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# Mindfulness and its Ability to Alleviate State and Trait Anxiety in College Students

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http://foodmatters.tv/images/assets/meditation.jpg

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**Abstract**: Society today puts extreme pressure on individuals to take on a magnitude of daily responsibilities in order to be successful. We are pushed beyond our limits both mentally and physically, which results in heightened state and trait anxiety. Adopting the theory of mindfulness teaches us to live in the present moment and not criticize our thoughts (Bormann et. al, 2013). The current study tests the effects of daily mindfulness meditation on state and trait anxiety as measured by the State-Trait Anxiety Inventory. Participants were Trinity College students that engaged in formal meditation sessions twice a week, but maintained the practice on their own every day. Students completed the State-Trait Anxiety Inventory before the first session began and after their sixth session. The inventory was also given before and after the fourth session. Based on past research, it was hypothesized that the participants that engaged in daily mindfulness meditation for six weeks would have a reduction in trait anxiety when compared to the control group. It was also hypothesized that the participants would see a reduction in state anxiety when measured before and after the meditation session. If mindfulness meditation is proved to be a significant reduction method for state and trait anxiety, this easy to learn lifestyle can be an effective alternative to medication.

**Purpose**: With the extremely high prevalence level of anxiety in college students, it is important to consider all options when treating these issues. Coinciding with our society and wanting a "quick fix," many students look for pharmaceutical options first (McManus et. al, 2012). It is simple to receive a prescription for anxiety medication from a primary care physician or psychiatrist after listing a few symptoms. This can be problematic because it is not teaching the student how to cope with life stressors and how to solve core issues that they are experiencing. Practices of mindfulness are successful ways to treat anxiety because they provide effective ways to interpret and deal with potentially uncomfortable or harmful situations by allowing acceptance instead of judgment (Chen et. al, 2012). Since meditation and other mindfulness practices, such as yoga, are relatively easy to learn, this experiment may support another behavioral technique to treat their patients with state or trait anxiety.

**Introduction**: Today, society in the United States is filled with stress and competition. There is considerable pressure to stand out and be the best. We have to go to the best schools and get the best grades so we can obtain the best jobs and make the most amount of money. We are constantly looking for qualities or opportunities that will give us an advantage over others. The tremendous societal pressure to stand out from our competitors makes us incredibly critical of our thoughts and actions (Goldin et. al, 2009). We process failures much more strongly than successes. This can prevent alternate opportunities for success, and make us not seem as competent to family, friends and employers. Children are bragged about based on a letter grade received instead of the amount of material learned. Adults feel more confident in their beings for having luxurious homes, cars, and vacation spots.

People may feel selfish and guilty for choosing professions that are less profitable, and will sacrifice their passion in order to fit our distorted view of happiness. Many members of Corporate America work over forty hours a week in order to climb the chain of command and attain the title of CEO. This complicates balancing time spent with family and friends, and engaging in pleasurable and relaxing hobbies. In order to create a family and have the means to provide for it, we take on more responsibilities than we can handle. Our view of success requires being constantly on the go, which leads people to exhaust themselves every day, both mentally and physically.

With this engrained lifestyle, it is so rare that one stops to appreciate a moment in time or a simple object in nature. Our worries are often future oriented, and society's want for the next best thing leads us to be only attracted to flashy objects of the highest technology (Evans et. al, 2008). Our eyes are looking so far forward in order to grab the

next opportunity that life's genuine moments pass us by. We are constantly pulled in many directions and therefore spread our thoughts over our different tasks and chores of the day. The additional stress brought about by this demanding way of life increases anxiety, which has detrimental effects on the functioning of our mental and physical capacity.

An individual with anxiety may think that he will get fired from his job and therefore not be able to provide for his family if he does not put in a seventy hour work week and will ruminate about these distressful potential scenarios (Walsh et. al, 2009). His inability to judge situations rationally and his willingness to sacrifice time spent sleeping, relaxing or with family shows how anxiety can push someone beyond their means. Anxiety also affects one's ability to accurately perceive social situations. It has been seen to bring about intense fear of being evaluated or judged by others, harsh criticism of the self, and the sense that you are constantly being watched and condemned throughout the entire situation.

Anxiety affects one's ability to regulate emotions, react appropriately to external stimuli and relate to others (Goldin et. al, 2009). Common tendencies of anxious individuals include focused attention to danger, repetitive and negative thinking, self-focused attention, tension, hyper-arousal, avoidance, and deficiencies in emotion regulation (Vollestad et. al, 2011). In particular, social anxiety disorder has an especially early onset, and can lead to increased school dropout, poor social assimilation and increased comorbidity with other psychological disorders (Goldin et. al, 2009). Having anxiety can lead one to overestimate the danger of a situation and its possible negative results (Chen et. al, 2012). Anxious individuals are more likely to detect threat than

individuals without anxiety issues, and are also more likely to interpret ambiguous stimuli as threatening when another individual may seem them as neutral (Walsh et. al, 2009). Anxiety can be seen as a product of classical conditioning in which a previously neutral stimulus brings about an intense fear in the individual. People with high levels of anxiety or anxiety disorders often overestimate the dangers and consequences of a situation (Chen et. al, 2012).

The distorted cognitions brought about by anxiety can lead to psychological disorders and issues that can affect one's ability to function in every day life (Goldin et. al, 2009). Irrational fears of people, places, or things can cause individuals to avoid certain activities and cause themselves to become more socially isolated (Vollestad et. al, 2011). This can debilitate one's independence and could also cause depression. Anxiety has also shown to cause many changes in our biological functioning. It causes an increase in one's respiration rate, and brings about hyperventilation and the false suffocation alarm, which are two conditions that leave the individual unable to breathe (Chen et. al, 2012). These maladaptive aspects of biological functioning can cause more severe and longer lasting health problems such as high blood pressure and heart attacks.

Mindfulness is a theory and practice that helps us be calm and in tune with our true thoughts. Mindfulness teaches us to live in the now, appreciate the present moment and to not fill our minds with judgment as we simply let life and its experiences happen (Wahl et. al, 2013). This practice helps focus our thoughts on what is currently happening, instead of worrying about yesterday or tomorrow. Mindfulness helps redirect any wandering attention back to the present. When trying to meditate or concentrate on our breathing or one word, we are taught to accept our thoughts and be forgiving if our

mind does shift to lingering responsibilities (Bormann et. al, 2013). If we become mindful and focus on our present thought instead of looking ahead or behind, our mind will be a lot more powerful when all of its effort it put towards one task.

Mindfulness allows the mind to be focused, and allows the individual to be calm when approaching the many obligations each day brings. This practice can teach us appropriate ways to handle situations as they happen by avoiding misinterpretations. Individuals are taught to accept and not judge the objects in their environment. This is especially important for perceived negative stimuli such as upsetting personal thoughts. Mindfulness has shown its benefits in past research as it has been able to reduce negative emotion and psychopathology in patients (Arch & Craske, 2010). Processing life in a mindful manner involves an accepting observation of any internal and external stimuli as they come into the present moment. We are taught to see upsetting thoughts as temporary instead of facts or accurate portrayals of the moment (Wahl et. al, 2013). If one is able to become aware and not be critical of a dramatic reaction he or she had in a situation, it will give the mind more patience to interpret the stimuli as they are in reality instead of what the mind can create them to be.

The practice of mindfulness emphasizes our need to be patient with ourselves. People with large amounts of stress in their life become overwhelmed very easily and habitually act in theatrical ways and react to others acting this way, because they might not have the time to truly evaluate apprehended dangers of the situation (Goldin et. al, 2009). Anxious behaviors, such as rumination and fantasizing prevents individuals from obtaining this mindful mindset (Walsh et. al, 2009). Mindfulness allows a present acceptance of a situation instead of an overbearing fear of what could have happened or

what might happen. Mindfulness based interventions help individuals expose themselves until they are desensitized to internal events that would normally be avoided or suppressed (Vollestad et. al, 2011). If we are able to focus on the present and not have distorted interpretations of reality and the stimuli that arise, we are strengthening our ability to balance all of the responsibilities in our lives. Engaging in mindful behaviors, such as meditation, can teach us to have moment-to-moment, non-judgmental awareness of the contents of our mind (Evans et. al, 2008). The practice of mindfulness will reduce stress by giving individuals effective coping strategies for upsetting internal and external stimuli.

A practice of mindfulness that is extremely beneficial for all individuals is meditation. Meditation is a method of therapy that avoids side effects of medication and the stigma of seeking mental health care. It is also a treatment that can be done in your own home for free. During meditation, the individual is trained mentally to consciously calm and empty the mind so that he or she can achieve inner peace and harmony and reach a state of detached observation or restful alertness. Meditation looks at and challenges one's ability to "let go" and separate themselves from any stressors or thoughts weighing them down (Arch & Craske, 2010). The main goal of meditation is for the individual to be accepting of the process, instead of judgmental of a fixed end result. Meditation has consistently shown its positive neurobiological effects. Meditation reduces levels of cortisol as well as catecholamine such as epinephrine and norepinephrine that can be responsible for biologically based anxiety such as increased adrenaline and heightened fear. (Chen et. al, 2012).

Meditation and its calming practices have been shown to be extremely helpful in reducing symptoms of anxiety for patients with mental health concerns. Meditation and other mindfulness practices, such as yoga, have been shown to improve one's mood, increase resiliency to chronic and acute stress and enhance one's performance on cognitive, psychomotor and psychical tasks (Khalsa et. al, 2009). The mental training learned through meditation allows the individual to enter a calm state that reduces his or her anxiety while developing beneficial coping strategies to everyday stress (Chen et. al, 2012). Mindfulness meditation and its emphasis on present moment focus without exaggerated evaluation help the individual not fall victim to heightened mental states. Mindfulness meditation is often used in mindfulness based stress reduction (MBSR), which has been shown to reduce self-referential processing (SRP) and self-rumination (Goldin et. al, 2009). There are many examples of how meditation and other practices of mindfulness have been incredibly therapeutic for patients with anxious thoughts and anxiety disorders.

Khalsa et. al (2009) conducted a study on young professional musicians that are placed under a high stress environment with the unpredictable work and travel schedule. This population was also of interest because most musicians experience performance anxiety and others experience performance related musculoskeletal conditions that can decrease their level of ability. This has been shown to perpetuate the performance anxiety and cause the musicians to think less of themselves and their talent. These students were provided with an 8-week meditation course. After the course was completed, participants showed significant reduction in performance anxiety, where the control group showed no change.

Another aspect to the experiment is that some of the musicians adopted a yoga lifestyle in which they had a weekly problem solving group discussion before their yoga sessions. The yoga sessions focused on different postures and breath control. The group discussions allowed the students to express any difficulties they had while being mindful and practicing yoga and meditation. They were also able to express and concerns about their musical performances and career paths. It was found that the participants in the yoga groups had decreased anger and hostility, as well as performance anxiety, where the level of anxiety in the control group stayed the same (Khalsa et. al, 2009).

Goldin et al. (2009) created a study that used fMRI to see if there were any changes from the mindfulness based stress reduction exercises. They looked to see if there were any changes in clinical symptoms and behavioral issues. The participants had eight 2.5-hour meditation sessions once a week. They were given audiotapes in order to practice at home every day. The participants also had a half-day meditation retreat after their sixth week.

When asked to come into the present moment and have self-awareness, participants that were trained in mindfulness meditation showed reduced brain responses in their amygala, which is responsible for fear and heightened emotions. They also showed increased responses in brain regions that are involved with cognitive control, such as the dorsal and ventrolateral prefrontal cortex; visceral responses, such as the posterior insular cortex and somatosensory cortex; and brain regions associated with attention, such as the inferior parietal lobule (Goldin et. al, 2009). After the experiment, patients that received the meditation exercises had less social anxiety, depression, rumination and state anxiety. They also saw an increase in self-esteem. It was also found

that the mindfulness meditation reduced negative self-views and increased positive ones when looking at the patients' self-referential processing. The practices of mindfulness can help correct delusional self-views that are often seen in Social Anxiety Disorder. Mindfulness helps the patients become nonjudgmental of their thoughts and actions and teach them to accept them and interpret them for what they are in that moment.

Bormann et al. (2013) conducted an intervention for veterans that had been diagnosed with post-traumatic stress disorder (PTSD). These researchers used practices of mindfulness that taught the veterans to become better focused on the present moment and to not be judgmental of their experiences. They thought mindfulness would be a beneficial lifestyle for the veterans to adopt in order for them to become more conscious, tolerant and accepting of their symptoms of PTSD. The experiment involved meditation with a mantra, which is a word or short phrase that the participants repeat over and over in a calming manner. Practicing with a mantra as often as possible is encouraged so the process becomes more automatic. Mantra meditation has been shown to distract individuals from negative emotions and can therefore reduce and emotional distress.

All of the veterans received talk therapy and medication treatments, but half also were enrolled in a mantra repetition program (MRP). These veterans in the experimental group had ninety-minute group sessions for six weeks. These sessions were comprised of discussion groups, lectures, and the participants had homework assignments from a required text. The participants in the experimental group had significant reductions in depression compared to the control group. They also showed an increase in quality of life and spirituality. The experiment showed to be extremely effective on hyper arousal

symptoms. The mindfulness skills learned from the mantra meditation helped the veterans self regulate their symptoms of arousal (Bormann et al, 2013).

Wahl et. al (2013) conducted a study on the effects of mindfulness on patients with obsessive compulsive disorder (OCD). The researchers felt a mindfulness attitude would be beneficial for this population because calling awareness to obsessive thoughts and compulsive behaviors may help the patients resist automatically falling susceptible to any distorted cognitions. It would also be beneficial to teach these patients that disturbing thoughts are temporary instead of factual, so they can eventually learn that their obsessions are exaggerated in their minds. This will help them cope with an obsession and eventually be able to let it go. Thirty patients diagnosed with obsessive-compulsive disorder were asked to listen to their own obsessive thoughts through headphones at different conditions. During the experimental condition, the participants were asked to use a mindfulness-based strategy while listening to their obsessive thoughts. The mindfulness-based strategies came to the participants in forms of three phrases on PowerPoint slides. The phrases read: "(1) 'Thoughts are thoughts and not facts.' (2) 'Become aware of your thoughts at this moment' (3) 'Let your thoughts pass by like clouds in the sky'" (pg. 756).

Participants exposed to these mindfulness-based strategies while listening to their obsessive thoughts showed a significant reduction in anxiety and urge to neutralize, compared to the control group who used methods of distraction. The researchers concluded that focusing on one's obsessive thoughts and being able to see them as passing and temporary objects is an effective treatment in reducing anxiety (Wahl et. al, 2013).

Before conducting their own study, Rees et. al (2013) investigated a study done in Vietnam on eighteen veterans that reported transcendental meditation was more effective that psychotherapy in reducing their anxiety, depression, insomnia, alcohol abuse, reactivity to stress and symptoms of post traumatic stress disorder. Rees et. al (2013) investigated if similar results would be found when observing Congolese refugees. A certified teacher taught a group of refugees transcendental meditation, which consisted of a one hour introductory lecture, a one and a half hour personal lesson on the meditation practices, and three follow up sessions that lasted two hours each.

The group that received transcendental meditation dropped thirty-six points on the post-traumatic stress disorder checklist, civilian version (PCL-C) after thirty days. The experimental group dropped thirty-eight points after 135 days. Members of the control group saw no reduction in points scored on the scale (Rees et. al, 2013). The researchers found that this significant drop in points was much greater than when any other type of therapy has been used. When cognitive processing therapy was used on a population with post-traumatic stress disorder, the researchers only saw a nine point drop on the scale. Researchers that used biofeedback therapy did not find any reduction on the scale when working with patients of this population.

In 2012, McManus and colleagues conducted a study to see how effective mindfulness based cognitive therapy (MBCT) would be for people with hypochondriasis, also known as severe health anxiety. They ran a program in which the participants became aware of their thoughts and feelings as they intentionally returned focus to a specific object or motion, such as their breathing or sensations. Participants had two-hour sessions once a week for eight weeks. They were also given six homework assignments a

week that took around an hour. The assignments consisted of routine meditation practices and other mindfulness exercises. The participants were taught to be mindful and be aware of what they experience in each moment, but not judge it. This was especially important as they encountered feelings of anxiety because they were able to see when negative thoughts were about to enter their minds.

The MBCT doesn't aim to change the patients' thoughts, but instead change their relationship to the thoughts as they have them. With hypochondriasis, the mindfulness teaches the patients to distinguish their fears of body sensations from the actual sensations. The patient is taught to pay attention to and seek out details of the sensations and see how the mind and body react to them differently. This helps the patient realize the power of the mind and how it can enhance anxiety around feelings that the body is okay with and can handle. MBCT teaches patients to point out their delusional thoughts as they start to form, and then "de-center" from them as they enter the mindful mindset that thoughts are temporary events. The participants were calmed as they were able to reduce rumination and no longer see anxious thoughts as reality. After the program ended, the experimental group that received the MBCT had significant reductions in health anxiety compared to the control group. Half of the patients in the experimental group no longer met the requirements for hypochondriasis, and could remove the diagnosis (McManus et. al, 2012).

Vollestad et. al (2011) conducted a study for eight weeks to see the effects of mindfulness based stress reduction (MSBR) for patients with panic disorder with or without agoraphobia, social anxiety disorder and generalized anxiety disorder. The experimental group was given reading material that introduced the theory of mindfulness,

the psychology and physiology of stress and anxiety, and ways in which mindfulness practices that are brought into every day life can provide healthy responses to stressors. The experimental group also participated in mindfulness exercises during group meetings, such as body scans, sitting meditation, attention to breath and mindful movements. Group sessions also consisted of group discussions as well as more intimate sharing times with one or two other individuals. The participants had homework in between group sessions where they kept a journal of the mindfulness practices that they were required to complete every day. There was also a retreat after the sixth session in which the participants meditated for half of a day. All patients in the experimental group had a significant decrease in anxiety symptoms, regardless of their anxiety disorder when compared to the control group. Mindfulness based stress reduction reduced negative and repetitive thinking, and increased trait mindfulness.

In 2010, Arch and Craske created an experiment that compared the responses to different tasks of patients with diagnosed panic disorder with or without agoraphobia, social anxiety disorder, or specific phobia. The experimenters aimed to look at trait mindfulness and how it affected responses to anxiety related tasks. The first area tested involved hyperventilation to see how the participants reacted to common physical and physiological sensations of anxiety, and their willingness to experience these feelings. The second task investigated the participants' willingness to continue an uncomfortable pattern of breathing into an analyzing device at a fast pace set by a metronome. They were instructed to endure the task as long as possible, with the maximum duration being three minutes. The next task the participants were asked to complete was a meditative relaxation task. Participants sat in comfortable chairs in a dimly lit room and were asked

to repeat a mantra in an effortless manner. After fifteen minutes the experimenter came into the room and administered different questionnaires that measured mindfulness.

The experimenters found that trait mindfulness influenced responses to anxiety related tasks. Those that had higher levels of trait mindfulness were more willing to endure the hyperventilation tasks for longer amounts of time. This shows how mindfulness allows individuals to be persistent and confident as they participate in unpredictable situations. The patients with higher levels of trait mindfulness were able to recognize the sensations of anxiety, but felt comfortable testing their limits because they knew the experiment would not lead to the inability to breathe or death. Behavioral willingness allows the individuals to pursue situations even when the outcome is unknown. In the relaxation tasks, the individuals with higher mindfulness scores were less afraid of relaxation and were able to meditate and become absorbed in the exercise for longer periods of time than were the individuals with low mindfulness scores. The ability to remain in the present moment is very telling of one's ability to relax, because it reflects whether the individual is able to let go of past and future worries. Arch and Craske (2010) found that healthy individuals had higher levels of mindfulness than those with anxiety disorders. Many thought processes and behaviors exhibited by anxious individuals prevent them from letting go of any stressors and having present moment focus.

The overwhelming evidence supporting significant reductions in symptoms and behaviors of anxiety shows how beneficial this method of treatment can be. Anxiety causes individuals to find danger in a situation that other individuals may see as neutral. Implementing mindfulness into one's everyday life helps one become more attentive to,

rational in, and accepting of any situation that comes their way. Mindfulness is an innovative and economic therapy that promotes a healthier lifestyle for all that partake, no matter the severity or course of one's mental health status.

**Method**: The participants of this experiment were current Trinity College students. Participants were recruited through announcements in Psychology classes, as well as through an email to a random sample of Trinity College students provided by James Hughes.

The experimental group originally was fourteen individuals, but three dropped the experiment before the six weeks concluded. Eleven individuals attended sessions of mindfulness meditation on two afternoons a week for six weeks. The sessions were held in the Meditation Room of the Counseling Center at Trinity College and were led by Dr. Randolph Lee, or myself. The sessions lasted for twenty to thirty minutes as the facilitator guided the students through meditation. The facilitator's involvement decreased as the sessions progressed. The first few sessions involved reminders every few minutes to stay in the moment and not let outside noises be distracters. By the last few weeks, the facilitator only did an introduction and then the participants were able to meditate on their own for twelve to fifteen minutes in pure silence.

After the first session where the theory mindfulness was introduced and the practice of meditation was shown, the students were asked to engage in this practice on their own every day, in addition to attending the sessions when possible. After giving informed consent, the participants of the experimental group were given the State-Trait Anxiety Inventory (STAI) before their first session of meditation and after their last session is over during the sixth week. They were also given the inventory before and after one of the sessions during the fourth week. Students were asked periodically throughout the six weeks if they were meditating every day and if they encountered any difficulties or had any questions with the practice.

The control group was Trinity College students that do not engage in any mindfulness practices or exercise more than three times a week, and were asked to maintain this throughout the duration of the experiment. There were originally thirteen students in this group, but one dropped the experiment before the conclusion of the sixth week. After giving informed consent, the students completed the STAI during their free time in the first week, as well as six weeks later. They also completed the STAI before and after one of their classes is held.

**The State-Trait Anxiety Inventory (STAI)**: The participants of this experiment were given the State-Trait Anxiety Inventory (STAI), which is a self-report, 40-item questionnaire. The STAI looks at state anxiety, which is temporary and brought on by external stimuli. In college students, state anxiety can most commonly be seen before starting the first day of class or right before taking an exam. The STAI also looks at trait anxiety, which is affected by one's personality or internal characteristics. Trait anxiety is seen when an individual is consistently apprehensive, worried and frightened of what may come in the future. People with trait anxiety are thought to store schemas involving dangers and threats in their long-term memory, which influence any interpretations of present and future situations. They constantly elaborate on potentially harmful stimuli and fixate on the potential dangers, instead of adopting a mindful mindset and seeing the stimuli for what they truly are. The constant looking into the future and over interpreting of internal and external stimuli makes it more difficult for anxious individuals to be mindful (Walsh et. al, 2009).

The S-Anxiety scale, which focuses on state anxiety, gives twenty statements about how the participant feels at the current moment. He or she will answer based on a scale of "Not at All" to "Very Much So." The T-Anxiety scale that focuses on trait anxiety, gives twenty statements about how participants feel generally. The participants will answer based on a scale of "Almost Never" to "Almost Always" (Spielberger, 1989).

**Hypotheses**: Based on prior research, it was hypothesized that participating in the meditation sessions would reduce the amount of anxiety reported by the students. It was hypothesized that participants in the meditation sessions would have reduced state and trait anxiety, where as there would be no significant change in the control group. Further, it was hypothesized that there would be a greater reduction in state anxiety when the STAI was administered before and after the fourth week's session. It was hypothesized that trait anxiety would be lowered in participants after participation in the six weeks of meditation sessions.

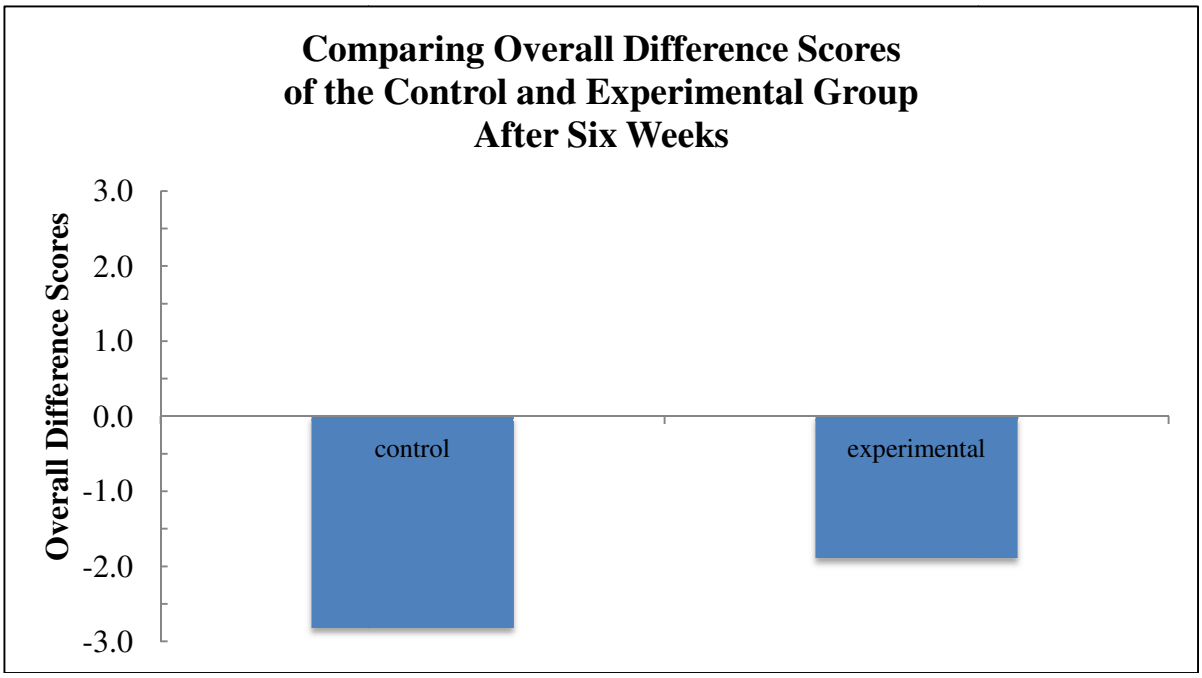
**Results**: It was predicted that students who incorporated mindfulness meditation into their lives every day for six weeks would experience a reduction in state and trait anxiety, where students of the control group would not see any significant changes. The dependent variable, scores of state and trait anxiety as defined by the STAI, was measured on a Likert scale from 1-4. State anxiety scores looked at responses that ranged from "not at all" to "very much so." Trait anxiety scores looked at responses that ranged from "almost never" to "almost always" (Spielberger, 1989). The independent variable of this experiment was the group of the participants. Students were either in the experimental group or the control group. Students of the control group attended meditation sessions once or twice a week, and meditated on their own every day for a period of six weeks. The control group had no additional responsibilities added to their weekly schedule.

An independent *t*-test was run in order to compare the overall STAI scores of the experimental group and the control group after both took the inventory for the first time. The mean score for the experimental group was 92.64 ($SD$ = 6.50), and the mean score for the control group was 86.42 ($SD$ = 13.82). There was no significant difference between these two scores $t$ (21)= -1.36, *ns*. This assures that the participants began the experiment with a relatively equal amount of anxiety.

The first hypothesis predicted participants in the experimental group to have a significant reduction in state and trait anxiety, as compared to the control group who would see no change. Difference scores were created by taking the overall score at the end of the six weeks and subtracting the overall score at the first week. This was done for both the experimental and control group. The mean difference score for the experimental

group was -1.90 *(SD*=6.30), and for the control group *M*=-2.83 (*SD*=10.94). An independent *t*-test was used to compare these difference scores to see if either the experimental or control group had a significant difference in anxiety levels after the six weeks. Neither the experimental or control group had a significant reduction in overall anxiety levels after the six weeks, *t* (20)= -0.24, *ns*.

*Figure 1.* Comparing Overall Difference Scores of the Control and Experimental Group After Six Weeks

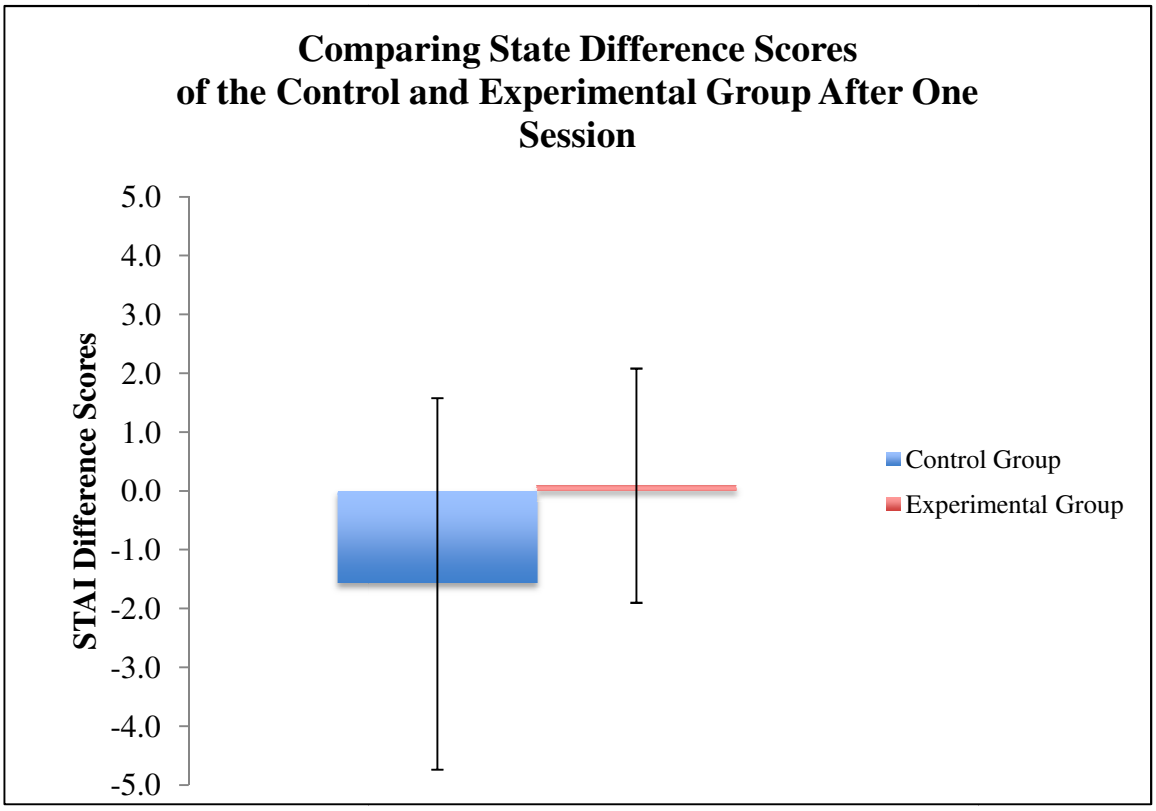



The second hypothesis expected a reduction in state anxiety for the experimental group when the STAI was administered before and after the meditation session during the fourth week. Difference scores for state anxiety were created by taking the state score at the end of the session and subtracting the state score from the beginning of the session. This was done for both the experimental and control group. A repeated-measures *t*-test

showed no significant difference between state anxiety scores when the experimental group took the STAI before and after a meditation session during the fourth week, *t* (10) = -.84, *ns*. The mean score for the experimental group was 0.09 (*SD* = 2.47), which shows that their anxiety levels actual rose by a small amount.

The same analysis was done for the control group, but the STAI was administered before and after one of their classes. There was also no significant difference in scores for the control group, *t* (11) = -.84, *ns*. The mean score for the control group was -1.58 (*SD* = 6.14). It was expected that the control group would see no reduction in state anxiety, but they had a greater reduction in anxiety than the experimental group, who's scores actually rose.

*Figure 2.* Comparing State Difference Scores of the Control and Experimental Group After One Session (±*SE*s)

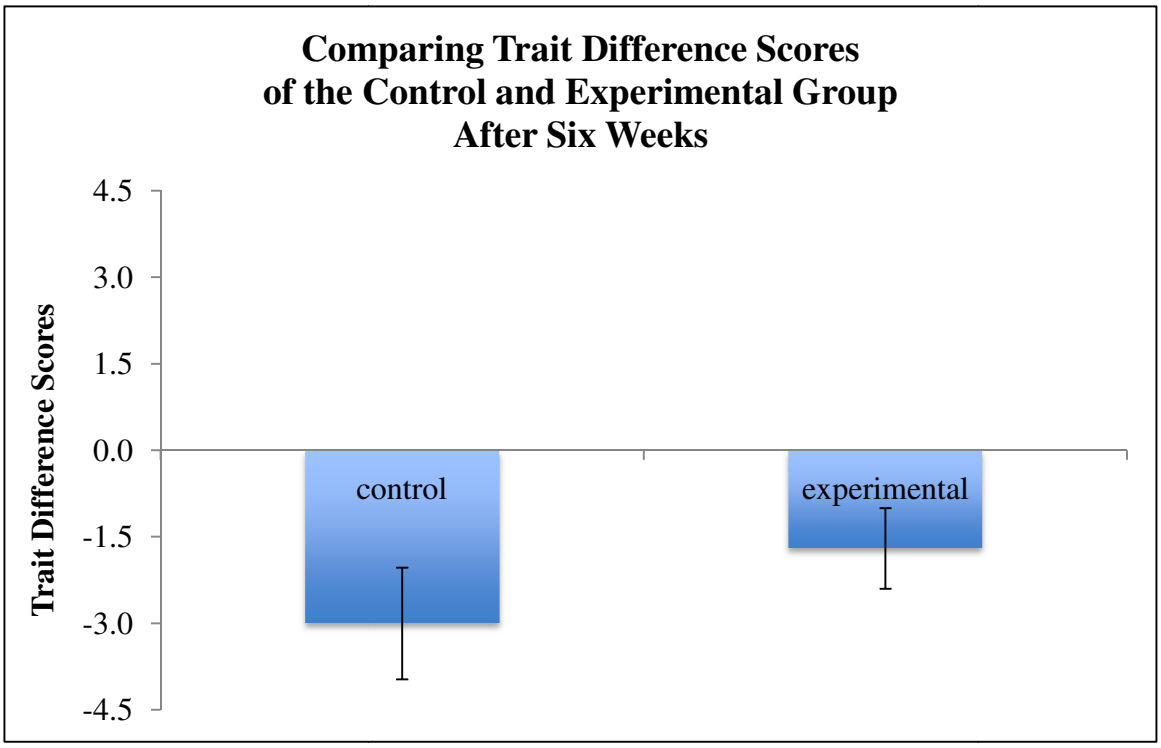


The third hypothesis stated that participants of the experimental group would have a reduction in state anxiety after mindfully meditating every day for six weeks. To validate this hypothesis, two tests were conducted. Difference scores were created for the experimental and control group to calculate changes in scores. The mean difference score for the experimental group was -1.90 *(SD*=6.30), and for the control group *M*=-2.83 (*SD*=10.94). While the data is not significant, this shows that the control group had a greater reduction in anxiety levels than the control group.

An independent t-test was run in order to see any significant reductions in overall anxiety levels from the first week to the sixth week. There was no significant difference between the experimental group and the control group when looking at the overall difference score of the STAI at the end of the six weeks, $t$ (20)= -0.24, *ns*.

A second analysis was done to compare the trait anxiety scores of the experimental group from the first week to those taken after the sixth week. A repeated-measures *t*-test showed that there was no significant effect of meditation on the overall STAI scores after the six weeks, $t$ (9) = 0.95, *ns*. There was also no significant difference between the experimental and control group at the end of six weeks in terms of the trait anxiety difference score, $t$ (20) = -1.05, *ns*.

*Figure 3.* Comparing Trait Difference Scores of the Control and Experimental Group After Six Weeks (±*SE*s)




Students of this experiment were separated into a experimental group and a control group. The experimental group meditated mindfully every day for six weeks. It was hypothesized that this intervention would reduce state and trait anxiety. The hypotheses of this experiment were not proven. Further research needs to be conducted to assure the effectiveness of mindfulness practices on reducing anxiety as an alternative to medication.

**Discussion**: Based on past research and the numerous experiments that demonstrate how an intervention teaching a mindful mindset reduces anxiety, it was predicted that this experiment would yield similar results. Three hypotheses were made in order to investigate that overall, state and trait anxiety levels would be reduced after meditating every day for six weeks. After looking at the effects of meditation and the theory of mindfulness on state and trait anxiety, the hypotheses were not supported. There were no statistically significant results in the data, and there are many possible explanations as to these findings.

The first analysis looked at the overall, state and trait anxiety scores of Spielberger and colleagues (1989) State Trait Anxiety Inventory (STAI) of the control group and the experimental group when the inventory was administered for the first time. This is a crucial analysis to run because it is important to ensure that both groups are starting off at similar levels of anxiety so the results at the end of the intervention can be compared fairly. It was found that there was no significant difference between the overall, state and trait anxiety scores on the STAI when the experimental and control groups were given the inventory at the beginning of the experiment.

The first hypothesis stated that participants in the meditation sessions would have a significant reduction in state and trait anxiety, as compared to the control group. Vollestad and colleagues (2011) used mindfulness-based stress reduction for patients with panic disorder with or without agoraphobia, social anxiety disorder and generalized anxiety disorder. After eight weeks, the participants in the experimental group had significant reductions in their anxiety symptoms when compared to the control group. The intervention of mindfulness especially reduced negative thinking and rumination.

The results from this experiment provide an example of how mindfulness reduces overall levels of anxiety.

After running the analyses of the current experiment, there was no significant difference between the experimental group and control group when looking at the overall difference score of the STAI at the end of the six weeks. While there was no significant decrease in anxiety levels, there was a trend in which both the experimental group and control group had lower STAI scores after the six weeks. The scores of the experimental group reduced by 1.9 points, and the scores of the control group reduced by 2.83 points. It is interesting to note a greater reduction in the control group because they were not exposed to any practices of mindfulness. A potential explanation for this finding was that the control group felt relaxed when filling out the inventory because they knew there was no intervention or change to their daily lives. The members of the experimental group may have felt pressure when filling out the STAI because they knew they were a part of an experiment. This notion is something worth exploring in future research.

A second analysis looked at the STAI scores of the experimental group at the first week, compared to those taken at the conclusion of the sixth week. It was hypothesized that there would be a significant reduction in STAI scores after the intervention of mindful meditation. While there was no significant effect of meditation on the overall STAI scores after six weeks, the trend indicated a slight reduction in STAI scores after the intervention. The average score taken at week one was 93.5, which lowered by 1.9 points to 91.6 by the sixth week. While this reduction is not statistically significant, this trend may reflect the beneficial effects of mindfulness and is promising for a future replication of this experiment.

The second hypothesis predicted that there would be a reduction in state anxiety for the experimental group when the STAI was administered before and after the meditation session of the fourth week. During analysis of this information, a repeated-measures t-test showed no significant difference between state anxiety scores when the experimental group took the STAI before and after a meditation session during their fourth week of participation. To further explore the data for this hypothesis, the STAI scores for state anxiety of the control group were compared to the state anxiety scores of the experimental group. While there was no statistically significant difference, the scores of the control group decreased by 1.58 points. The experimental group's scores actually increased by 0.09 points after meditating. These results oppose the predictions because it was hypothesized that the experimental group would feel a reduction in anxiety after meditating for twenty to thirty minutes.

While this trend is unexpected, there are plausible reasons for its existence. The students were asked to stay after the session for a few minutes while they completed the inventory. This delay could have conceivable raised their anxiety levels if they were worried about being late to their next commitment. Arch and Craske (2010) conducted an experiment that tested participants' responses to unpredictable situations that can provoke anxiety. They found that those with higher levels of mindfulness were able to last longer in tasks such as hyperventilation because while they recognized their fear, they were able to see these feelings as temporary and refocus their minds onto the reality of the present moment. Unlike the present experiment, the participants of the previous experiment were able to reduce their levels of state anxiety by using methods of mindfulness to regulate the potential harm of the moment.

Another possibility for these findings could be that during that week the participants had a significant amount of academic work, which made it more difficult to clear their minds or made them think about their responsibilities as soon as they stopped meditating. Khalsa and colleagues (2009) implemented an intervention of mindfulness in the lives of young musicians and found that participants with this exposure had reduced performance anxiety, where as the level of anxiety for the control group stayed the same. Their levels of state anxiety reduced, because the musicians were able to calm themselves in moments of extreme pressure. These results oppose the results of the current experiment, because Khalsa et. al (2009) lends evidence of how adopting a mindful lifestyle can reduce state anxiety. Meditation is an individual process and deciphering through the many potential reasons for the results found is difficult. People have their own experiences when meditating and while an increase in anxiety in the experimental group opposes past research, clearing one's mind can be difficult based on their situational circumstances.

The third hypothesis posited a reduction in trait anxiety for the participants of the experimental group after they engaged in six weeks of mindfulness meditation. No significant difference was found. However, there is a trend in the data that revealed both the control and experimental group experienced a reduction in trait anxiety scores after the six weeks. The trait anxiety scores for the experimental group reduced by 1.7 points, where as the trait anxiety scores for the control group reduced by 3 points. The data trends found are more consistent with findings in previous literature that supports the benefits of mindfulness. Achieving a statistically significant difference in trait anxiety should be a goal for future experiments.

McManus and colleagues (2012) implemented mindfulness based cognitive therapy in order to reduce symptoms for patients with health anxiety, also known as hypochondriasis. They found that their patients had reduced levels of rumination, which is a common component of trait anxiety. Participants were able to use the intervention of mindfulness in order to change their tendencies of anxious cognitions.

Another example is Bormann et. al (2013) having patients with post-traumatic stress disorder meditate in order to reduce their symptoms of anxiety. It was found that these participants were able to regulate their symptoms of arousal after incorporating meditation into their lives for six weeks. These results oppose the current findings because being able to refocus feelings of arousal and see a situation without any heightened emotion would reduce trait anxiety.

In the present experiment, a reduction in overall, state and trait anxiety scores of the STAI after participation for six weeks was expected. Mindfulness is an intervention that refocuses our expectations onto the present moment and allows us to see stimuli for what they are, instead of what our mind can create them to be. The three hypotheses were not proven with statistically significant results, and there are many explanations for these findings.

The sample size for this experiment may have been too small. The results would be more reliable if there was a large and diverse group of students to engage in the practices of mindfulness. If the experimental group and control group were comprised of students that had equal numbers from each gender, class year, and race, those variables could be controlled for, leaving anxiety levels to be the only variable in question. In order to increase the generalizability of the results, additional participants would be required.

It may have also been beneficial if the students could have participated in the experiment for a longer time period than six weeks. When initially meeting the participants, only two or three reported having meditating before. Meditation can be difficult for some people to grasp and the more time spent meditating, the more they will see therapeutic results. The faster one can enter a meditative state, the easier they can use this skill to self soothe during anxiety provoking situations in the future. This will allow them to transition from a state of panic to being able to focus on the present moment and not be judgmental of their thoughts.

While meditation sessions were held for the participants twice a week, the experiment required the participants to meditate on their own every day. It was difficult to monitor this, and was only measured through self-report. Self-report measures can be biased because participants often portray themselves more favorably and are reluctant to expose themselves not upholding the requirements of the experiment. The duration of the meditation sessions that the participants engage in on their own is another variable that could have affected the results. During the sessions formally held twice a week the length of the session was constant, but it is a variable that cannot be controlled while they are expected to practice on their own. It is also unknown if the participants meditated every day on their own, or if it was only a few days in addition to the formal sessions held. The amount of times during the week one meditates and the duration of their sessions can alter any change in state and trait anxiety levels. Meditation sessions should have been held every day and of sufficient duration to ensure that the participants incorporated the practices of mindfulness into their every day lives.

It is also important to ensure that the participants are meditating mindfully when practicing on their own. While a handout about the theory of mindfulness and the steps of meditation were distributed to the participants during the first session, if the students did not refer to it or lost it, it would be difficult to adopt the theory in their lives. Having meditation sessions every day would ensure that the meditation was conducted in accordance to the theory of mindfulness.

This experiment might not have had statistically significant results because there was not a way to screen for individuals with a diagnosable amount of anxiety. Students that experience normal levels of stress may see a reduction in state anxiety, but not see a difference in trait anxiety. Applying this experiment to a clinically anxious population would lend greater differences in STAI scores. While it is expected that the experimental group experienced reductions in overall, state and trait anxiety scores, it was predicted that the control group would exhibit no change. The changes in scores of the control group were not significant, but when comparing trends and differences in scores, they exhibit greater reductions than the experimental group when looking at overall, state and trait anxiety. This notion is interesting to explore because implementing an intervention of mindfulness for one group would imply a greater reduction in anxiety levels than a group with no intervention.

As previously demonstrated, mindfulness is an effective intervention in reducing the many types of anxiety experienced by people every day. Having the ability to see negative thoughts as temporary and refocus your mind away from distractions and back to the present moment allows us to not perceive potential harm as factual. Mindfulness also teaches us to not be judgmental of our thoughts and actions. This also reduces our

anxiety by eliminating time spent ruminating on thoughts and being self conscious of past behaviors. Although the present study did not support the numerous experiments that have already shown the anxiolytic effects of mindfulness practices, it is important to explore the ways in which this theory can reduce stress and anxiety.

Implementing a six week intervention of mindfulness meditation did not lend any statistically significant results when looking at state and trait anxiety for Trinity College students. However, it is important to continue studying the effects of meditation to see if it is indeed a reliable alternative to medication as has been proved in previous literature. In today's society, insurance companies limit how many therapy sessions a person can attend each year. It can be incredibly expensive for a person to maintain co-payments for each appointment and then pay for additional sessions out of pocket if they require help more frequently. It is also taxing to refill prescriptions each month. Practices of mindfulness, such as meditation and yoga, are free and easy to learn methods that can produce some of the same calming effects as medication.

Mindfulness should be taught in elementary school to all children, so they are able to absorb the theory and implement the practices into their lives from a young age. Practices of mindfulness can benefit every individual, regardless of the severity of their daily issues. Society tries to keep us focused on the future and attaining the newest product (Evans et. al, 2008); however, it is so important to appreciate the present moment exactly how it is. We need to lose all criticism, and be accepting of the many mistakes we will make in life.

In the future, society needs to look at mental illnesses and emphasize how they also affect us physically. It is important for researchers to study further the connection

between our mind and our body in order to discover alternative methods of treatment. Having anxious thoughts can lead to physical outcomes such as sweating and increased heart rate (Chen et. al, 2012). Finding a way to calm one's mind can simultaneously relieve the body from physical excitation. Patients should have as many options as possible to decrease distress and further research on mindfulness will strengthen the theory as an alternative to medication.

**Limitations**: While this experiment provides an effective way to look at the effects mindfulness has on state and trait anxiety, there are some limitations that can be improved upon when the experiment is replicated. One limitation is the number of participants. While it is difficult to attain dozens of college students for a six-week commitment, having more participants would ensure more reliable results. While many efforts were made to recruit participants, if the experiment was replicated, the experimenter should look to more students for participation. Also in regards to the participants, there ideally should have been an equal number of men and women, and an equal number of both from every class. This would allow the variables of gender and class year to be controlled instead of a possible confound.

Another limitation is that there was no way to measure if the participants were actually meditating every day. My advisor and I asked the participants weekly if they were, but self-report is not always a valid measure of participation. If this experiment was replicated, it would be recommended to have meditation sessions every day to ensure everyone was being mindful for enough time each day, without the distractions of their regular routines.

If this experiment could be replicated, I would recommend looking at college-aged students with diagnosable anxiety disorders, or a significant amount of anxiety. This was a piece of information that I was not able to collect or screen for as an investigator, but believe that mindfulness would have more of an impact on the participants if we could see a greater reduction in anxiety level. While this experiment has been beneficial for the participants, there are many areas of improvement if it could be replicated in the future.

**Conclusion**: The theory of mindfulness lends messages in which every individual should base their outlook on life. Society today is filled with pressure to attain perfection and our critical nature can be damaging to one's self image and increase one's level of anxiety and self-consciousness. We are constantly probed to focus on the future to see what opportunities we can next attain that will set us above our peers. This causes us to lose sight of the present moment and not appreciate stimuli for what they are.

Regardless of the amount of anxiety experienced, adapting this ideology allows each individual to not be judgmental of his or her hesitancy during moments of worry. Although there were no significant findings from this experiment, past research gives endless interventions that demonstrate the calming nature of the theory and how it reduces levels of anxiety. Meditating every day in a mindful manner is a way for individuals to learn how to be in the present moment without letting judgments of past and future perceptions interfere with their focus.

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