hold due to data being in excess regarding whether PD patients are willing to participate in future naturopathic trial therapies, thus, benefiting the lives of many struggling individuals.

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Appendices

Appendix A: *Survey Questions using Likert Scale*

Note: Complete survey is not included here.

1. Would you be open to considering kindness meditation[2] as an adjunct to your current PD medication?

a. Very likely
b. Likely
c. Neutral
d. Not likely
e. Not likely at all

Part IV:

1. Please rate the following statements on the scale provided below.
    a. Naturopathy is an ineffective mode of treatment.
        a. Strongly agree
        b. Agree
        c. Neutral
        d. Disagree
        e. Strongly disagree
2. How do you feel that naturopathy is viewed by the public?
        a. Strongly accepted
        b. Accepted
        c. Neutralized
        d. Denied
        e. Strongly denied

Appendix B: *Questions Used in Association with Likert Scale Questions*

Note: *Complete* survey is not included here.

1. What is your birth gender? Please choose 1 of the following.
    a. Male
    b. Female
2. Which classifies your age range? Please choose 1 of the following.
    a. 44 or younger
    b. 45-65 years
    c. 75-85
    d. 86+

Part II:

1. What is your current clinical staging of Parkinson's disease (PD)?
    a. Early stage (stages 1 and 2)
    b. Mid-stage (stages 2 and 3)
    c. Advanced stage (stages 4 and 5)

Part III:

1. Do you currently reside in a nursing home or assisted living? If *yes*, continue to question 2. If *not*, go to question 3.
    a. Yes
    b. No
2. How many years have you been in a nursing home or assisted living facility?
    a. Less than 1 year
    b. 1-3 years
    c. 5+ years

3. Do you feel that you are currently experiencing apathy[1] as a result of your Parkinson's disease PD medication? If *yes*, continue to question 2. If not, submit the survey.
    a. Yes, I am currently experiencing apathy due to my PD medication.
    b. No, I am not currently experiencing apathy due to my PD medication.

4. Are you receiving the combination of Carbidopa/Levodopa as a medication for your PD? If yes, continue to question 3. If not, continue to question 2 in part IV.

a. Yes
b. No

Appendix C: Complete Survey

Parkinson's Patients Experiencing Apathy

Throughout the evolution of Parkinson's Disease (PD) research, numerous modes of treatment have been devised and tested by researchers. In recent years, correlations between the use of specific apathy medication in PD patients and adverse symptoms of the disease have been examined. Current and future research hopes to derive solutions to these reactions, with the hopes of finding adequate modes of treatment for individuals struggling with drug reactions in addition to the symptoms of their disease.

Part I:

1. What is your birth gender? Please choose 1 of the following.
    a. Male
    b. Female
2. Which classifies your age range? Please choose 1 of the following.
    a. 44 or younger
    b. 45-65 years
    c. 75-85
    d. 86+

Part II:

1. What is your current clinical staging of Parkinson's disease (PD)?
    a. Early stage (stages 1 and 2)
    b. Mid-stage (stages 2 and 3)
    c. Advanced stage (stages 4 and 5)

Part III:

1. Do you currently reside in a nursing home or assisted living? If *yes*, continue to question 2. If *not*, go to question 3.
    a. Yes
    b. No

2. How many years have you been in a nursing home or assisted living facility?
    a. Less than 1 year
    b. 1-3 years
    c. 5+ years

3. Do you feel that you are currently experiencing apathy[1] as a result of your Parkinson's disease PD medication? If *yes*, continue to question 2. If not, submit the survey.
    a. Yes, I am currently experiencing apathy due to my PD medication.
    b. No, I am not currently experiencing apathy due to my PD medication.

4. Are you receiving the combination of Carbidopa/Levodopa as a medication for your PD? If yes, continue to question 3. If not, continue to question 2 in part IV.
    a. Yes
    b. No

5. If so, would you be open to considering kindness meditation[2] as an adjunct to your current PD medication? Please answer according to the scale listed below. If you chose "not likely" or "not likely at all," please continue to the next subpart.
    a. Very likely
    b. Likely
    c. Neutral
    d. Not likely
    e. Not likely at all
    f. Part IV:

1. Please rate the following statements on the scale provided below.
    a. Naturopathy is an ineffective mode of treatment.
        a. Strongly agree
        b. Agree
        c. Neutral
        d. Disagree
        e. Strongly disagree
2. How do you feel that naturopathy is viewed by the public?
        a. Strongly accepted
        b. Accepted
        c. Neutralized
        d. Denied
        e. Strongly denied

Appendix D: Informed Consent Document

Dear Participant:

My name is [redacted], and I am a student at [redacted], a high school associated with [redacted]. I am working on completing a research project for a class I am enrolled in: AP Research. The title of my research study is *The willingness of Parkinson's patients to consider meditation as an adjunct to apathy-inducing medication: a quantitative approach*.

The purpose of this study is to contribute to the body of knowledge that is Parkinson's research and provide information pertinent for developing future naturopathic treatment[1] options for Parkinson's patients dealing with drug-induced apathy[2]. I would like to give a brief online survey to individuals currently diagnosed with Parkinson's Disease using *REDcap*. It should only take about 10 minutes to finish. You will be asked questions about your orientation (gender, age and demographic) as well as your experience with Parkinson's Disease thus far. Since this study deals with personal inquiries and online survey software, the risk is that you may feel possible discomfort with answering questions. However, you may also feel better after you have had the chance to express yourself about the questions themself. This study may benefit you or others by contributing to future Parkinson's research. Data collected from this study will help decide whether the development of future naturopathic adjuncts for patients dealing with drug-induced apathy is appropriate.

Your confidentiality will be protected as best we can. Since we are using technology, no guarantees can be made about the interception of data sent over the internet by any third parties, just like with emails. We will make every effort to make sure that your name is not linked with your answers. REDcap has security features that will be used: names, email addresses and IP addresses will not be collected.

Although your rights and privacy will be maintained, the research records may be looked at by individuals that have the legal right to see that information. This may include the ETSU IRB overseeing this research, other individuals at the University with the responsibility for ensuring we follow the rules related to this research, the federal Office of Human Research Protections (OHRP) that protects participants like you, and the research team.

All information that can identify you will be removed from the data. This data will then be stored for possible use in future research studies. We will not ask for additional consent for those studies.

Taking part in this study is voluntary. You may decide not to take part in this study. You can quit at any time. You may skip any questions you do not want to answer, or you can exit the online survey form if you want to stop completely. If you quit or decide not to take part, the benefits or treatment that you would otherwise get will not be changed.

If you have any research-related questions or problems, you may contact me, [redacted] at [redacted]. I am working on this project together with my advisors, [redacted] and [redacted]. You may reach [redacted] at [redacted] and [redacted]. This research is being overseen by an Institutional Review Board (IRB). An IRB is a group of people who perform independent review of research studies. You may also contact the [redacted] IRB at [redacted] or IRB@[redacted].edu for any issues, questions or input that you may have about the research or your rights as a research participant.

Sincerely,
[redacted]

- Clicking the I AGREE button below indicates:
    - I have read the above information
    - I agree to volunteer
    - I am at least 18 years old
    - I am physically present in the United States
    - I have been diagnosed with Parkinson's Disease