Personality's Effect on How an Individual Experiences Complementary and Alternative Medicine (CAM) When Given Expectations: Using a Cold-Pressor Task

Word Count: 5,000

Abstract

This study examines what personality types, as assessed from the NERIS type explorer, are more prone to report positive results from complementary and alternative medicine (CAM) as prompted by others. Data was collected from 13 participants at a mid-sized school in the Chicago suburbs through pain-scales relating to a cold-pressor task with verbal expectations given to induce placebo analgesia. Results showed that those holding an advocate personality type- introverted individuals, who use an intuitive thinking process, base decisions off of emotion, and prefer a more structured lifestyle- respond positively to CAM. Those holding protagonist and mediator personality types do not respond in a significantly positive way towards CAM. This study is significant for the integration of CAM into the modern medical system.

Keywords: Complementary and Alternative Medicine (CAM), cold-pressor task (CPT), personality type, placebo analgesia

Introduction

Recently the placebo effect has undergone a significant amount of scrutiny by the medical community; despite all of the research conducted on the phenomenon, there is still a lack of clarity in regards to its mechanisms (Miller and Brody, 2011). Definitions of placebo have differed throughout its history and in present-day research, from placebo being considered inert to a powerful psychological tool. Additionally, one's interdisciplinary background influences their definition of placebo (Foot and Ridge, 2012; Bishop et al., 2014). Unfortunately, the medical community associated placebos with being inert very early on, which has led many medical professionals to discredit placebos and any effects they may produce (Miller and Brody, 2011; Foot and Ridge, 2012).

Lately, studies on placebo have focused on the therapeutic advantages the placebo effect can hold to shift the medical society's critical view of its use in medicine. While a placebo is still regarded as an inert or ineffective form of treatment for a condition, the definition of the placebo effect is shifting (Foot and Ridge, 2012). The placebo effect is now considered to be the changes in one's health that result from the therapeutic and hope attributing effect a placebo induces when situated in a health care setting (Foot and Ridge, 2012; Bishop et al., 2014). This change in view is most likely due to the placebo effects prominence in Complementary and Alternative Medicine (CAM).

CAM is a group of varying medical and healthcare systems that are not typically acknowledged by the medical community or have a non-scientific basis (Lindeman, 2011; Marchant, 2015). Treatments that fall under the umbrella of CAM are highly disputed, but some common examples are: "acupuncture, homeopathy, herbal therapies, chiropractic, massage, …

high-dose megavitamins, spiritual healing, lifestyle diet, relaxation, imagery, energy healing, folk remedies, biofeedback, hypnosis, psychotherapy, and art/music therapy" (Austin, 1998 p. 1549).

The use of CAM has considerably increased in recent years; this rise is puzzling considering the stigma connected with placebo, which is heavily associated with CAM (Austin, 1998). CAMs' increased use has, therefore, inspired many researchers to look into the underlying cause. Many researchers have found through their endeavors that personality is correlated to the use of CAM (Austin, 1998; Galbraith et al., 2018; Sirois and Purc-Stephenson, 2008; Olchowska-Kotala, 2013). Nenad Jaksic et al. explain personality "as dimensions of individual differences in tendencies to show consistent patterns of thoughts, feelings, and actions across developmental periods and contexts" (Jaksic et al., 2012 p. 17). This correlation to the use of CAM indicates that personality may similarly affect the efficacy of CAM for an individual. Therefore, it is in the interest of the medical community to understand how personality relates to CAMs' effectiveness.

Literature Review

Before one can look at how personality influences CAM efficacy, it is essential to look at how the placebo effect relates to CAM. When one participates in CAM, the main form of placebo induced is placebo analgesia; placebo analgesia is the reduction of pain caused by an expectation of pain reduction (Colloca and Bendetti, 2005; Kong et al., 2013; Tracey, 2010). Moreover, different forms of conditioning produce these expectations. In research, it is most commonly visual or verbal conditioning. Visual conditioning, a type of Pavlovian conditioning, is where an event, such as pain alleviation, is repeatedly associated with a visual, like a color,

causing the individual to connect the experience to the visual. Verbal conditioning is when someone describes an event to another individual, such as pain relief, therefore convincing the individual of its occurrence. Verbal conditioning is less powerful alone than it is when used with visual conditioning; however, verbal conditioning can be provided more readily in CAM than visual conditioning (Kong et al., 2013; Enck, 2013).

To understand why this study analyzes how personality influences CAM efficacy, one must look at the current body of knowledge on personality's connection to CAM. The existing collection of research fails to address how personality correlates to CAM efficacy. However, while there is no current research linking personality traits to CAM's effectiveness, there is research addressing how specific characteristics, possessed by an individual, influence placebo responsiveness. One primary attribute found to affect the placebo effect's effectiveness is optimism, due to its relation with placebo analgesia. Optimists tend to focus on positive information and are, therefore, more likely to respond to positive expectations that induce analgesia. Another trait found to mediate the placebo effect is extraversion. Extraverts tend to be more agreeable, cooperative, sociable, and positive; these traits cause more extroverted individuals, to be more responsive to positive expectations (Jaksic et al., 2012; Darragh et al., 2014; Kottow, 1992). However, these studies fail to determine a single trait that consistently correlates to placebo responsiveness; furthermore, these studies individually analyze specific characteristics (Darragh et al., 2014). Looking at how a combination of attributes determines placebo efficacy, rather than examining traits independently, may produce better results.

Unlike studies on personality's influence on the placebo effect, past studies on personality's relation to CAM have primarily focused on how specific characteristics determine

CAM use and one's belief in it. These studies surveyed various groups of people regarding their personalities, along with their practice or opinion of CAM, to determine what traits mediate one's relationship with CAM. Several studies present similar characteristics that commonly connect to CAM use; these studies found that those who hold a holistic outlook, are sociable, and open to new experiences tend to utilize CAM more (Olchowska-Kotala, 2013; Sirois and Purc-Stephenson, 2008; Austin, 1998; Lindeman, 2009; Jeswani and Furnham, 2010). However, beyond these trends, few other studies find similar results. Niall Galbraith et al. found, through content analysis, that few traits are consistent mediators for CAM use and belief in its efficacy (2018). Additionally, these studies, similar to ones about how personality influences placebo efficacy, are limited since they only analyze specific traits individually. Independently examining attributes does not accurately reflect the complexity of an individual. Moreover, these studies are limited further due to the sole use of surveys. Surveys can only partially reflect an individual's sentiment on an issue and do not show the full range of reasons for an individual's position on CAM.

Therefore, while there is research to argue that personality influences the placebo effects effectiveness and that certain personality traits are associated with a positive attitude towards CAM, there is no research examining how personality influences CAM efficacy. Given the limitations of preceding research, future studies must consider how a combination of characteristics impacts CAM's effectiveness; this study will aim to accomplish this through the NERIS type explorer, referred to as NERIS-te in this paper. The NERIS-te assigns people a personality type by assessing five pairs of traits. Therefore, the use of the NERIS-te to evaluate personality ensures that personality traits in this study are not analyzed individually.

Additionally, seeing as previous research relating personality and CAM utilized surveys, it is in the interest of future researchers to look at a more experimental method to better reflect CAM's use in society.

Since CAM's effectiveness is understood to be due to placebo analgesia, the best way to test its efficacy is through an experiment examining placebo analgesia (Colloca and Bendetti, 2005; Kong et al., 2013; Tracey, 2010). Administration of expectations verbally is found to be more easily conveyed; therefore, in this study, the researcher will deliver expectations verbally to create analgesia (Kong et al., 2013). By doing so, the researcher can see how one would most likely positively respond to CAM, and therefore, analyze CAM's efficacy. Thus, this study will attempt to address the gap of personality's influence on CAM efficacy by asking the question: what personality types, as assessed from the NERIS type explorer, are more prone to report positive results from Complementary and Alternative Medicine (CAM) as prompted by others?

Hypothesis

Based on the assertions made in prior studies about personality influences on the placebo effects effectiveness and one's attitude towards CAM, the researcher has made a hypothesis on which NERIS-te types will respond best to CAM. Building on the correlations found in previous research, it is hypothesized that extroverted individuals (E), who use an intuitive thinking process (N), and base decisions off of emotion (F) are more responsive to CAM. The researcher has no hypothesis regarding whether an individual will respond better if they prefer structure or are more flexible (J or P), or if they work well under stress or not (-A or -T).

Method

Participants

This study's sample initially consisted of twenty-one participants (17 female, 4 male) from a mid-sized school in the Chicago suburbs. Eight participants were omitted due to a lack of representation for their personality type. Only participants who hold one of the three most prominent personality types (ENFJ-T/A, INFJ-T/A, and INFP-T/A) were studied because there were enough participants to represent them; leaving a total of 13 participants (11 female, 2 male). Participants were between the ages of 16 and 18. Out of the sixteen personality types assessed, three were represented.

To collect participants, the researcher sent multiple emails about the experiment to the schools Sophomore, Junior, and Senior class. Those interested in participating then filled out the consent forms contained in the email. Participants were given the incentive of catering after the experiment's conclusion.

Basis for Method

Personality Types

The NERIS-te is used to quantify personality in this study over another personality identifier primarily due to its open access. The test is free to use, unlike many other personality tests, which has allowed its creators to gather more data from a larger sample, especially since the test is available in thirty different languages. The test accessibility allows more individuals to identify their personality, and therefore, in theory, their responsiveness to CAM. Additionally, the NERIS-te utilizes the straightforward acronym format employed by the Myer-Briggs type indicator. However, the test does not use the Myer-Briggs Jungian concepts employed in the

Myer-Briggs type indicator. Instead, the test adopts a form of the dimensions of personality called the Big Five personality traits, which is more dominant in modern psychological and social research (Our Framework, n.d). Therefore, the approach used by the NERIS-te enables the researcher to examine one's personality as a sum of traits. The NERSI-te is formatted so that respondents rate on a scale how much they agree or disagree with a given statement. A copy of the test is included in Appendix A.

Cold-Pressor Task

Additionally, this study utilizes a cold-pressor task (CPT). A CPT is where participants stick their non-dominant hand in cold water to create mounting amounts of pain. They are commonly used in pain studies because they provide a consistent and safe amount of pain. For this study's purpose, a CPT allows the researcher to test the efficacy of placebo treatment for individuals based on their personality type. This study adopts the procedure for the CPT from two previous studies, which utilized a CPT to observe how participants respond to a painful stimulus when given expectations about it. In both studies, positive expectations were given concerning a treatment to induce placebo analgesia. This study will use a combination of the methods outlined in the two papers, *Beliefs About Expectations Moderate the Influence of Expectations on Pain Perception* by Ian Handley et al. and *Choice and placebo expectation effects in the context of pain analgesia* by Jason Rose et al., to conduct a CPT (Handley et al. 2011; Rose 2011). By adapting the method for this research's CPT from two scholarly studies conducted by psychologists, the researcher ensures that the results gathered from this study are collected reliably through methods previously tested and proven effective.

Procedure

NERIS-te Administration and Use

The researcher sent participants the NERIS-te test a week before the experiment through email. This timeline was chosen to ensure participants had enough time to complete the test when they felt comfortable. Participants then took the test online on Chromebooks through the 16personalities website. In the email participants were told that their participation is voluntary and that they could opt-out at any time and not share their test results; this ensured that the participants answered honestly. Additionally, participants could take the test on their own time allowing for more honest answers and accurate results. Participants emailed their name, age, gender, and NERIS-te personality type to the researcher. The researcher documented this information for demographic and contact purposes. Names and emails were only used to identify individuals, and this paper does not include any participants' names or emails.

Cold-Pressor Task

Participants came in for the experiment based on their time preference; either 10:15-11:10 am, 3:30-4:30 pm, or 5-6 pm. These times were chosen for the participants' convenience; some participants were available only at certain times due to school. The experiment took place inside the school's dance room. This room was chosen due to the mirrors lining the walls, which make the room appear larger and more sterile. Additionally the room is smaller so it is easier to monitor participants. There were long tables and folding chairs set up in the room; there were at most 3 participants at each table so that each had an ample amount of room. The researcher and volunteers wore white lab coats, so the setting looked more clinical. Participants set up their Chromebooks along the tables.

The researcher directed participants, upon their arrival, to put on heart rate monitors under their shirts; participants could go to the bathroom to put on their monitor if they desired. Volunteers ensured that the monitors were functioning.

Then, the researcher told participants that they would soon be placing their non-dominant hand in a bucket of ice water (the CPT), which would be painful. Participants first went through the control task, having an inert cream applied to their non-dominant hands by volunteers who were wearing surgical gloves. The cream was a mixture of iodine, frankincense oil, and unscented lotion to create a sanitary-smelling and looking cream. Additionally, the cream was put in a bottle with packaging made by the researcher (figure 1). Individuals were told that the cream was a hand sanitizer to clean their hands before the CPT to ensure sanitary conditions. Therefore, because participants received no expectation for analgesic relief, the task functioned as a control trial.

Then the researcher instructed participants to completely submerged their hands (up to their wrist) in ice water. The researcher directed participants to keep their hand submerged for a minute and thirty seconds, but they could remove their hand if it became unbearable. At three points in the task (every thirty seconds, for a minute and thirty seconds), the researcher instructed participants to rate their pain on a scale of 0 (no pain) to 10 (worst possible pain). Immediately after removing their hands, participants completed a post-task pain scale, the same pain scale as used previously. When participants rated their pain the researcher recorded their heart rate (bpm).

Next, after allowing the participants' hands to return to a normal temperature, participants went through the same procedure but instead were given a slightly different inert cream and told

that the cream was an ointment that would reduce their pain during the CPT. The cream was slightly different to help induce placebo analgesia through look and smell. The cream was a mixture of iodine, tea tree oil, yellow coloring, and unscented lotion to create a medicinal-smelling and looking cream. Additionally, the cream was put in a bottle with packaging made by the researcher to help induce placebo analgesia (figure 1). The researcher told the participants that the cream was a local anesthetic called Voratine, which was made for research purposes. Additionally, participants were informed that their hands would begin to feel numb a few minutes after the ointment's application. Since participants were given a similar inert cream (with only scent and color changed) along with an expectation for analgesic relief the second task functioned as the test trial.

Figure 1. Inert cream used during the control trials of the experiment (on the right) next to the inert cream used as a placebo local anesthetic during the test trials of the experiment (on the left). The ingredients listed on the bottles are the ingredients of the unscented lotion base used to create the creams.

Approximately five minutes after receiving the second cream the participants went through the same CPT procedure as before (putting their non-dominant hands in ice water for a minute and thirty seconds, completing the same pain-scale at 3 points in the task, and completing the same post-task pain scale after). When participants rated their pain the researcher recorded their heart rate (bpm), as before.

After both tasks were completed participants completed a separate questionnaire about their personal history with CAM. The questionnaire is based on the study *Why Patients Use Alternative Medicine* by John Astin (1998), a researcher in disease prevention at Stanford University School of Medicine. The pain scales and the questionnaire were distributed on Chromebooks through Google Forms. Appendix B and C of this paper contain the pain scales and questionnaire.

Data Analysis

A paired one-tailed t-test with an alpha level of $p<.05$ was used to analyze the results from the pain-scale and the participants' bpm; graphs and charts were made to accompany. A t-test allows the researcher to see if there is statistical significance between the control and test pain ratings and bpm for each personality type. A one-tailed t-test was chosen because the researcher is assuming that the participants were convinced that the placebo cream is effective, resulting in a lower pain-ratings and bpm during the test trial. Questionnaire results were

analyzed by putting the participants' responses into bar and pie charts to see which answers were the most common.

When discussing personality types the researcher refers to the names assigned to the personality type by the NERIS-te creators. Due to a limited amount of data and how the NERIS-te categorizes personality types, how an individual responds under stress (T and A) cannot be analyzed like the other four traits. Therefore, personality types are labeled with both stress traits (T and A), however, neither trait is analyzed or discussed by the researcher due to a lack of data.

The result section will outline the data from each of the three personality types- protagonist (ENFJ-T/A), advocate (INFJ-T/A), and mediator (INFP-T/A). Then the data from the questionnaire will be discussed. Lastly, the researcher will discuss the significance of the results.

Findings and Analysis

ENFJ-T/A (Protagonist)

Figure 2.

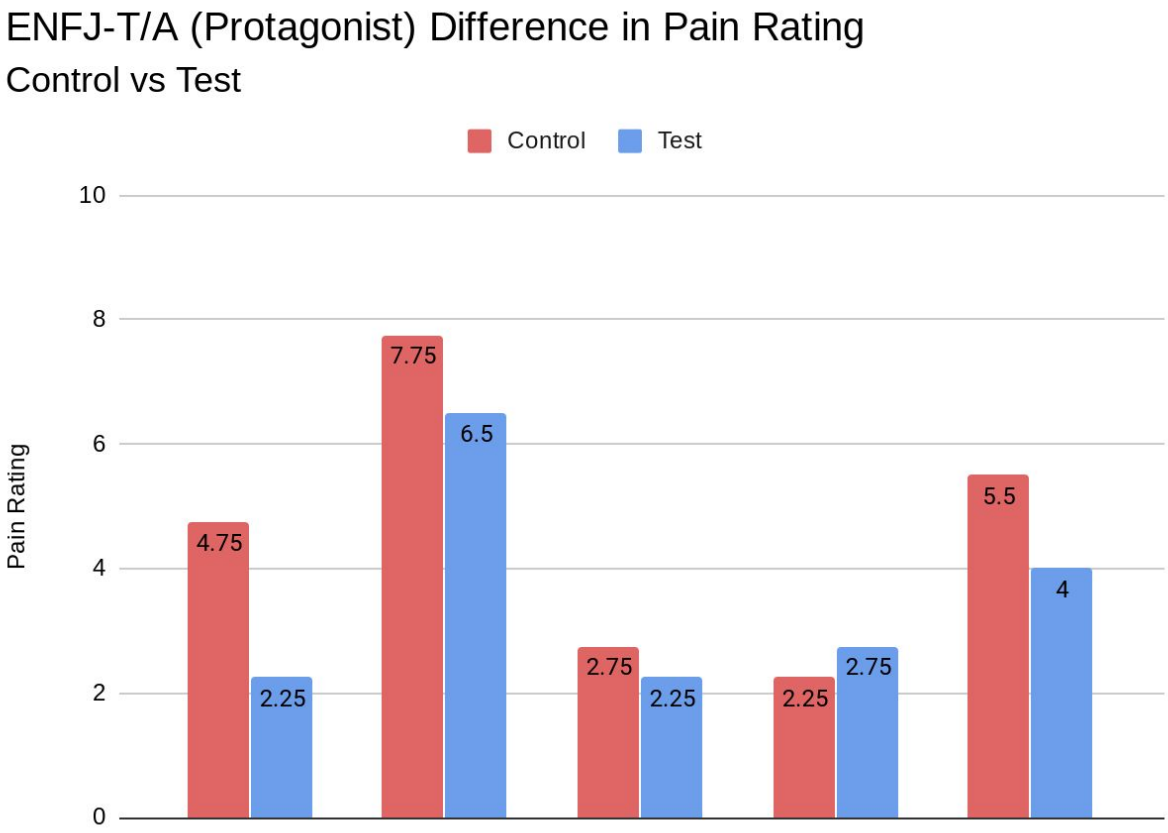

Figure 2 displays the mean pain-rating for each protagonist participant for the control and test trial. Overall, the protagonist reported less pain in response to the CPT after receiving the placebo cream, indicating that they responded positively to the placebo. One participant reported more pain during the test than the control trial, meaning that they did not respond positively to the placebo.

Figure 3.

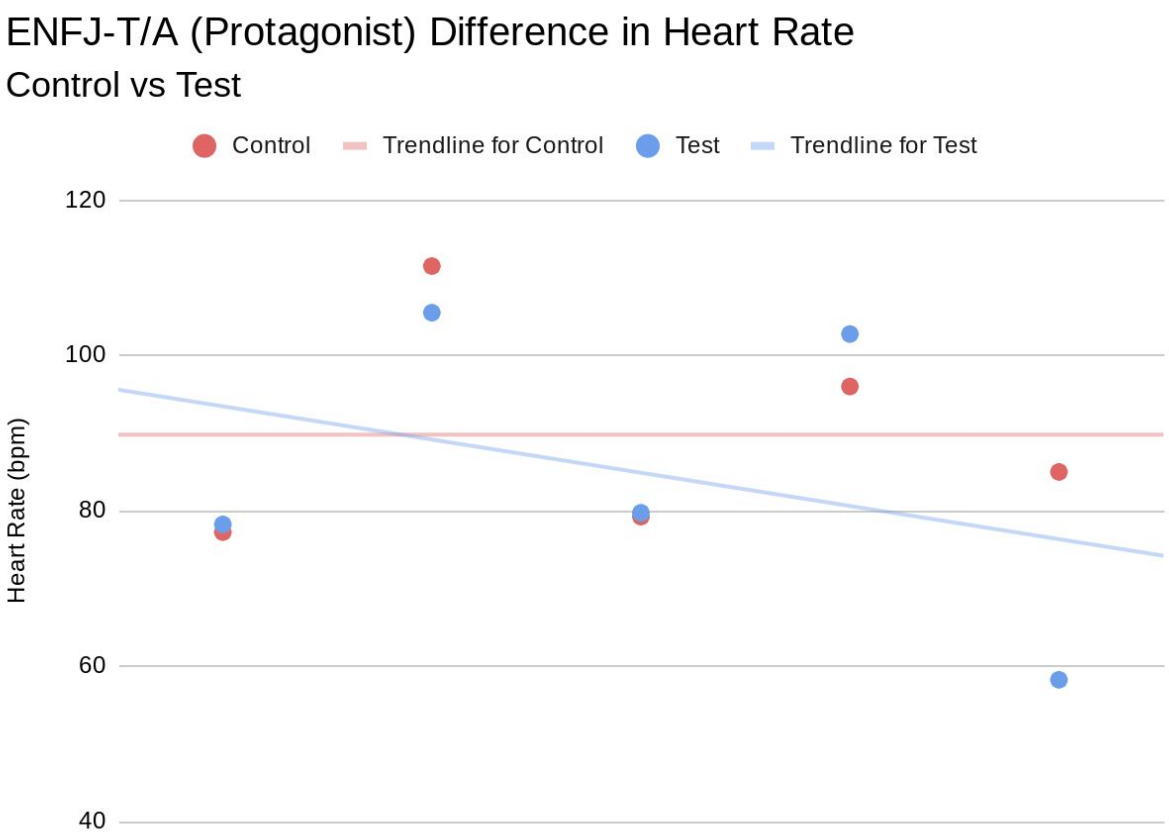

Figure 3 shows the mean bpm for each protagonist participant during the control and test trials. Overall, not all protagonists' bpm were lowered by the placebo cream. Therefore, while many reported less pain, the placebo did not physically reduce stress in many.

Figure 4.

Mean ENFJ-T/A (Protagonist) Pain Rating	Control	Test	Difference
Participant 1	4.75	2.25	2.5
Participant 2	7.75	6.5	1.25
Participant 3	2.75	2.25	0.5
Participant 4	2.25	2.75	-0.5
Participant 5	5.5	4	1.5
Overall	4.6	3.55	1.05

Positive difference No difference Negative difference

Figure 4 shows the differences in protagonists' mean pain-ratings between the control and test trial. Overall, protagonists have a positive difference between their control and test means, showing that the protagonist, as a group, responded positively to the placebo cream. One participant has a negative difference between their control and test means, showing that they did not respond positively to the placebo.

The results from the t-test show that there is a near significant decrease in pain-ratings among protagonists during the control trial (M=4.6, SD=2.04) compared to the test trial (M=3.55, SD=1.93), t(2.09), p=.052. Due to the p-value being just above .05 it is difficult to conclude whether the placebo cream significantly reduced protagonists' pain-ratings.

Figure 5.

Mean ENFJ-T/A (Protagonist) bpm	**Control**	**Test**	**Difference**
Participant 1	77.25	78.25	-1
Participant 2	111.5	105.5	6
Participant 3	79.25	79.75	-0.5
Participant 4	96	102.75	-6.75
Participant 5	85	58.25	26.75
Overall	89.8	84.9	4.9

Positive difference No difference Negative difference

Figure 5 shows the differences in protagonists' mean bpm between the control and test trial. In general, protagonists have a positive difference between their control and test means, showing that the protagonist, as a group, responded positively to the placebo cream. However, three participants have a negative difference between their control and test means, showing that the placebo did not physically reduce their stress levels.

The results from the t-test show that there is not a significant decrease in bpm among protagonists during the control trial (M=89.8, SD=17.69) compared to the test trial (M=84.9, SD=19.53), t(0.84), p=.22. Since the p-value is greater than .05, it can be assumed that protagonists did not respond positively to the placebo cream.

INFJ-T/A (Advocate)

Figure 6.

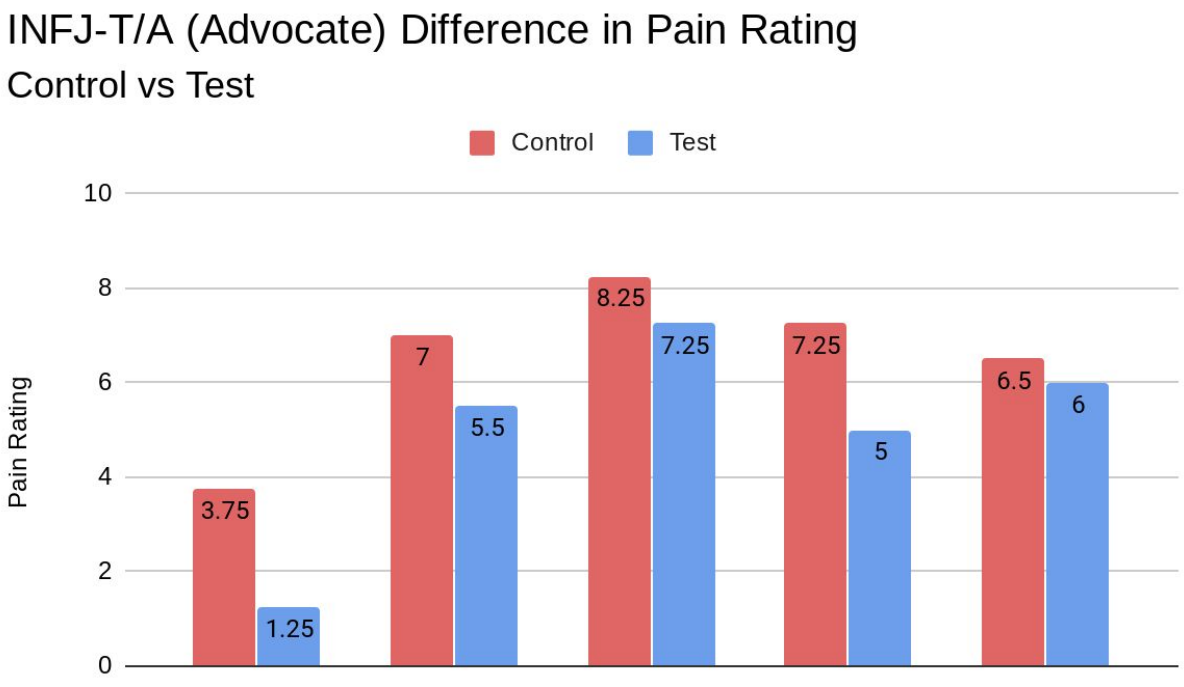

Figure 6 displays the mean pain-rating for each advocate participant for the control and test trial. All of the advocates reported less pain in response to the CPT after receiving the placebo cream, most by a large margin.

Figure 7.

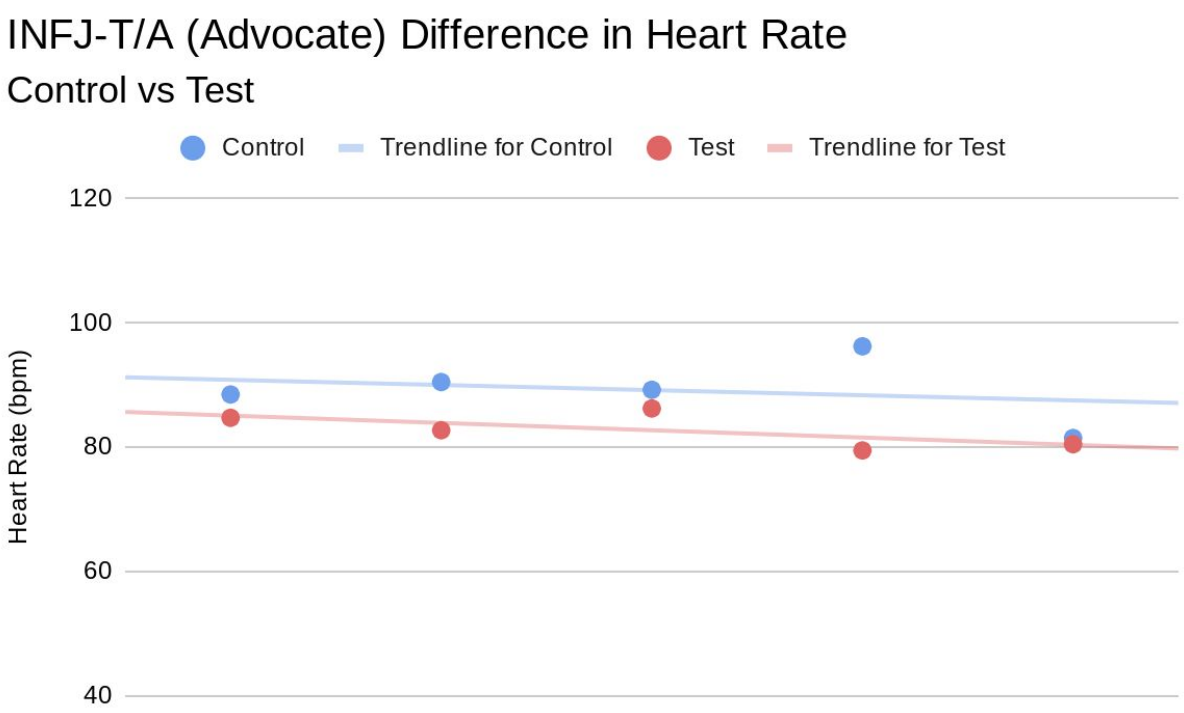

Figure 7 shows the mean bpm for each advocate participant during the control and test trials. All advocates' bpm were lowered by the placebo cream. Therefore, not only did advocates report less pain, the placebo physically reduced stress as well.

Figure 8.

Mean INFJ-T/A (Advocate) Pain Rating	**Control**	**Test**	**Difference**
Participant 1	3.75	1.25	2.5
Participant 2	7	5.5	1.5
Participant 3	8.25	7.25	1
Participant 4	7.25	5	2.25
Participant 5	6.5	6	0.5
Overall	6.55	5	1.55

Positive difference No difference Negative difference

Figure 8 shows the differences in advocates' mean pain-ratings between the control and test trial. All advocates have a positive difference between their control and test means, showing that the advocates found the placebo to reduce pain.

The results from the t-test show that there is a significant decrease in pain-ratings among advocates during the control trial (M=6.55, SD=2.31) compared to the test trial (M=5, SD=2.27), t(4.14), p=.007. Because the p-value is below .05, the researcher can conclude that the placebo significantly reduced advocates' pain-ratings.

Figure 9.

Mean INFJ-T/A (Advocate) bpm	**Control**	**Test**	**Difference**
Participant 1	88.5	84.75	3.75
Participant 2	90.5	82.75	7.75
Participant 3	89.25	86.25	3
Participant 4	96.25	79.5	16.75
Participant 5	81.5	80.5	1
Overall	89.2	82.75	6.45

Positive difference No difference Negative difference

Figure 9 shows the differences in advocates' mean bpm between the control and test trial. All advocates have a positive difference between their control and test means, showing that the advocates' stress was reduced by the placebo.

The results from the t-test show that there is a significant decrease in bpm among advocates during the control trial (M=89.2, SD=10.13) compared to the test trial (M=82.75, SD=6.32), t(2.3), p=.04. Since the p-value is less than .05, it can be concluded that advocates did respond positively to the placebo cream.

INFP-T/A (Mediator)

Figure 10.

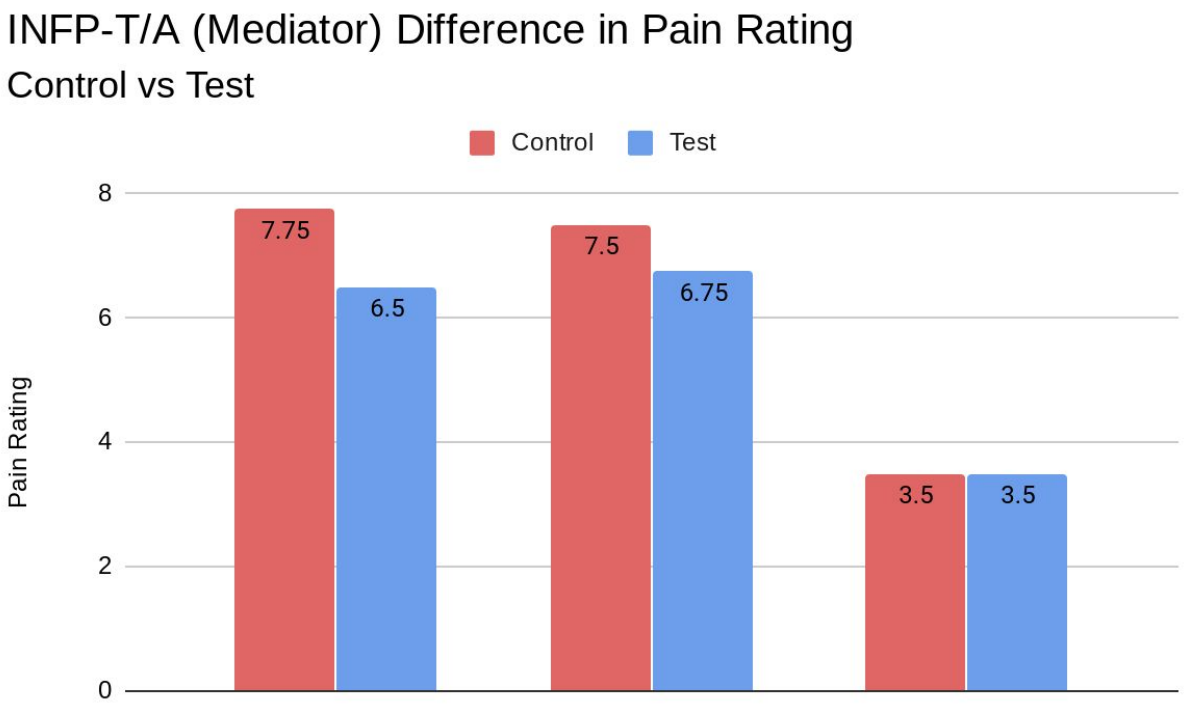

Figure 10 displays the mean pain-rating for each mediator participant for the control and test trial. Overall, the mediators reported less pain in response to the CPT after receiving the placebo cream. One participant reported no change in pain from the test to the control trial, meaning that they did not respond to the placebo cream.

Figure 11.

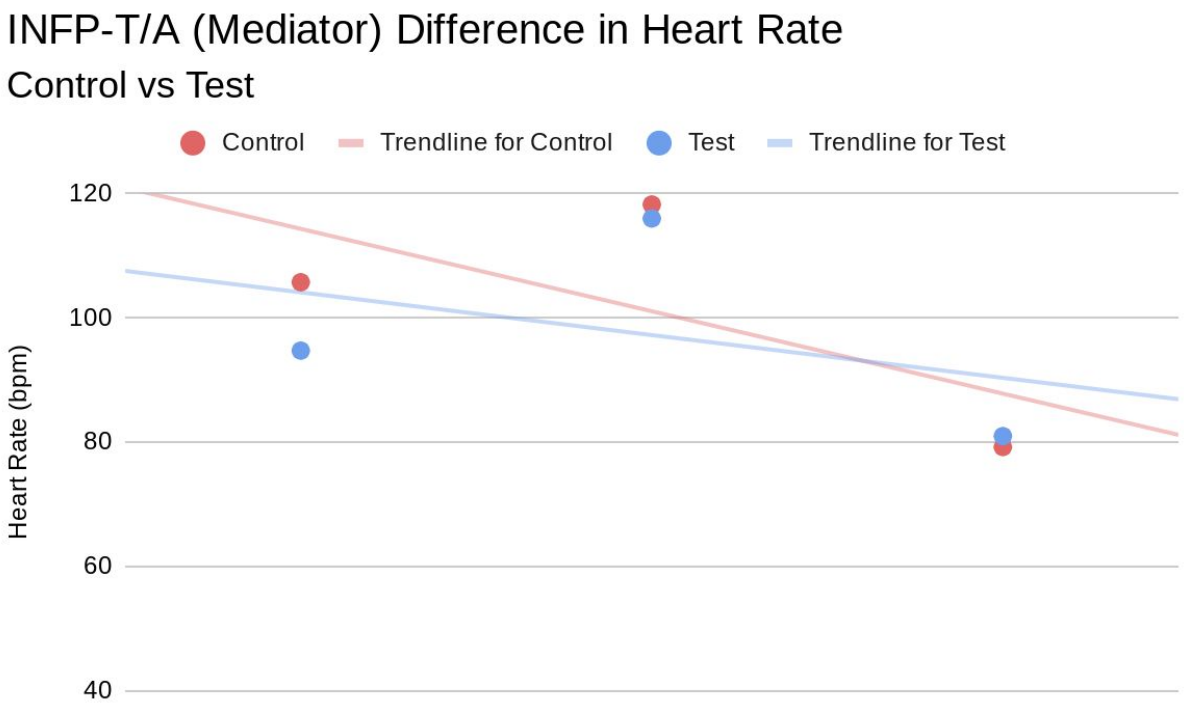

Figure 11 shows the mean bpm for each mediator participant during the control and test trials. Overall, mediators' bpm remained mostly the same for both the control and test trial.

Figure 12.

Mean INFP-T/A (Mediator) Pain Rating	**Control**	**Test**	**Difference**
Participant 1	7.75	6.5	1.25
Participant 2	7.5	6.75	0.75
Participant 3	3.5	3.5	0
Overall	6.25	5.58	0.67

Positive difference No difference Negative difference

Figure 12 shows the differences in mediators' mean pain-ratings between the control and test trial. Overall, protagonists have a positive difference between their control and test means, showing that the mediators, as a group, responded positively to the placebo cream. One participant has no difference between their control and test means, showing that they did not respond to the placebo cream.

The results from the t-test show that there is not a significant decrease in pain-ratings among mediators during the control trial (M=6.25, SD=2.18) compared to the test trial (M=5.58, SD=1.78), t(1.84), p=.1. Due to the p-value being above .05 it can be concluded that the placebo cream did not significantly reduce mediators' pain-ratings.

Figure 13.

Mean INFP-T/A (Mediator) bpm	**Control**	**Test**	**Difference**
Participant 1	105.75	94.75	11
Participant 2	118.25	116	2.25
Participant 3	79.25	81	-1.75
Overall	101.08	97.25	3.83

Positive difference No difference Negative difference

Figure 13 shows the differences in mediators' mean bpm between the control and test trial. Overall, protagonists have a positive difference between their control and test means, showing that the protagonist, as a group, responded positively to the placebo cream. However, one participant has a negative difference between their control and test means, showing that they responded negatively to the placebo cream.

The results from the t-test show that there is not a significant decrease in bpm among protagonists during the control trial (M=101.08, SD=21.22) compared to the test trial (M=97.25, SD=16.45), $t(1)$, p=.21. Since the p-value is greater than .05, it can be assumed that mediators did not respond positively to the placebo cream.

Questionnaire

Figure 14.

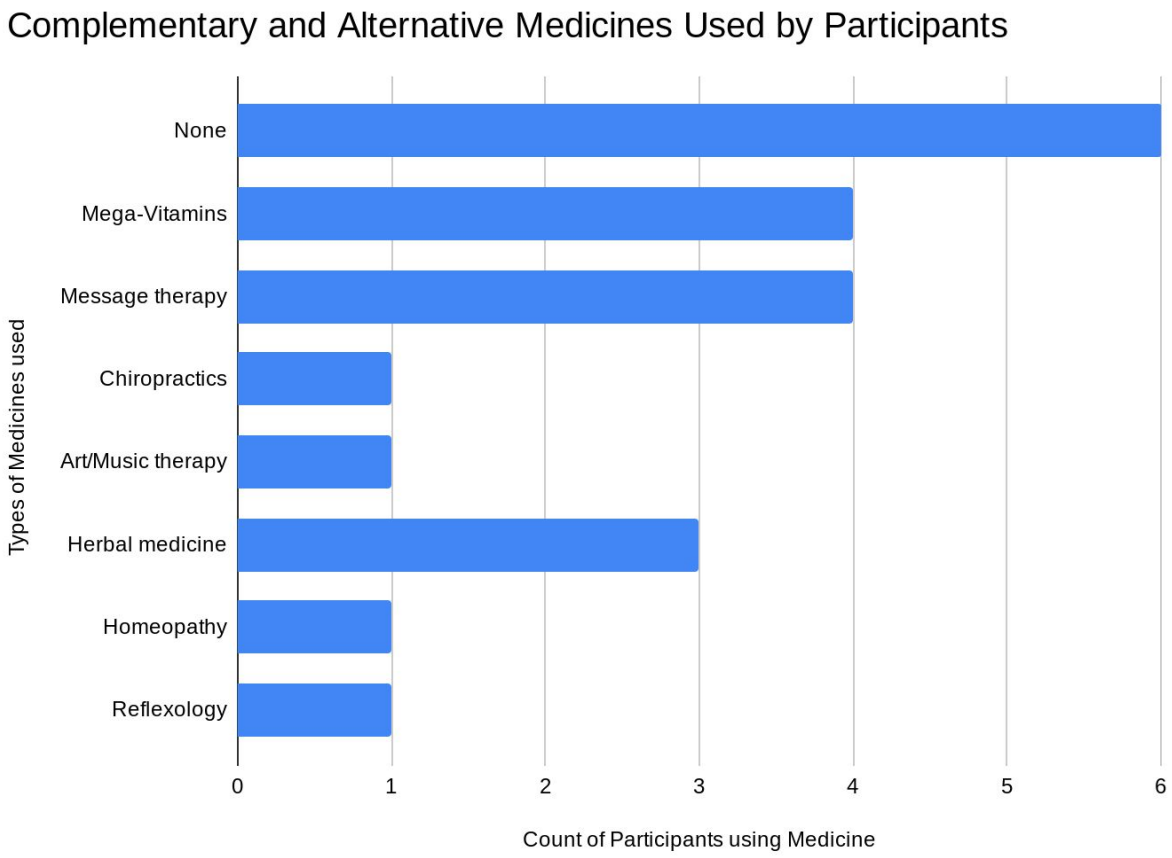

Figure 14 shows the types of CAM used by participants. 7 of the participants use some form of CAM, 6 use no form of CAM. Massage therapy and Mega-vitamins (to treat illness) were the two most common forms of CAM used among participants. Herbal medicine was also fairly common among participants.

10 participants said that they had never used CAM before, 2 said that they may have used CAM before, and 1 said that they had used CAM before. Therefore, while many of the participants have used some form of CAM before they are unfamiliar with the term CAM.

Figure 15.

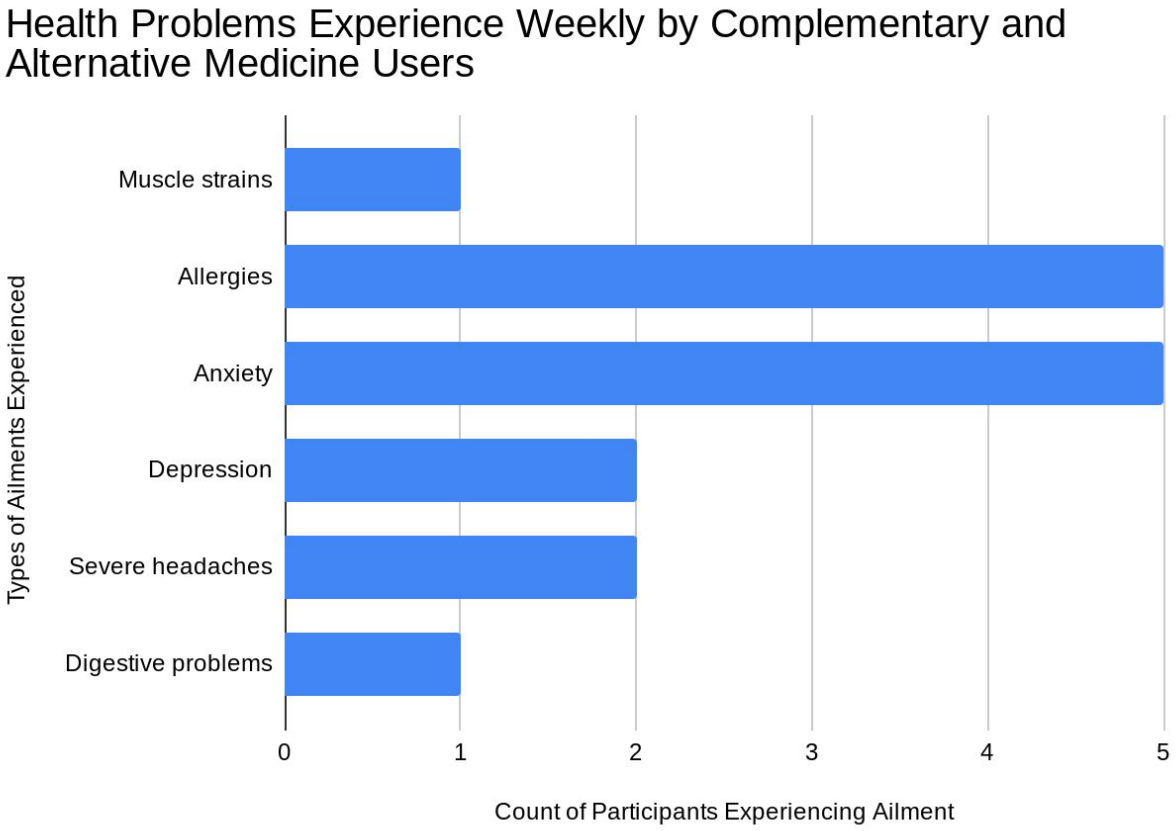

Figure 15 shows the health problems CAM users experience at least once a week. The most common ailments among CAM users are anxiety and allergies. 71% of the 7 CAM users experienced either anxiety, allergies, or both on a weekly basis.

Figure 16.

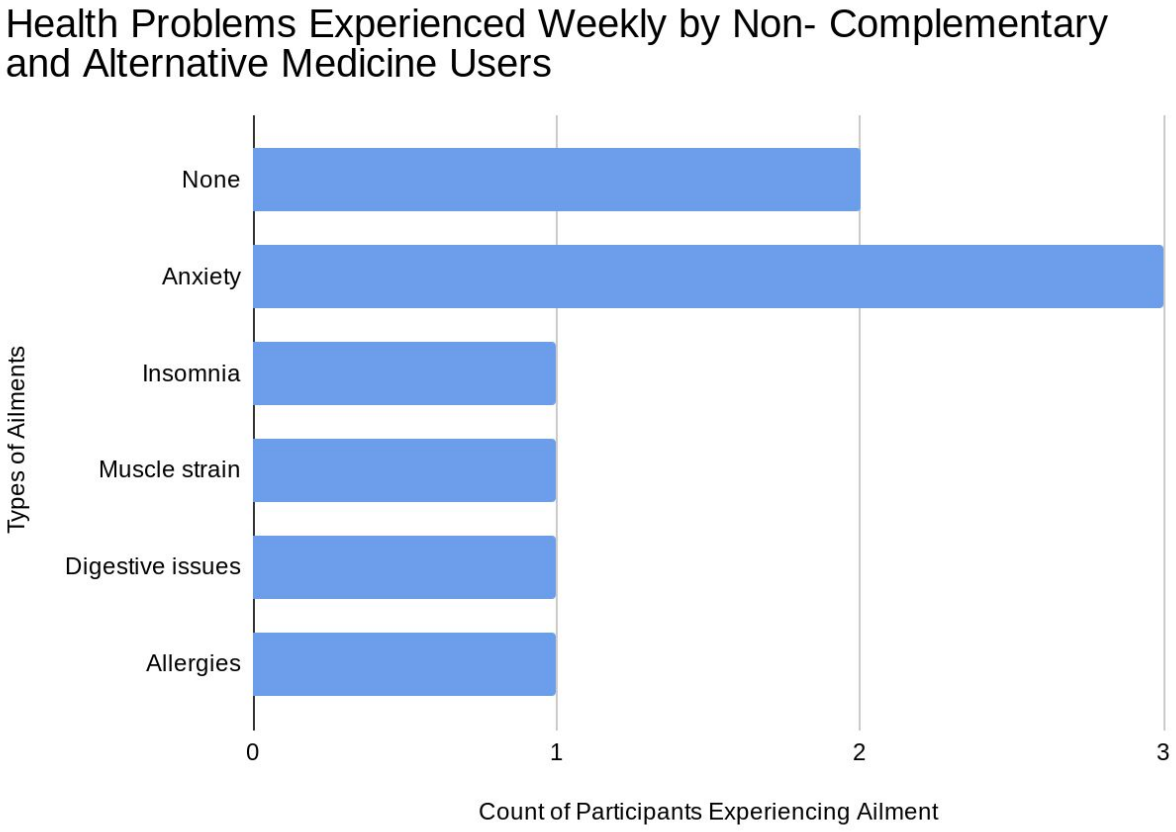

Figure 16 shows health problems non-CAM users experience at least once a week. Anxiety was the most common ailment, with 50% of the 6 non-CAM users experiencing anxiety at least once a week. 33% of the 6 non-CAM users experience no health problems weekly.

Figure 17.

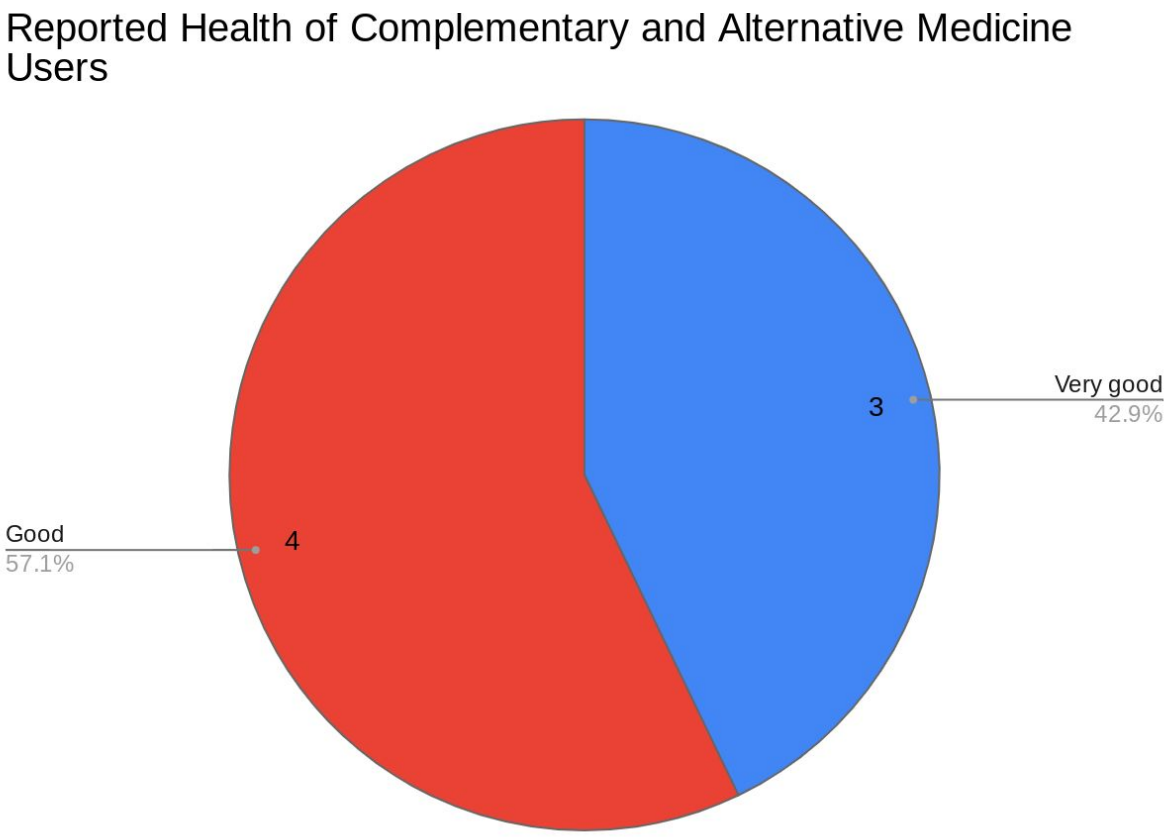

Figure 17 shows the reported health of CAM users. The majority of CAM users (57.1%) said that their health is good. 42.9% of CAM users said that their health is very good.

Figure 18.

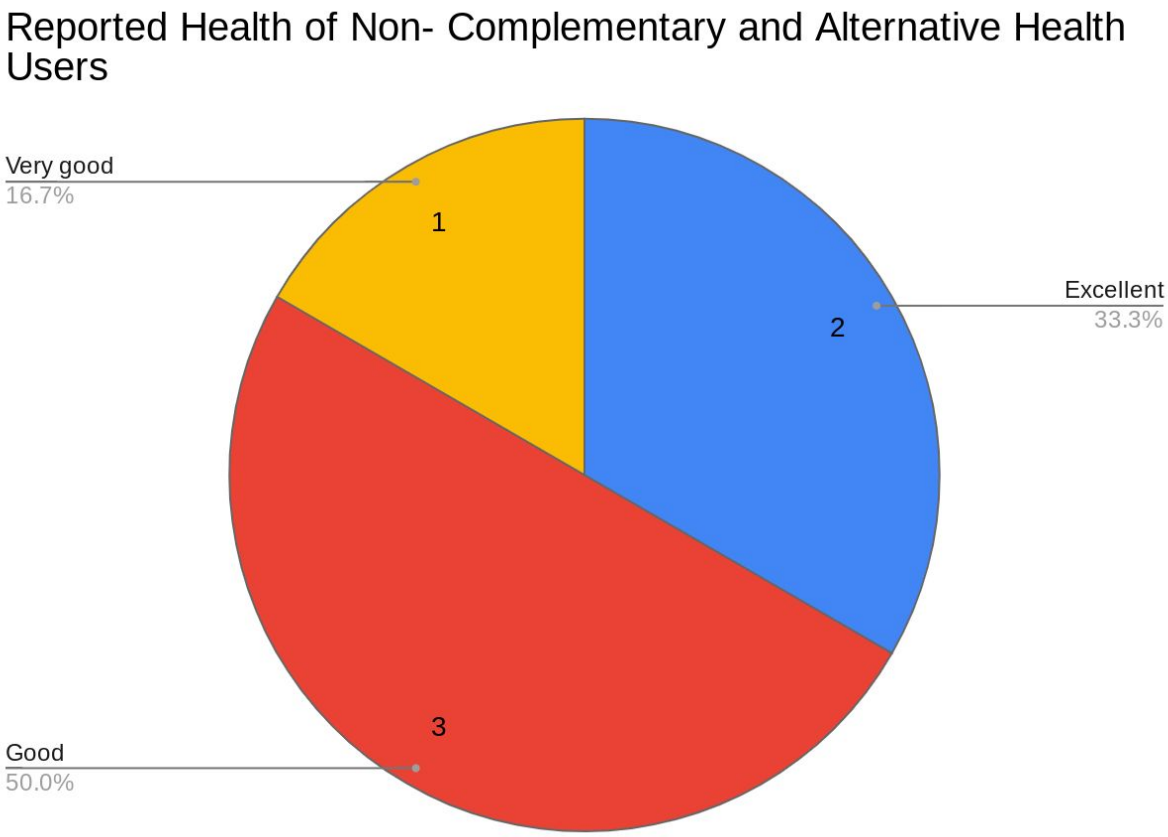

Figure 18 shows the reported health of non-CAM users. The majority (50%) of non-CAM users said that their health is good. 33.3% of non-CAM users said that their health is excellent.

Discussion

CAM Efficacy

Of the three personality types studied, advocates are the only ones who had significant t-test results. Because the method used to conduct the study was intended to replicate the conditions of CAM, the researcher can conclude that, of the three personality types studied, advocates will find CAM most effective. This means that introverted individuals, who use an intuitive thinking process, base decisions off of emotion, and prefer a more structured lifestyle are more responsive to CAM.

It was originally hypothesized that the protagonist would find CAM most effective, however, this hypothesis is not far off from the actual results. Advocates share a majority of their traits with the protagonist, the only difference is that advocates are introverted and protagonists are extroverted. Therefore, the results of this study are comparable to those of similar studies, since the researcher's hypothesis is based on previous research. Other research agrees that individuals who use an intuitive thinking process and base decision on emotion have a preference for CAM (Olchowska-Kotala, 2013; Sirois and Purc-Stephenson, 2008; Austin, 1998; Lindeman, 2011; Jeswani and Furnham, 2010). However, it is surprising that the protagonist did not respond positively to the placebo treatment in a significant way since, in previous studies, it is agreed that extroverts respond to positive expectations, like those given in this study (Jaksic et al., 2012; Darragh et al., 2014; Kottow, 1992).

Questionnaire

Results from the questionnaire show that while about half of the participants have previously used CAM, only one was familiar with the term. This shows that the age group of

16-18 is generally unfamiliar with CAM, and previous knowledge of CAM did not bias their responses.

It is evident from the questionnaire that CAM is most likely used by individuals for more minor or mental health related ailments, like allergies and anxiety. Additionally, none of the CAM users reported having no ailments or that their health is excellent, showing that CAM is used primarily by those with underlying conditions. Of the non-CAM users it is clear that they are less prone to weekly ailments with 33% claiming to experience no health issues on a weekly basis. Additionally, non-CAM users generally gave more positive health ratings, however, due to a limited sample size it is difficult to draw conclusions on the reason an individual may or may not utilize CAM.

Conclusion

This study met the objective, defined in the literature review, of finding what personality types, as assessed from the NERIS-te, are more prone to report positive results from CAM as prompted by others. Through this research, it can be assumed that individuals having an advocate personality type- introverted individuals, who use an intuitive thinking process, base decisions off of emotion, and prefer a more structured lifestyle- will respond positively to CAM.

Implications

While the sample size limits this study, this research still includes valuable information that can be employed to help effectively practice CAM alongside traditional medicine. As asserted by Paul Enck et al., better knowledge of a patient- which, as this study shows, can be done through a personality test- and the systematic use of placebo mechanisms, based on what is known about the patient's personality, can improve the efficacy of a treatment (Enck et al.,

2013). Therefore, this study may allow doctors to prescribe CAM treatments to individuals who have an advocate personality type because they likely will respond the most positively to the CAM treatment, as found through this research. Additionally, through this investigation, doctors know not to prescribe CAM to the protagonist or mediator patients because they are not observed to react positively towards it.

Limitations

Due to limited resources, there are some limitations to this study's sample and method. The sample for this research has restrictions with only 13 participants, of which only two were male. The researcher was unable to gather the desired sample size of 30 or more participants, even with extensive advertisement and incentives given. Consequently, there are limitations in the researcher's ability to conclude personality's effect on CAM efficacy; there were only 3 to 5 representatives for a fraction of the personality types. Additionally, while the method of a control trial followed by a test trial was adopted from Handley et al's. researcher, this approach has the potential to create bias in participant's pain ratings during the test trial. Therefore, it is in the interest of future researchers to replicate this study with a separate control and test group for the future continuation of this study's inquiry with more resources.

Call for Future Research

Due to this study's limited sample size, the researcher could not evaluate all 16 personality types; therefore, it is in the interest of future researchers to study all 16 NERIS-te personality types and how they impact CAM's efficacy. By doing so, there will be a better understanding of how personality affects the effectiveness of CAM. Additionally, future research should compare personality tests to see if the assessment type also has an impact. Future

researchers should use a larger sample size to draw more conclusive results if they continue this research.

Additionally, researchers need to conduct future investigations on the effects of CAMs' integration into the medical system. While this study is critical for understanding how to integrate CAM, more research needs to focus on if CAMs' use by the medical system is advantageous to society. While this research shows that CAM can help reduce pain, the full extent of CAMs' capabilities is unknown. Therefore, after there is a better understanding of who is responsive to CAM, further research needs to be conducted on how to integrate CAM into the medical system. Further research will eventually help doctors better understand CAM and how to effectively prescribe it to their patients, creating a more personalized and effective health care system.

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Appendix A

NERIS Type Explorer Test

You enjoy vibrant social events with lots of people.

You often spend time exploring unrealistic yet intriguing ideas.

Your travel plans are more likely to look like a rough list of ideas than a detailed itinerary.

You often think about what you should have said in a conversation long after it has taken place.

If your friend is sad about something, your first instinct is to support them emotionally, not try to solve their problem.

People can rarely upset you.

You often rely on other people to be the ones to start a conversation and keep it going.

If you have to temporarily put your plans on hold, you make sure it is your top priority to get back on track as soon as possible.

You rarely worry if you made a good impression on someone you met.

It would be a challenge for you to spend the whole weekend all by yourself without feeling bored.

You are more of a detail-oriented than a big picture person.

You are very affectionate with people you care about.

You have a careful and methodical approach to life.

You are still bothered by the mistakes you made a long time ago.

At parties and similar events you can mostly be found farther away from the action.

You often find it difficult to relate to people who let their emotions guide them.

When looking for a movie to watch, you can spend ages browsing the catalog.

You can stay calm under a lot of pressure.

When in a group of people you do not know, you have no problem jumping right into their conversation.

When you sleep, your dreams tend to be bizarre and fantastical.

In your opinion, it is sometimes OK to step on others to get ahead in life.

You are dedicated and focused on your goals, only rarely getting sidetracked.

If you make a mistake, you tend to start doubting yourself, your abilities, or your knowledge.

When at a social event, you rarely try to introduce yourself to new people and mostly talk to the ones you already know.

You usually lose interest in a discussion when it gets philosophical.

You would never let yourself cry in front of others.

You feel more drawn to places with a bustling and busy atmosphere than to more quiet and intimate ones.

You like discussing different views and theories on what the world could look like in the future.

When it comes to making life-changing choices, you mostly listen to your heart rather than your head.

You cannot imagine yourself dedicating your life to the study of something that you cannot see, touch, or experience.

You usually prefer to get your revenge rather than forgive.

You often make decisions on a whim.

The time you spend by yourself often ends up being more interesting and satisfying than the time you spend with other people.

You often put special effort into interpreting the real meaning or the message of a song or a movie.

You always know exactly what you want.

You rarely think back on the choices you made and wonder what you could have done differently.

When in a public place, you usually stick to quieter and less crowded areas.

You tend to focus on present realities rather than future possibilities.

You often have a hard time understanding other people's feelings.

When starting to work on a project, you prefer to make as many decisions upfront as possible.

When you know someone thinks highly of you, you also wonder how long it will be until they become disappointed in you

.

You feel comfortable just walking up to someone you find interesting and striking up a conversation.

You often drift away into daydreaming about various ideas or scenarios.

You look after yourself first, and others come in second.

Even when you have planned a particular daily routine, you usually just end up doing what you feel like at any given moment.

Your mood can change very quickly.

You often contemplate the reasons for human existence or the meaning of life.

You often talk about your own feelings and emotions.

You have got detailed education or career development plans stretching several years into the future.

You rarely dwell on your regrets.

Spending time in a dynamic atmosphere with lots of people around quickly makes you feel drained and in need of a getaway.

You see yourself as more of a realist than a visionary.

You find it easy to empathize with a person who has gone through something you never have.

Your personal work style is closer to spontaneous bursts of energy than to organized and consistent efforts.

Your emotions control you more than you control them.

After a long and exhausting week, a fun party is just what you need.

You frequently find yourself wondering how technological advancement could change everyday life.

You always consider how your actions might affect other people before doing something.

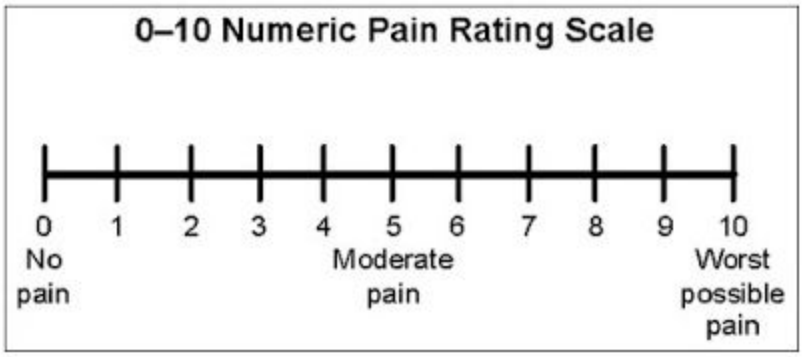
You still honor the commitments you have made even if you have a change of heart.

You rarely feel insecure.

Appendix B

Pain-Scales

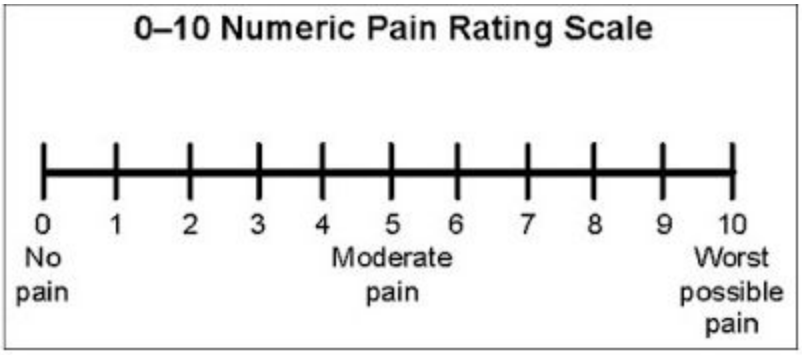
1. **Name (first and last)**



2. **30 seconds: Rate pain** *

Mark only one oval.

- 0 (No pain)
- 1
- 2
- 3
- 4
- 5 (Moderate pain)
- 6
- 7
- 8
- 9
- 10 (Worst pain possible)



3. **60 seconds: Rate pain** *

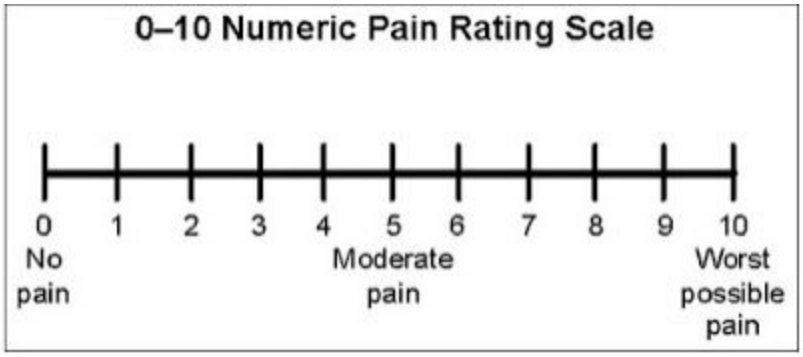
Mark only one oval.

- ◯ 0 (No pain)
- ◯ 1
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 (Moderate pain)
- ◯ 6
- ◯ 7
- ◯ 8
- ◯ 9
- ◯ 10 (Worst pain possible)

4. **90 seconds: Rate pain** *

Mark only one oval.

- ◯ 0 (No pain)
- ◯ 1
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5 (Moderate pain)
- ◯ 6
- ◯ 7
- ◯ 8
- ◯ 9
- ◯ 10 (Worst pain possible)



5. **After removing hand: Rate pain** *

Mark only one oval.

- 0 (No pain)
- 1
- 2
- 3
- 4
- 5 (Moderate pain)
- 6
- 7
- 8
- 9
- 10 (Worst pain possible)

Appendix C

Post-Experiment Questionnaire

1. **Name (first and last)**

_____

2. **Mark all treatments you have used prior**
Check all that apply.

- [ ] Chiropractics
- [ ] Herbal medicine
- [ ] Art/Music therapy
- [ ] Mega-vitamins (to treat an illness)
- [ ] Homeopathy
- [ ] Psychotherapy
- [ ] Reflexology
- [ ] Massage therapy
- [ ] None of the above
- [ ] Other: _____

3. **Mark all of the health problems you experience at least once a week**
Check all that apply.

- [ ] Chronic pain
- [ ] Anxiety
- [ ] Muscle strains
- [ ] Severe headaches
- [ ] Depression
- [ ] Digestive problems
- [ ] Allergies
- [ ] Insomnia
- [ ] Other: _____

4. **Would you say that your health in general is**
Mark only one oval.

- ◯ Excellent
- ◯ Very good
- ◯ Good
- ◯ Fair
- ◯ Poor

5. **Have you ever used Complementary and Alternative Medicine?**
Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ Maybe