Does Locus of Control Influence the Effectiveness of Guided vs. Self-Guided Meditation?

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Abstract

Locus of control (LOC) refers to the extent to which individuals believe they are in control of their actions. Individuals with internal LOC believe they are in control of their actions, and those with external LOC believe that environmental factors are more responsible. Research has found that individuals with different LOC have different responses to stress. The aim of this study was to determine if LOC affected participants’ stress levels after guided or self-directed meditation. Participants were 46 undergraduate students, categorized as having internal/external LOC using Rotter’s Locus of Control Scale. Stress was induced through the Sing-a-Song Stress task, and stress was measured via both heart rate and self-report. Following the stressor, participants received five minutes of guided or self-directed meditation. A mixed-design ANOVA indicated main effects for both heart rate change and condition but no LOC x Condition interaction.
Stress is commonly defined as the response that arises when an individual perceives that they cannot cope with the demands made on them or with the threats to their well-being (Lazarus, 1966). Stress can be a good thing when it motivates people, however chronic stress or stress without coping strategies can be problematic (Crum et al., 2010). Additionally, people differ in their response to stress due to many factors such as socioeconomic status, social support, mental health, and personality factors (Gadalla, 2009). The fact that all people experience stress and that there are numerous known coping techniques makes it important to determine which technique is most effective for an individual. Personality factors are often targeted by clinicians when trying to find effective coping strategies due to the accessibility of reliable personality measures. In the search for new ways of coping, research has explored the connections between relaxation techniques of meditation and yoga with various personality factors.

Many ways to cope with stress have been researched, with many different target populations in mind. Research has found a wide variety of techniques for coping with stress for both clinical populations and the general public. In Miedziun and Czabala’s (2015) study, they administered a questionnaire to 100 people, asking about what stressful experiences they have and what strategies they use to cope. The findings provided information about which stress coping techniques were most common among the sample. They categorized coping techniques into seven different categories. Techniques used most often include solving problems (72.5%), replacement gratification (57.8%) and distancing (53.8%). They did not find which techniques were most effective at coping with certain types of stressful events but inferred from their findings that those techniques involving directly addressing the stressor are the most effective.
They also found that those who are the most stressed use more techniques involving replacement gratification (listening to music, stepping away from the problem, reading) and lack of activity.

**Meditation**

Studies have explored the effectiveness of combined coping strategies to reduce stress, but many researchers have also explored the effectiveness of meditation alone due to its long history of use. Meditation is an ancient practice which originated from Asian cultures and was primarily used for religious purposes. There are many varieties of meditation, and the differences largely stem from what type of attention they try to cultivate and the relationship to cognitive processes (Sedlmeier et al., 2012). Cultivating attention refers to what the meditator is focusing on, such as focusing on body processes, breathing, thoughts, or mantras. Meditation often employs concentrative and mindfulness techniques. Concentrative techniques involve using an object to focus attention and originates from Hinduism. Mindfulness meditation is connected to Buddhism and emphasizes staying present, being alert, and in an aware state, without judging oneself. The goals of mindfulness meditation are typically about not letting the mind wander to thoughts of the past or future and to bring deep awareness to thought patterns. Mindfulness meditation is also becoming increasingly common as a tool in clinical treatment settings (Pagnini et al., 2016; Sedlmeier et al., 2012).

As meditation is becoming more frequently used in clinical settings, researchers are finding that the long-term benefits can begin to make mental health improvements in individuals eight weeks into an intervention. Research by Tacon, McComb, Caldera, & Randolph (2003) found this when they examined the impact of mindfulness meditation on anxiety reduction in patients with heart disease. They had a group of twenty female participants, all patients with heart disease. The participants engaged in a mindfulness-based stress reduction program, two
hours a week for eight weeks. They participated in three mindfulness related practices with the body scan, sitting meditation, and Hatha yoga. They measured state anxiety, emotional control, coping styles, and health locus of control. State anxiety refers to their anxiety in the given moment, in comparison to trait anxiety which refers to long-term anxiety. Emotional control involves how much control the individual believes they have over their emotional response to a situation. Coping styles was defined as the method someone employs when experiencing something stressful. They split coping strategies into three scales based on the Problem-Focused Styles of Coping measure, where participants would rate on reflective or thoughtful style, reactive or impulsive style, and suppressive or controlled style. Their results showed that participants in the meditation group experienced a significant reduction in stress, where the before meditation mean score was 37.88 (SD=10.91) and after meditation was 29.11 (SD=7.37). They also experienced an improvement in emotional control where the participants had a mean score of 62.11 (SD=4.85) and after, a mean of 57.44 (SD=4.46). For coping, women who scored as having a reactive and impulsive coping strategy were found to have a decrease in reactivity by the end of the program, with their mean score before of 15.33 (SD=2.34) and after, a mean of 13.77 (SD=1.78). There was no significant main effect for health locus of control. This study found that mindfulness-based stress reduction programs (MBSR) are effective strategies for reducing stress in individuals with heart disease.

Another study explored how effective a combined yoga-meditation program could be in treating stress. Waelde, Thompson, and Gallagher-Thompson (2004) looked at stress reduction in a sample of 12 females who acted as caretakers for a family member with dementia. The women participated in a program of six weekly sessions, where they did meditation, Hatha yoga, breathing techniques, guided imagery, and mantra repetition. A series of tests were administered
to the participants before they began the intervention. After each session, the participants would learn how to incorporate those practices into their lives as caregivers. Then they were asked to practice those techniques 30 minutes a day, six days a week with practice manuals. One month after treatment and after practicing on their own, their results showed that there was a significant effect of the intervention. Results indicated that according to the Center for Epidemiological Studies—Depression Scale, there was a significant decrease in depressive symptoms with the mean score of 23.5 ($SD=17.05$) before the intervention, and a mean of 18.58 ($SD=17.05$) after the intervention. There was also a significant decrease in state anxiety according to the State-Trait Anxiety Inventory (STAI) with a pre-intervention mean of 24.75 ($SD=7.16$) and a postintervention mean of 21.08 ($SD=7.39$). There was also a significant increase in self-efficacy scores where the mean grew from 61.38 ($SD=22.35$) to a mean of 74.29 ($SD=10.68$). These interventions were found to decrease anxiety and depression and increase self-efficacy.

In addition to stress reduction, meditation has also been used in clinical treatment for anxiety and mood disorders. Koszycki, Benger, Shlik, and Bradwejn (2007) wanted to see how well mindfulness meditation worked in comparison to a gold-standard treatment (CBT) for seasonal affective disorder. CBT is the abbreviation for the treatment cognitive-behavioral therapy, characterized by its focus on restructuring irrational thoughts and harmful thought patterns. Fifty-eight participants who were assessed to have high levels of SAD were randomly assigned to treatment via CBT or mindfulness-based stress reduction (MBSR). Those in the CBT treatment condition received treatment in accordance with a CBT manual which was delivered by an experienced CBT therapist. They had single 2 ½ hour group sessions each week, for 12 weeks. The MBSR was administered via a manual and delivered by a MBSR instructor for the 2 ½ hour group sessions for 8 weeks. The MBSR condition also received education about
meditation and mindful yoga. Symptom scales were administered by psychiatrists involved in the study. The participants also took the Social Interaction Scale (SIAS) and Social Phobia Scale (SPS) (Mattick and Clarke, 1988), the Interpersonal Sensitivity Measure (IPSM) (Boyce and Parker, 1989), the Beck Depression Inventory (BDI-II) (Beck and Steer, 1996), the Liebowitz Self-Rated Disability Scale (LRDS) (Schneier et al. 1994), and the Quality of Life Inventory (QoLI) (Frisch, 1994). Although MBSR did not show to be more effective than CBT in the measures listed, participants improved significantly in both groups on all scales. There were meaningful changes to social anxiety, mood, disability, and quality of life. Both treatments were also equal in self-reported treatment of depression. Meditation was not more effective than CBT, however there were significantly improved scores for patients who went through the meditation (Koszycki et al., 2007).

Although meditation is a common tool in stress reduction, research has found that it takes a high level of focus and diligence to help the individual experience long-term psychological benefits (Delmonte, 1984; Sauer-Zavala, 2012; Sedlmeier, 2012). Delmonte (1984) found that personality factors can impact an individual’s regularity of meditation practice in a clinical population. In his study on 37 hospital outpatients recommended for relaxation therapy, a cognitive-somatic anxiety questionnaire, social desirability scale, self-esteem scale, locus of control scale, and personality inventory were administered. Participants were then asked to meditate for 10-20 minutes, two times a day. Their success in practicing daily was measured at 3, 6, and 12 months. This study showed that high scores for neuroticism and introversion were correlated with lower practice frequency at 3 months. Whereas extraversion was positively correlated with practice frequency at 6 months and 12 months. Delmonte’s (1984) findings help
illustrate how certain personality factors can contribute to the challenges of adhering to a meditation routine, and therefore the effectiveness of meditation.

**Personality and Meditation**

Researchers Nyklicek and Irrmischer (2017) found the personality factor of neuroticism delayed the benefits of meditation, compared to the results of when other personality factors were controlled for. In a sample of 167 meditation-naïve participants, with 70% women, they administered a mindfulness-based stress reduction program from the manual of Jon Kabat-Zinn (1990). In the practice, participants engaged in typical mindfulness meditation techniques of bringing awareness to breath allowing thoughts to drift away. They engaged in the program for eight 2 ½ hour sessions over 8 to 10 weeks and had daily homework for 40 minutes. After sociodemographic and health measures were recorded, participants took the NEO Personality Inventory (NEO-PI-R) (Costa and McCrae 1992). The study found that higher neuroticism scores were associated with a smaller decrease in in anxiety and smaller decrease in depression. The significance in difference between the range of high to low neuroticism in pre and post intervention ranged from 0.042 to 1.67, with high neuroticism having the least significant change.

**Locus of Control**

One personality factor that has been thoroughly researched is locus of control. Locus of control refers to people’s beliefs and what determines whether they will get reinforced (Rotter, 1954). It also refers to the degree to which people believe they are in control of their actions and the consequences of their actions (Carton et al., 1994). When someone has internal LOC, a behavior is more likely to be strengthened; whereas, when a reinforcer seems outside of the control of the individual, they are less likely to strengthen that behavior (Rotter, 1966). It is
possible that locus of control can relate to developing stress coping strategies because a coping strategy might be more likely to be effective for an individual if it matches their beliefs in how their behavior is reinforced. It may also be important to take this into account when looking for a stress reduction technique that can be sustained.

Locus of control is split into internal and external, with individuals categorized into one of the two. Those with an internal locus of control tend to believe that reinforcement for their actions is a result of their effort and work, while those with an external locus of control believe reinforcement is out of their control (Marks, 1998). Locus of control has been shown to be viewed differently in cultural contexts and clinicians can differently interpret it in treatment. Marks (1998) found that according to the importance placed on certain factors in Western culture, internal locus of control is typically believed to be more beneficial. found that factors in Western cultures have found internal locus of control to be more beneficial in these societies. Additionally, much research has found external locus of control to be linked with depression or depressive symptoms and hopelessness.

Previous research has linked hopelessness and depression with external locus of control. Prociuk, Breen, & Lussier believed hopelessness had this connection to external LOC, through negative expectancies about the future (their definition of hopelessness), expectancies for reinforcement, and depression. The participants of their study were 111 undergraduate students who were administered a battery of psychological tests to measure hopelessness, LOC, and depression. Hopelessness was found to be significantly correlated to perceived external control $r(65)=.40$, $p<0.01$ and to depression $r(65)=.35$, $p<0.01$. Their findings were consistent with other literature on hopelessness, depression, and external LOC (Beck, 1974).
Other research found the relationship between external LOC and depression more specifically. Benassi, Dufour, and Sweeney (1988) found that there was a significant relationship between externality in locus of control and depressive symptoms through a meta-analysis. They coded 97 published studies, so positive correlations indicated more depression and external locus of control. They coded the number of subjects, type of LOC measure used, type of depression measure used, type of depression induced in the study, type of research report, gender, and year the report was made. In their study, the authors found that the mean $r$ for the association between external locus of control and depression was .31, which is categorized as medium in Cohen’s $d$. They also ran a Z test to determine how reliable the locus of control and depression relation in their data was, the test had a value of 38.25 ($p<0.0000001$), meaning that it is extremely unlikely all the research’s findings on this relationship were unreliable.

Though research has strongly supported the theory that external LOC and depressive symptoms are related, little research has been done to examine the relationship between locus of control and stress. Houston (1972) was one of the first to explore the relationship between stress reactions and LOC. Researchers examined the way a person’s perception of control over a threat impacts both their physiological arousal and self-reported rating of the threat. Sixty-five male participants experienced induced stress and were either put in a situation where they had perceived control of the threat, like internal LOC, less control, like an external LOC, or a condition where they were not exposed to a stressor. The conditions were set up by the participants receiving different instructions regarding their control over the shock. The individuals in the avoidable shock group (perceived control) experience a sharper heart-rate increase than those in the unavoidable shock group (lack of control). They reasoned that this happened because those in the avoidable shock group were putting in more effort to control the
situation, raising their heart-rate. In self-reported anxiety measures, however, the researchers found that participants reported greater anxiety when they were helpless to protect themselves from the shock. They also examined how people would react in incongruous situations (external locus of control in avoidable shock group) but that was not significant. Those in the unavoidable shock group always rated the event as more threatening. People with different loci of control tend to perceive stimuli differently, and determining whether a threat is avoidable or not determines one’s level of reaction.

Only one other study to date has examined the relationship between physiological stress, self-reported stress, and locus of control. Harrell’s (1980) study measured the relationship between locus of control, heart rate, and subjective stress responses following exposure to a stressful audio tone stimulus. In this study, 38 male undergraduate students were exposed to a stressful tone sequence. The participants rated the tones on a five-point scale, measuring intensity, unpleasantness, and impact. Following exposure, half of the participants were led in progressive muscle relaxation by a video recording and the other half were told to relax themselves. They were then exposed to the stimuli again and asked to rate the stressful tone’s intensity and unpleasantness. Those with an internal locus of control rated the stimuli as less aversive. Individuals with internal locus of control also reported an increased heart rate during stress exposure. Harrell’s research demonstrated that individuals with an internal locus of control did not experience a reduced heart-rate to stress because of the progressive relaxation training, even though they may have subjectively rated more of a decreased heart-rate response. They had a pattern of rating their subjective stress as lower than their heart-rate might suggest.

Little research has explored the connection between LOC and stress reduction techniques, however, Peter di Nardo and Jayne Raymond (1979) studied the differences in intrusive thoughts
individuals with different LOC might experience during meditation. They designed a study where they measured if participants with an internal LOC or external LOC would be able to maintain greater focus during meditation (measured by reporting intrusive thoughts) with an actual stimulus or visual image stimulus. They administered the LOC scale by Rotter, then had participants either focus attention on a candle flame or visualize a candle flame. Participants were then divided into four different groups (internal locus/actual stimulus, internal locus/imagined stimulus, external locus/actual stimulus, external locus/imagined stimulus). Mean scores of intrusive thoughts were calculated for each group. An ANOVA reported that those who had an internal LOC experienced significantly fewer intrusive thoughts than those with an external LOC, where internal conditions had intrusion means of 7.4 for actual stimulus and 10.7 for the imagined, and external LOC had 18.1 for actual stimulus and 23.3 for the imagined stimulus. They also found significantly fewer intrusions in the condition with the actual stimulus.

Research has shown that locus of control impacts reactions to stress, both physically and psychologically (Houston, 1972; Harrel, 1980). It has also shown that those with internal locus of control have different experiences during meditation than those with external locus of control (di Nardo, 1979). However, research has not paired locus of control and meditation together as a mechanism in reducing stress. In this experiment, the effectiveness of guided vs. self-guided meditation techniques in reducing stress were measured in the context of locus of control. Stress was induced through the Sing a Song Stress Task (Brouwer & Hogevoorst, 2014), and measured via heart-rate and self-reported stress. It was hypothesized that a) those with an external LOC will experience the greatest reductions in heart-rate and stress following meditation, b) those in the guided meditation group will experience the greatest decrease in heart rate and stress following meditation, and c) those with an internal LOC who receive self-directed meditation
and those with an external LOC who receive guided meditation will have the greatest reductions in heart rate and stress.

**Methods**

**Participants**

Participants consisted of 49 North Central College students enrolled in a section of introduction to psychology. The data from three participants was unable to be used due to technical problems. Therefore, the final sample size was 46.

**Materials**

**Pulse oximeter.** To measure physiological stress a pulse oximeter was used and measured heart-rate. It was worn on the index finger of the participant’s nondominant hand. The pulse oximeter was from the brand iHealth and connected to an iPad via Bluetooth technology. A timer on a cell phone was used to determine when heart-rate was to be recorded. Heart-rates were recorded on a heart-rate logging sheet and then transferred to the last page of the Qualtrics survey.

**Demographics questionnaire.** A series of questions was created to measure demographic information, such as age, academic year, gender, and major. This was included in the beginning of the survey. A series of questions about previous meditation experience was also included in this portion to determine what kind of background the participant had with meditation.

**Perceived Stress Scale (PSS; Cohen, 1983).** This scale is used to measure how the participants perceive the current levels of stress in their lives in the past month. It specifically measured how unpredictable, uncontrollable, and overloaded participants feel about their lives. The scale is a series of 10 likert-scale questions. Sample questions include, “in the last month,
how often have you felt that things were going your way?”, “In the last month, how often have you felt that you were on top of things?”, “in the last month, how often have you felt nervous and ‘stressed’?” Responses ranged from “never” to “very often”. Scores for the PSS were calculated by reverse scoring the four positive items and then summing all items. Scores can range from 0 to 40, with higher scores indicating more stress. The Perceived Stress Scale has been found to have very high validity and reliability (Carlozzi et al., 2010).

**Center for Epidemiologic Studies Depression Scale (CES-D).** The questionnaire is made of 20 brief questions with four answer options regarding frequency of various thoughts in line with depression. Examples of items include, “I was bothered by things that usually don’t bother me”, “I felt depressed”, and “I felt that people dislike me”. Answer options ranged from “rarely or none of the time (less than 1 day)” (with a value of 0) to “most or all of the time (5-7 days)” (with a value of 4). Scoring for positive items was reversed. The range of possible scores is zero to 60, where higher scores indicate more symptoms consistent with depression. This measure is reported to have high internal consistency, with a reliability between .85 and .90. The concurrent validity and construct validity have also been established in research (Radloff, 1977).

**Rotter’s Locus of Control Scale (Rotter, 1966).** To measure the variable, locus of control (LOC), the Rotter Scale (Rotter, 1966) was used. This measure is made of 29 pairs of statements, where the participant is asked to pick which statement they agree with most strongly. Examples of the two statements are “Children get into trouble because their parents punish them too much” or “The trouble with most children nowadays is that their parents are too easy with them”. The test was scored, with one statement in each pair correlating with internal or external LOC. Internal consistency reliability ranged from 0.65 to 0.79 and test-retest reliability ranged between 0.49 and -0.12. To score, one item was assigned to correlate with internal locus of
control, and that answer was given one point. Higher scores related to an external LOC and lower scores related to an internal LOC. Scores could range from 0 to 23.

**Meditation Video.** The video “5 Minute Mindful Breathing Meditation” (stopbreathethink.com) was used to guide the meditation for the participants. The video gave verbal instructions about breathing, body posture, and how to focus on thoughts. The audio was of a female voice, with soft music in the background. Some of the video had no background music. The video also contained visuals of moving shapes in pastel colors.

**Meditation.** Two methods of meditation were used in the experiment, to replicate mindfulness meditation strategy, guided meditation and self-directed meditation. For the guided meditation, participants received instructions “The meditation will be a five-minute video. Please follow the instructions and guidance of the video, the best you can.” They then followed the directions in the video, described above. For the self-guided condition, participants received instructions from the experimenter designed for this study, to replicate the instructions and themes mentioned in the video. The instructions said, “During the five minutes of meditation, sit comfortably with your eyes closed, focus on your breathing, and try not to let your thoughts drift off. If they do, accept those thoughts and then bring your attention back to you breathing.” A shortened version of the instructions was repeated. Finally, the researcher received verbal confirmation from the participant that they understood the instructions.

**Sing-a-Song Stress Task (SSST; Brouwer & Hogevorst, 2014).** A modified version of the SSST was used to induce stress. The task consisted of a timed PowerPoint presentation. The first slide of the presentation gave the instructions to, “Silently read the messages that appear on the monitor. One message may give instructions for a task which needs to be completed.” Following that, neutral phrases were taken from the Wikipedia webpage about refrigerators, and
were displayed for 15 seconds each. Each neutral phrase was averaged to be the same length as the final task phrase to rule out the possibility of the length of the phrase effecting the participants. The final phrase gave the instructions to “Think of a song, any song. When the timer hits zero, start singing that song aloud. Continue singing until instructed to stop.” Participants sang for 30 seconds. This study was shown to significantly increase heart rate in the anticipation of singing.

Procedure

The design of this experiment had multiple stages. Upon beginning the experiment, participants completed an informed consent form on the Qualtrics survey. Once consent was obtained, a baseline for heart-rate (HR) was calculated by measuring it at three points within a minute and then averaging the heart-rates. Next, participants completed the PSS, CES-D, Rotter Scale, and demographic questions. The three scales were randomized as to control for any effect of the surveys on mood or stress. Before moving on, the participants answered a brief likert scale question, self-reporting their current stress. This same question was repeated three times in total, throughout the experiment.

Once the tests were completed, the participants were presented with a PowerPoint presentation designed in accordance to the recommendations in the Sing a Song Stress Task (Brouwer & Hogevoorst, 2014). They followed the instructions on the slides and sang for 30 seconds. During the task their heart rate was measured every 30 seconds during the neutral phrases, before the timer reached zero in anticipation of singing, and at the end of singing. After the task, participants answered a question rating their current level of stress.

Through randomization within Qualtrics, the participants were assigned to a self-guided or guided meditation. Before meditation began, all participants were read two paragraphs of
Educational material about mindfulness meditation. That information was pulled from a metanalysis of variations in meditation types, by Sedlmeier et al. (2014). The script used for this can be found in Appendix A. The educational material was included to replicate the educational process a patient might experience with a clinician before meditation, or information someone might find when researching meditation online. Heart-rate was measured before meditation began.

For both conditions the experimenter sat facing away from the participants. Heart-rate was recorded every minute and the participants completed the self-report stress question following meditation. They also answered a series of questions regarding how well they believe they meditated and whether they would meditate again. After meditating, participants were given a verbal debriefing and handout where LOC, stress induction, and the types of meditation used in the study were explained.

**Results**

**Demographics**

In this study, there were 46 participants, where approximately 67% were female, and 78% were Caucasian. Mean age was 19 (SD=3.1). When asked how often they have meditated, 58 percent responded that they have tried meditation but haven’t meditated regularly. The PSS showed that the mean stress rate was 18.89 (SD=5.7). This was higher than the norm for the age group, at a score of 14 (SD=6). The mean CES-D score was 37.8 (SD=10), and mean score on the Rotter Scale was 10.15 (SD=3.06). External locus of control had scores of 13 or higher and internal locus of control was 6 or lower. They were assigned to either condition, with those within one standard deviation removed from the locus of control data. More information about demographics and test results can be seen in Table 1.
Correlation

Pearson correlation tests were run to explore associations among the PSS, CES-D, and Rotter Scale scores. The results of the correlations can be seen in Table 2. Significant positive correlations were found between perceived stress levels and locus of control, $r=0.33, p<0.05$. There was also a significant positive correlation between CES-D and perceived stress, $r=0.00, p<0.05$.

Mixed ANOVA

A mixed-design ANOVA was used, with heart rate as the within-subjects factor and locus of control and meditation condition as between-subject factors. There was a significant main effect for heart rate within all participants $F(2, 12)=0.026, p<0.05$. Specifically, heart rate was low at baseline ($M=75.52, SD=14.28$), increased during the stress task ($M=86.36, SD=14.3$), and lowered again during meditation ($M=77.52, SD=13.98$). There was a significant main effect for condition $F(2, 12)=0.04, p<0.05$, with those in the self-guided condition experiencing greater heart rate reduction ($M=11.28, SD=6.6$) than those in the guided meditation condition ($M=9.4, SD=7.4$). These two findings are illustrated in Figure 1. There was no significant main effect for locus of control $F(2, 12)=0.215, p>0.05$, showing that change in heart rate for people with internal LOC ($M=11.48, SD=6.39$) was not significantly different than those with an external LOC ($M=8.46, SD=12.7$). The ANOVA did not show a significant effect condition x locus of control interaction $F(2,12)=0.287, p>0.05$. Results were null after controlling for total PSS scores, $F(2, 12)=0.438, p>0.05$.

Because stress was also measured via self-report, a second mixed-design ANOVA was run with self-report of current stress as a within-subjects factor and locus of control and condition as between-subject factors. The test showed that reporting of current stress did not
change significantly at different points. The test showed that there was no significant main effect for condition $F(2, 12) = 0.611, p > 0.05$, where the self-reported stress for those in the guided meditation condition ($M=-2.2, SD=1.2$) and self-directed meditation ($M=-2.47, SD=1.2$) conditions. There was also no significant main effect for locus of control, where individuals with internal locus of control did not have a significantly different change in current stress ($M=-3.13, SD=0.8$) than those with an external locus of control ($M=-1.15, SD=0.58$) $F(2, 12)=0.562, p > 0.05$. The ANOVA did not show a significant effect condition x locus of control interaction $F(2, 12)=0.611, p > 0.05$. Results were null even after controlling for total PSS scores, $F(2, 12)=0.278, p > 0.05$.

**Discussion**

The findings of this study demonstrated that there was a significant change in heart-rate between each of the three stages of the experiment (baseline, SSST, and meditation). The heart-rates also followed the appropriate pattern, with increasing in the stress task and then decreasing after meditation. Self-guided meditation was also shown to reduce stress significantly more than guided meditation. These two findings are demonstrated in Figure 1. Locus of control did not have an interaction with heart-rate, condition, or self-reported stress. The self-reported stress variable did not show any relationship to the variables of the study and was not found to change significantly at different points of the study.

The positive correlations between perceived stress levels and locus of control were consistent with previous research (Benassi, 1988). External LOC has been shown to be related to symptoms of hopelessness and depression because of their interpretation of what factors are in or out of their control (Benassi, 1988). The positive correlation between depressive symptoms and perceived stress is also not surprising. The correlation found in the present study is so strong, in
fact, that it shows that in any instance of higher depressive symptoms, there is high perceived stress. Although correlation does not imply causation, these correlations to have strong associations, implying that the variables are related. Those with depressive symptoms also report as having more stress, likely because of a more pessimistic outlook on the future (Prociuk, 1976). This is likely also related to having an external LOC due to the correlation between perceived stress and LOC.

This study did not yield any results indicating an impact of LOC on effectiveness of meditation conditions or on heart-rate levels. This contradicted with research from Houston’s (1972) research that found a difference in heart-rate between those with internal or external LOC. The study did yield results that found a significant difference in heart-rate at the different points where heart-rate was measured. This indicates that the stress task did increase heart-rate significantly from the baseline and that the heart-rate calculated average from meditation had decreased from the stress task. This provides a strong foundation for the other findings from the present study. A significant difference in heart-rates shows that the study design was effective at inducing and reducing stress.

There was also a significant main effect for heart-rate change and condition. Results indicated that those in the self-guided meditation condition experienced greater heart-rate reduction compared to those in the guided condition. This was a surprising finding that contradicted the hypothesis that those in guided meditation would experience greatest stress reduction. The research shows that those in guided meditation experience greater reduction of heart-rate than those in a self-directed meditation. Although there was no specific hypothesis about which meditation technique may reduce stress most effectively independent of LOC, this is a surprising result. Intuition would guide a hypothesis that guided meditation is more direct and
requires less work for the individual, which would be more relaxing. However, the freedom of self-guided meditation may have provided more opportunity to relax at their own pace.

Contradicting the results on change in heart-rate, the current stress variable did not yield anything significant. Self-reported stress was not different at each of the points it was recorded. It is possible that this was due to design errors in the stress question. A likert-scale of five options rating high to low stress at the current moment could not have captured the construct of current stress well enough. Perhaps their changes in stress were more nuanced and a qualitative answer would have been more effective. Self-reported current stress level was also only measured at three points in the study. It is possible that measuring it more frequently and then finding an average of those measures, more similarly to how heart-rate was measured, would have been more effective. The findings of this again contrasted with research by Houston (1972) which found a significant difference in self-reporting stress with individuals with internal vs. external LOC.

Limitations

As in all experimental research, there were several limitations to this experiment. One major limitation of this experiment was the small sample size. The sample size of 46 was then cut down to 18 participants in the process of establishing criteria boundaries for the two loci of control. There were a few statistics that approached significance, and it is likely that a larger sample size would have yielded more significant results.

Another limitation of the study was the challenge of setting cutoff criteria for LOC. Personality factors tend to be measured on a scale because one factor can usually be represented in two different ways, such as introversion and extraversion. Previous research using Rotter’s scale did not set clear expectations for how to compare internal vs. external LOC. One researcher
used the score of 11 as a median boundary, where scores above 11 were external and those below were internal (di Nardo and Raymond, 1979). However, we rejected 11 as a cutoff because it seemed amiss to consider people within one point of each other to be in different categories. We decided on one standard deviation as opposed to 1.5 or 2 standard deviations because we had a small sample size. If the sample size was larger, it would have been useful to use a more stringent cutoff, which would also allow for greater distinction between the internal and external loci of control.

Another limitation would be some complications with the SSST. Some participants were confused about the instructions for the stress task. It is unclear how the instructions could have been more direct without ruining the stress induction aspects. In a handful of situations, however, participants asked for further instruction from the researcher or didn’t understand they needed to sing out loud. This task appeared to be effective at increasing heart-rate, but the effects could have been more significant or have led to more significant results in the rest of the study if the instructions were made clearer to the participants.

**Directions for Future Research**

Although there were no significant findings between LOC and the other variables, this study was one of the first to examine locus of control in relation to meditation and stress reduction. Future research examining this topic with a larger sample size or stronger experiment design would contribute valuable information to the body of knowledge in the area of stress reduction. The study design of this experiment could be modified to study other personality factors such as neuroticism and extraversion. Further exploring how personality factors can impact the effectiveness of stress reduction techniques is infinitely valuable as daily life becomes more stressful for the average person. If more information is acquired to find the connection
between personality factors and relaxation techniques, people may experience stress reduction more quickly and receive benefits of effective techniques that become long-term healthy coping strategies.
IMPACT OF LOCUS OF CONTROL ON MEDITATION STYLES

References


Harrell, J.P. (1980). Relationship Among Locus Of Control, Heart Rate And Ratings Of Stress. *Psychological Reports, 46*(2), 472-474. doi:10.2466/pr0.1980.46.2.472


### Table 1. Demographic Information

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<tr>
<th></th>
<th>Percent</th>
<th>M</th>
<th>SD</th>
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</thead>
<tbody>
<tr>
<td>PSS</td>
<td>18.86</td>
<td>5.7</td>
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</tr>
<tr>
<td>CES-D</td>
<td>37.9</td>
<td>10.48</td>
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</tr>
<tr>
<td>Rotter LOC</td>
<td>10</td>
<td>3.06</td>
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<tr>
<td>Age</td>
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<tr>
<td>Junior</td>
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<tr>
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</tr>
<tr>
<td>Male</td>
<td>32.6% (n=15)</td>
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<td>Ethnicity</td>
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<tr>
<td>Caucasian</td>
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<td>Guided Meditation</td>
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<td>Self-Directed Meditation</td>
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<tr>
<td>Would you meditate again?</td>
<td></td>
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</tr>
<tr>
<td>Yes</td>
<td>91.3%</td>
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<tr>
<td>No</td>
<td>8.7%</td>
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Table 2. Perceived Stress Scale, Center for Epidemiologic Studies Depression Scale, Rotter’s Locus of Control Scale: Correlations

<table>
<thead>
<tr>
<th>Variables</th>
<th>CES-D</th>
<th>PSS</th>
<th>Rotter LOC</th>
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<tr>
<td>CES-D</td>
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<td>---</td>
</tr>
<tr>
<td>PSS</td>
<td>.000*</td>
<td>---</td>
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</tr>
<tr>
<td>Rotter LOC</td>
<td>.112</td>
<td>.033*</td>
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</table>

*p<0.05
Figure 1.
Appendix A.

“You will be participating in a mindfulness meditation exercise. It will take five minutes. Before meditating, I will read to you the following educational material.

There are many types of meditation, and many types used by mental health practitioners to help their patients. Mindfulness meditation is a type of meditation which has been used for thousands of years, primarily in religious settings in Eastern cultures. It is closely connected to Buddhism, in particular. In those cultures, it is used to develop balance within oneself and encourage spiritual growth. Mindfulness meditation involves awareness of thoughts, mental states, and experience in a non-judgmental way.

It emphasizes staying present in the moment and maintaining a sense of awareness. This is in contrast with some other types of meditation you may have heard of, which encourage thinking about a repeating mantra. Those practicing mindfulness meditation learn to keep their mind focused and avoid their mind wandering to thoughts of the past, future, or thoughts going on tangents. Higher level practice eventually gives meditators the awareness of their thought patterns without experiencing the typical emotional reactions those thoughts may invoke. Mindfulness meditation has become an increasingly common tool in clinical treatment for anxiety disorders and in treating stress in people without an anxiety diagnosis.”