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The Effects of Brief Mindfulness Practice on Stress Reduction and the Mental Health

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Abstract

Lately, mindfulness has been gaining a lot of attention. Research have found that its practice can promote several health benefits and lead to a better quality of life. This research investigates the relationship between mindfulness and stress; specially, if a brief mindfulness meditation session is capable of reproducing the same stress reduction benefits as the 8-week long mindfulness-based stress reduction (MBSR) program.

Based on a review of literature, an online study was conducted, and no significant difference was found between the experimental and the control group, indicating that the practice of a brief mindfulness session is not related to stress reduction.

Key Words: Mindfulness / Stress / Meditation / Experiment

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Introduction

We are facing a global crisis which is causing a lot of deaths, spreading suffering and the feeling of powerlessness, and turning people's lives around. The challenging situation that we are living today due to the coronavirus is much more than just a health crisis; it is an economic, human and social crisis that is attacking the population in its core. It affects all segments of society and is especially harmful posing higher risk of death to people in more vulnerable situations, such as elderly people, people with disabilities, people living in poverty ("Everyone Included: Social Impact of COVID-19 | DISD.", 2020), and people with heart disease, diabetes, and cancer (Ossola, 2020).

The economy has suffered with the lockdown measures taken in order to prevent the proliferation of the corona virus. Stock markets around the world have plunged and oil prices have dropped significantly. The effect on workers and employers of all sectors have been devastating. Millions of people have lost their jobs and many others are concerned about being laid off. Most people are not spending money and business are not getting revenue which forces them to take drastic measures which include reducing working hours and letting employees go (Mahar, 2020). The tourism and travel sectors have been one of the most affected by the outbreak. The International Air Transportation Association (IATA) estimates that the industry's passenger revenues for 2020 could be 44% lower than the numbers of 2019, due to the seriousness of travel bans and restrictions. The tourism sector in the European Union is estimated to be losing around €1 billion in revenue per month as a result of the Covid-19 situation ("COVID-19: How Social and Economic Sectors Are Responding.", 2020).

The Covid-19 situation requires drastic changes in the way we live and has generated a lot of uncertainties, which lead to increased anxiety, frustration, preoccupation, fear, and stress (Faustino, 2020). Humans are creatures of habit that fear change and the unknown. Major life changes, pleasant or not, and especially uncertainty about the future are major causes of stress, because you feel like you have no control over it and there is nothing that you can do (Casarella, 2020).

Pandemic stress is caused by the required changes in our behavior, altered routine, various restrictions in social life, possible financial trouble, and fear of getting infected, just to cite some aspects that help to increase the stress caused by the Covid-19 (Faustino, 2020). People are stressed by this situation and it is of extreme importance that we take the needed actions to reduce stress and maintain our overall health. We are all together in this experience and there are multiple measures that can be adopted to reduce stress, such as exercising and the practice of mindfulness meditation.

Literature Review

Mindfulness has been a topic of increasing interest lately. Interest for mindfulness has "quietly exploded" and researches on the area have increased exponentially over the past two decades (Brown et al., 2007).

In 2011, Williams and Kabat-Zinn, pioneers in the field of mindfulness research highlighted that the number of publications on mindfulness increased exponentially from approximately five publications in 1983 to approximately 350 in 2010. Academic interest in mindfulness has expanded to multiple areas of study and nowadays there are thousands of studies about mindfulness, ranging from decision making and gambling to anxiety and stress reduction (Williams & Kabat-Zinn, 2011).

A significant amount of research in the topic has related mindfulness to positive effects in mental health, psychological and physical well-being (Baer, 2003; Brown & Ryan, 2003; Grossman et al., 2004; Brown et al., 2007). Researchers believe that mindfulness is positively related to energy, positive affect, or the propensity to experience positive emotions, self-esteem, interpersonal relationship quality and happiness; and negatively related to stress, anxiety, rumination, and depression. Therefore, it is possible to imply that mindfulness contributes greatly to wellbeing and quality of life (Brown & Ryan, 2003; Brown et al., 2007; Glomb et al., 2011).

Past research has found that mindfulness meditation training is related to reduction of stress and anxiety and increases in well-being; however, it is not clear whether these effects depend on long-term practice or not. Currently, we know very little about the effects of brief mindfulness meditation practices in the reduction of stress and anxiety levels. Very few studies have been performed, and those that have been conducted demonstrate the ability of mindfulness practice to significantly reduce stress, anxiety, nervousness, negative affect, and

rumination; and significantly increase positive affect and self-compassion, after weeks or even months of mindfulness practice (Shapiro, Brown & Biegel, 2007).

Therefore, does the practice of a brief mindfulness session help to reduce stress?

To answer this question, I will review relevant literature to form a specific hypothesis about mindfulness and its effects on stress reduction.

What is Mindfulness?

Mindfulness has its roots in Buddhism and is at the core, "the heart" of Buddhist teachings and Buddhist meditation practices (Fossas, 2015). Therefore, it was only five decades later that mindfulness has strongly established itself in the mainstream society, partially, through the Mindfulness-Based Stress Reduction (MBSR) program developed by Jon Kabat-Zinn, a professor of medicine at the University of Massachusetts Medical Center in 1979. The MBSR program was designed to help patients with chronic pain to reduce their condition through the practice of mindfulness meditation (Baum, 2010).

Since then, more and more scientific research studies have supported the benefits of mindfulness meditation and the effectiveness of the 8-week MBSR program to lower stress and enhance physical, psychological, and mental health. It is not surprising that the growth of scholarly interest in mindfulness has generated discussion concerning what, exactly, the definition of mindfulness is.

Mindfulness is about paying attention in a systematic way and for no reason apart than to be present, because most of the time, if you concentrate to where your mind is at, it's off someplace else, either in the future or in the past, but not in the present moment. We spend huge amounts of time worrying, planning, and being upset about what happened or didn't happen, that we tend to forget about the present moment which is the only period we have got to create, learn, be in relationship or to do anything. The present gets squeezed, and

we see ourselves blasting through our present moments to urge hopefully to better moments in the future. Whether it is the weekend, a vacation, or whatever it is, where it will all comes together, and in fact it does not because there is something else on the way. Whatever the reason is, the conditions are never actually right for being in the present moment, which is why we tend to deviate from it so much driving ourselves insane trying to rearrange the deck of chairs on the Titanic instead of trying to understand that we are not in the Titanic to begin with (Kabat-Zinn, 2010).

Jon Kabat-Zinn defines mindfulness as: "Mindfulness means paying attention in a particular way; on purpose, in the present moment and non-judgmentally." (Kabat-Zinn, 1994). This means that mindfulness includes being fully present and fully aware at the present moment. It requires an intense concentration on the events happening now without judgment nor preoccupation on thoughts about the past or the future. Mindfulness is the "power of the present". It is training our minds to be right here and right now, at this moment, without trying to change the present moment, just being aware of it. However, it is not only about paying attention to the present moment, but how we pay attention to the moment, with acceptance, not judgment. "Acceptance in this sense refers to receptivity to seeing things as they actually are in the present moment" (Kabat-Zinn, 1990), without trying to change the circumstances or the way you perceive them (Gonzalez, 2013). Every single moment and experience is unique, and if we let predefined as assumptions, thoughts, and/or expectations interfere, we will never be able to experience the moment as it truly is.

Mindfulness is about experiencing the present moment and being intimate with it. Still, most of the time we are out somewhere else in the past or the future, and forget that living this moment, the present, shapes the moments that follow, and if we are able to withstand it, shapes the future and also the quality of our lives and relationships. The only way to influence the future is to own the present, however we find it (Kabat-Zinn, 1990).

Mindfulness is often treated as a mental state practiced in mindfulness meditation; therefore, studies indicate that some people have a predisposition to be more mindful than others, indicating that individual differences, such as personality traits, reflect on the level of mindfulness experienced, which indicate that mindfulness can also be regarded as a trait (Kiken et al., 2015), or genetically determined characteristic (i.e. trait).

Empirically Supported Benefits of Mindfulness

Research on mindfulness have identified multiple benefits associated with it, which include reduction of stress, anxiety, rumination, emotional reactivity, depression, fatigue and anger, and improvement of attention, focus, cognitive flexibility, emotional intelligence, and relationship satisfaction. Below, some of these benefits are discussed with further detail.

The mindfulness-based stress reduction (MBSR) program helps to reduce anxiety symptoms in people with generalized anxiety disorder, which is characterized by poor sleep, irritability, and ruminative unproductive worries (Corliss, 2014). A research with therapists in training found that participants on the 8 weeks MBSR training reported significant decreases in perceived stress, anxiety, negative affect, rumination; and significant increases in positive affect and self-compassion, when compared to participants in the control group. The results of the study indicate that mindfulness practice may not only lower stress but also increase the ability of emotional selectivity, reflected in the decreases in ruminative thoughts

(Shapiro et al., 2007).

Mindfulness meditation is directly related with cognitive flexibility and attentional functioning and helps to improve the ability to focus and suppress distracting information (Moore & Malinowski, 2009). A military group who participated in the 8-week MBSR program was observed and it was found that mindfulness meditation helps to enhance attentional functioning through improvement in working memory (Jha et al., 2010).

Studies also suggest that mindfulness helps to improve self-awareness, increases the ability to react properly to negative and stressful situations (Cahn & Polich, 2006; Davidson et al., 2003), and can help to better communicate emotions which can be related to increased relationship satisfaction (Barnes et al., 2007; Wachs & Cordova, 2007).

Premedical and medical students reported decreased anxiety and depression after participating in the 8-week mindfulness-based stress reduction (MBSR) program (Shapiro et al., 1998). After the training, therapist trainees reported reduced levels of rumination, stress, and negative affect (Shapiro et al., 2007). In addition, MBSR training has been proved to decrease total mood disturbance, which include anxiety and stress (Rosenzweig et al., 2003; Davis & Hayes, 2012).

There are several studies about mindfulness which focus in different areas and sample groups with different characteristics which may not be related; therefore, all these studies arrive to similar conclusions about mindfulness and its benefits, suggesting that mindfulness meditation practices can help to reduce stress and overall mood disturbance and contributes greatly to well-being and overall quality of life.

Mindfulness and Stress and Anxiety

Stress is how the body and brain respond to any challenge or demand, such as a significant life change, a traumatic event, a divorce, or getting promoted ("5 Things You Should Know About Stress", n.d.). Stress is a feeling of emotional and/or physical tension that can lead to many negative outcomes (National Institutes of Health, n.d), such as depression, substance use, poor eating habits and sleep quality, attention deficit, pain, weight gain (Goyal et al., 2014), and anxiety, which is the most common mental health issue in the United States nowadays, according to the National Council for Behavioral Health (Ross, 2018). So, it is important to identify its causes and learn how to deal with it.

Research has found that traits like neuroticism, described as the propensity to experience negative mood states, and extraversion, characterized by talkativeness, sociability, and openness are associated with anxiety and stress (Uliaszek et al., 2010). Some other contextual predictors of stress include stressful events such as divorce, job loss, major illness or injury, death of a loved one, imprisonment, and retirement ("10 Most Stressful Life Events: the Holmes and Rahe Stress Scale", 2018).

Stress is typically divided into two categories: acute stress and chronic stress. Acute stress is short-term, such as stress from an argument, criticism, or a traffic jam. If not resolved, acute stress can turn into chronic stress which is long-term and constant, such as stress from constantly arguing with your partner, living in a dangerous place, poverty, a bad job or a dysfunctional family. We can handle and recover fast from acute stress; however, we are not able to handle chronic stress the same way. Over time, chronic stress can lead to increased heart rate, blood pressure, chronic pain, depression and even suicide (Porter, 2017; Timothy, 2016).

Particularly, in this time of Covid-19, people anecdotally report increased stress and anxiety. For example, people are feeling stressed and anxious because of uncertainties related to one's health and the health of loved ones (McGuire, 2020), the economic situation (Baker, 2020), and future plans (vacation, events, graduation, etc.) ("How to Deal with Uncertainty during Coronavirus", 2020). Empirically, several recent researches have demonstrated elevated anxiety due to self-isolation (Xiao et al., 2020), and a review of recent Covid-19 studies found an increase of depression and anxiety symptoms as well as self-reported stress (Rajkumar, 2020).

As discussed earlier, several studies indicate that mindfulness is negatively related to stress, and that it increases our ability to handle stressful and challenging situations.

But, how exactly does mindfulness helps to reduce stress and specifically Covid-19-related stress?

Mindfulness practice facilitates self-regulation of attention and emotion, enabling people to identify thoughts and emotions without being controlled by them, which allows people to see the situation as it really is; and so, deal with negative events and stressful situations with increased self-control and reduced rumination, the repetitive thoughts that lead to stress (Brown et al., 2007; Glomb et al., 2011). Paying attention to the present moment increases acceptance and toleration, which allows us to respond to that specific situation rather than reacting to it and trying to find explanations (Camara, 2020). Therefore, making us less likely to become stressed by situations perceived as stressful before (Delagran, n.d.).

Several past studies have indicated that mindfulness is inversely related to stress; however, these studies have relied mostly on the 8-week mindfulness-based stress reduction (MBSR) program. The purpose of this research project was to investigate the relationship between mindfulness and stress through the practice of a brief mindfulness session.

Independent Variable Dependent Variable

Research question:

Does a brief mindfulness meditation practice help to decrease stress?

Null (Ho) hypothesis:

Brief mindfulness meditation practice does not correlate to the levels of stress a person faces.

Alternate hypothesis:

Brief mindfulness practice leads to a decrease in the levels of stress a person faces.

It is expected that the practice of mindfulness meditation helps to reduce stress as reviewed in the literature review above. However, it is still unknown if the practice of a brief mindfulness session is effective and produces the same desired effects.

Methodology

Participants

For this experiment, participants were recruited from Nova School of Business & Economics and the researchers' network. For inclusion, participants had to be at least 18 years old. All data collection occurred online. Procedures included the completion of surveys, questionnaires, and a task (either mindfulness meditation or counting verbs). Participants were given extra course credit if participating via Nova Behavioral Lab for bonus credit.

A total of 100 individuals participated in the study, of which 75 completed all study procedures and 25 did not complete all the study. These that did not complete the entire study were excluded from the analysis. Demographics of the sample are presented in Table 1 in the Appendix session. Most of the participants (n=57; or 76%) participated via Nova Behavioral Lab for bonus course credit. The sample was predominantly female (n=44; or 58.7%), with a management background (n=56; or 74.7%), aged 23 (n=16; or 21.3%) and ranging age from 18 to 59 (Mo=23; SD=9.69), and from Portugal (n=32; or 42.7%).

Following the instructions provided in the study description, participants were randomly assigned into one of two groups: a control group - Counting Verbs (n=36; or 48%); and an experimental group – Mindfulness (n=39; or 52%).

Procedure

The study was conducted in a single online session of approximately 30 minutes through the platform Qualtrics. A series of audio guided activities and self-reported measures, which included assessments of state mindfulness and perceived stress, were performed.

First, participants were asked to complete an audio check to ensure there were no problems with the audio, and to complete the Ten Item Personality Measure (TIPI)

questionnaire, then they were randomly allocated to either the experimental group or the control group.

Experimental Condition: Mindfulness

The experimental group participants (n=39; or 52%) listened to an audio guided focused breathing mindfulness meditation practice of 9 minutes, in which they were guided through a meditation exercise that constantly reminded them to observe the present moment and bring their awareness to the physical sensations of the breath meditation. For example: the sensation of the abdomen inflating and deflating with each breath.

Control Condition: Counting Verbs

The control group participants (n=36; or 48%) listened to the same 9 minutes audio guided focused breathing mindfulness meditation record; therefore, they were asked to count the number of verbs in the audio instead of focusing on the meditation practice.

After the audio guided practice, participants were asked to fill the Mindful Attention Awareness Scale (MAAS) to assess their perceived level of mindfulness; and the adapted Perceived Stress Scale 4 (PSS-4) in order to assess their perceived levels of stress.

After that, some demographic questions were asked, which included gender (male, n=31; female, n=44), age (M = 23 years, SD = 9.69), and nationality (Portuguese, n= 32). It was also asked participants' meditation experience and meditation frequency, and their field of study (management, n=56; finance, n=5; others, n=14).

Some technical questions were also asked in order to evaluate the reliability of the experiment: "Did you manage to complete the survey without any breaks?" (yes, n=72; no, n=3); "Did you manage to complete the survey without any distractions?" (yes, n=62; no, n=13); and "Were there any issues with the audio or other aspects of the survey?" (no, n=72; yes, n=3). Participants which reported issues with the audio, were actually reporting minor

distractions by outside noise (e.g. car and stomach noise). Therefore, it was assumed that everyone did the study in one shot, without any breaks, distractions, nor audio issues and no further participants were excluded from analysis.

Measures

Personality

The Ten Item Personality Inventory (TIPI) is a shorter version of the Big Five personality traits questionnaire and was used to assess the personality traits of participants (Gosling, Rentfrow & Swann, 2003). Each of the personality trait was assessed with two items. Sample items included: I see myself as… "Extraverted, enthusiastic", " Critical, quarrelsome", " Dependable, self-discipline", " Anxious, easily upset", "Open to new experiences, complex", "Reserved, quiet", "Sympathetic, warm", "Disorganized, careless", "Calm, emotionally stable", "Conventional, uncreative". Items were reverse coded and averaged to form scores for Extraversion (Spearman-Brown Coefficient = 0.71), Agreeableness (Spearman-Brown Coefficient = 0.15), Conscientiousness (Spearman-Brown Coefficient = 0.49), Neuroticism (Spearman-Brown Coefficient = 0.50), and Openness (Spearman-Brown Coefficient = 0.03). Participants responded to the TIPI questionnaire using a 7-point scale (1 = Disagree strongly, and 7 = Agree strongly).

The scores of Spearman-Brown Coefficient suggest that the ability to measure Agreeableness and Openness are quite below the usual conventional accepted value of 0.7; nevertheless, for this study Neuroticism was the trait of most interest.

Mindfulness

To assess mindfulness, the 5 item Mindful Attention Awareness Scale- State (MAAS, Brown & Ryan, 2003) was used. The state MAAS is a 5-item scale assessing the current receptive state of mind in which attention simply observes what is occurring in the present (Brown & Ryan, 2003).

The MAAS has been used in several previous studies and has been frequently validated. Participants responded to the 5 item MAAS using a 7-point scale (1 = Not at all, and 7 = Very much) Likert scale, in which all items were reverse coded. Therefore, higher scores indicated higher state mindfulness. Sample items included: during the audio guided task, I… "Found it difficult to stay focused on what was happening", "Was doing something without paying attention", "Was preoccupied with the future or the past", "Was doing something automatically, without being aware of what I was doing" and "Rushed through something without being really attentive to it".

The Cronbach's Alpha for the SMAAS scale equals 0.693, meaning that its ability to measure SMAAS is slightly below the usual conventional accepted value of 0.7.

Stress

To assess stress, participants completed the adapted Perceive Stress Scale 4 (PSS-4). Responses were made on a 5-point Likert scale (1 = Strongly disagree, and 5 = Strongly agree) with respect to how often participants feel a certain way. Sample items included: Right now, I feel… "That I am unable to control the important things in my life that have been impacted by the coronavirus (Covid-19) situation", "Confident about my ability to handle my personal problems that have arisen due to the coronavirus (Covid-19) situation", "That things are going my way during the present coronavirus (Covid-19) situation" and "That difficulties are piling up so high that I can not even overcome them due to the coronavirus (Covid-19)

situation". Statements 2 and 3 were reverse coded. Higher scores indicated higher level of perceived stress (Cohen, Kamarck & Mermelstein, 1983).

The Cronbach's Alpha score for the stress appraisal is 0.632, which means that this scale's ability to measure stress is slightly below the usual conventional accepted value of 0.7.

Meditation Experience & Frequency

Meditation experience and frequency might interfere with the results of the study; therefore, two questions were asked in order to assess participants' meditation experience and frequency. Meditation experience was assessed through the question: "How much meditation training have you had (e.g. meditation exercises, meditation retreats)?"; sample responses were "None", "Hours", "Days", "Weeks", "Months", "Years". (See Appendix 2 – Meditation Experience)

Meditation frequency was assessed through the question: "How often do you meditate through meditation exercises?"; and sample responses were "Never", "Once a month", "2-3 times a month", "Once a week", "2-3 times a week", "Daily". (See Appendix 3 – Meditation Frequency)

It was found that most participants had none or very little meditation experience. 82.7% of participants reported having only a few hours of experience or no experience at all. While 62.7% reported that they never meditate through meditation exercises.

Data Analysis

The data was analyzed using the statistics software SPSS version 26 by IBM. A series of different analysis were made in order to test the hypothesis and form the conclusion of the study.

Research Results

Personality

From the means and standard deviations it is possible to identify averages of personality traits. Extraversion (M=4.75, SD=1.54); Agreeableness (M=4.51, SD=0.95); Conscientiousness (M=5.40, SD=1.15); Neuroticism (M=3.40, SD=1.28); Openness (M=5.55, SD=0.90). These scores indicate that in general participants are more extroverted than introverted, agreeable than hostile, conscientious than spontaneous, and more open than closed. Neuroticism's mean value of 3.40 indicates that participants are slightly more emotionally stable than neurotic.

A Pearson Correlation Analysis was ran in order to identify the relationship between the different big 5 personality traits (extraversion, agreeableness, conscientiousness, neuroticism, and openness) and stress.

It was found a significant relationship between stress and neuroticism (pearson's $r = 0.38$, $p < .001$). This indicates that neuroticism has a positive relationship with stress, which is expected as stated in the literature review (See Appendix 4 for full Correlation Table).

State Mindfulness Scale

A Univariate Analysis of Variance (Univariate ANOVA) was conducted in order to determine whether there are any significant differences between the means of state mindfulness in the two groups.

No significant difference was found between the control group - counting verbs (M=4.75, SD=1.35) and the experimental group – mindfulness (M=4.55, SD=1.06), $F(1, 73) = 0.49$, $p > .05$. This indicates that a brief mindfulness session does not affect the SMAAS reported by participants.

Perceived Stress

A Univariate ANOVA was conducted in order to determine whether there are any significant differences between the means of perceived stress in the two groups.

No significant difference was found between the control group - counting verbs (M=2.64, SD=0.77) and the experimental group – mindfulness (M=2.89, SD=0.72), $F(1, 73) = 2.15$, $p > .05$. This indicates that a brief mindfulness session does not affect the perceived stress reported by participants.

Additional Analyses

Some extra analysis was ran using Process Macro (Hayes, 2012) in order to identify if there are moderators in the relationship between mindfulness and stress. Basically, to examine if the different personality traits affect the relationship between mindfulness and stress. All interaction terms were mean centered. No significant interactions were found from the regressions (see Appendix 5 – Regression Analyses). It was found that personality does not affect the relationship between mindfulness and stress; mindfulness is equally ineffective for people with different personality traits. These analyses are exploratory.

Discussion

This study found that the practice of a brief mindfulness session does not reduce stress. We found no evidence that that a brief mindfulness session affects the level of state mindfulness reported, nor the level of perceived stress.

The PSS-4 scale used for measuring perceive stress was adapted to reflect the Covid-19 situation. Most of the participants were Nova students that were still attending classes and doing assignments; thus, it is possible that they were not really affected or stressed by the Covid-19 situation. We can see from the average score of 2.77 for Covid-19 stress that participants were not really stressed by the situation.

Recent research shows that people most affected by Covid-19, such as frontline medical workers, dental hygienists, flight attendants, grocery workers and other occupations in areas with high infection rates (Lu, 2020) report elevated anxiety and stress levels. It may be of researchers' interest to examine if a brief meditation can help lower these high anxiety and stress levels.

On the other hand, it is also possible that Covid-19 stress is a unique kind of stress that cannot be reduced. Stress in our regular life comes from areas and challenges that we have the ability to handle, talk to others about, and look for answers. Therefore, Covid-19 is an unknown situation that nobody has answers for, making it completely out of our control. The uncertainty about coronavirus is the hardest thing to handle because we do not know how exactly we will be impacted or how bad things might get, making it easy for the situation to become overwhelming, increasing anxiety and stress ("Coronavirus Anxiety: Coping with Stress, Fear, and Worry", 2020).

One other possible explanation that cannot be eliminated is that counting verbs is as good as mindfulness at reducing stress. Some people anecdotally report that they try to keep occupied with personal projects, reading, meditation, and studying during Covid-19. Indeed,

emotions can be self-regulated through strategies of suppression or distraction (Gross, 2002). Although this idea that keeping the mind occupied with counting verbs is as good as mindfulness when it comes to stress cannot be proven in the current experimental design, a future study with a known control condition can try to examine this.

Finally, it may be that reaching a state of mindfulness requires a certain level of practice of which participants did not have; therefore, affecting the results.

Limitations and Future Directions

While the research makes contributions to understand the relationship of mindfulness and stress, it is not without limitations. One of the limitations is that we only used one mindfulness induction activity of focused breathing. Another limitation of the study is that we used a counting verbs (Koole et al., 2009) activity for the control condition, which might not be an effective activity for the control condition. Originally, a mind wandering control condition was going to be used and this control condition is the standard for many studies examining mindfulness (Hafenbrack, Zoe & Sigal, 2013). However, due to the Covid-19 situation we are going through, it would be unethical to have people to do a mind wandering activity, where they let thoughts come to mind freely whatever they may be, because it could induce further stress than they were already facing.

Another limitation of the study is that we were not able to conduct it in a controlled environment and had to make necessary adaptions to an online format due to the Covid-19 situation; which might have affected the desired results and reliability of the study because it was not possible to make sure that people were actually meditating and not distracted.

Future research could use other form of mindfulness induction activities as well as other kinds of control condition. Also, conducting the study in a controlled environment would be beneficial.

Conclusion

The increasing scholarly interest in mindfulness continues to unveil many benefits. This research aimed to identify the relationship between mindfulness and stress. Based on a quantitative analysis, the present research suggests that the practice of a brief mindfulness session does not affect the level of state mindfulness nor perceived stress reported by participants. Further research is needed to test other experimental and control conditions and to understand how much practice is needed in order to experience mindfulness' benefits.

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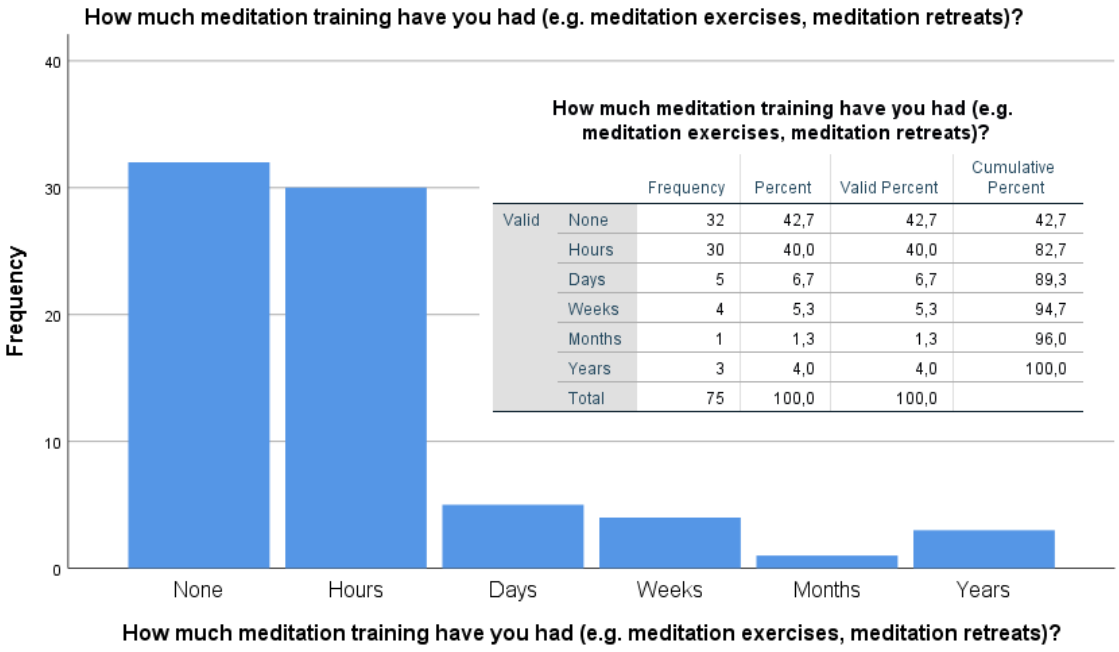
Appendix

Appendix 1. Demographics

Table 1 - Demographics			
	n	%	
Gender			
Male	31	41.30%	
Female	44	58.70%	
Age			23±9.69
Nationality			
Australia	1	1.30%	
Austria	1	1.30%	
Belgium	1	1.30%	
Brazil	15	20%	
China	1	1.30%	
Germany	17	22.70%	
Italy	5	6.70%	
Portugal	32	42.70%	
United States of America	2	2.70%	
Field of Study			
Finance	5	6.67%	
Management	56	74.67%	
Others	14	18.67%	

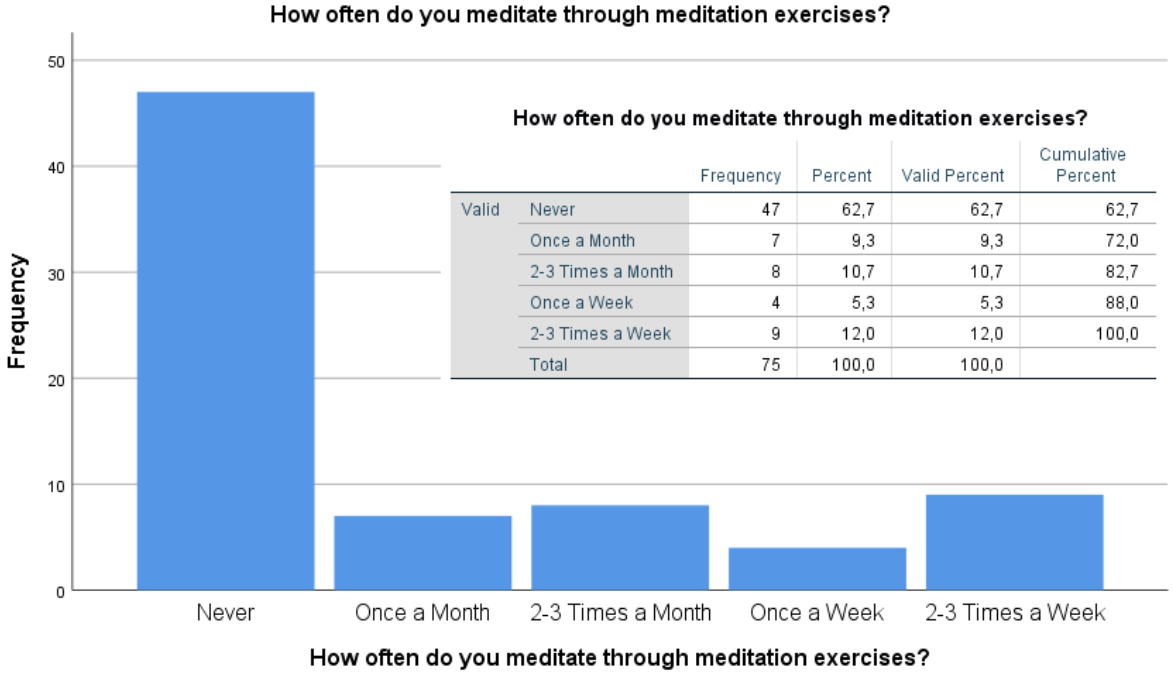
Appendix 2 – Meditation Experience



How much meditation training have you had (e.g. meditation exercises, meditation retreats)?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	None	32	42,7	42,7	42,7
	Hours	30	40,0	40,0	82,7
	Days	5	6,7	6,7	89,3
	Weeks	4	5,3	5,3	94,7
	Months	1	1,3	1,3	96,0
	Years	3	4,0	4,0	100,0
	Total	75	100,0	100,0	

Appendix 3 – Meditation Frequency



How often do you meditate through meditation exercises?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never	47	62,7	62,7	62,7
	Once a Month	7	9,3	9,3	72,0
	2-3 Times a Month	8	10,7	10,7	82,7
	Once a Week	4	5,3	5,3	88,0
	2-3 Times a Week	9	12,0	12,0	100,0
	Total	75	100,0	100,0	

Appendix 4. Correlation Table

Ns, Correlations, Means and Standard Deviations

		Mean	Standard Deviation	N° of Responses	1	2	3	4	5	6	7	8	9	10
1	Age	25.43	9.69	75	1.00									
2	Male[a]	0.41	0.49	75	-.03**	1.00								
3	Extraversion	4.75	1.53	75	-.26*	.07	1.00							
4	Agreeableness	4.51	0.95	75	.134	-.33**	-.16	1.00						
5	Conscientiousness	5.40	1.15	75	-.06	-.18	.09	.30**	1.00					
6	Neuroticism	3.40	1.28	75	-.11	.09	-.01	-.13	-.21	1.00				
7	Openness	5.55	0.90	75	.02	-.18	.23*	.07	-.15	-.06	1.00			
8	Condition_Mindfulness	0.52	0.50	75	-.19	-.11	.04	.03	.06	.02	.11	1.00		
9	SMAAS	4.65	1.20	75	.30**	-.04	-.05	0.13	-.08	-.13	.13	-.08	1.00	
10	Stress	2.77	0.75	75	-.21	-.02	.03	-.06	-.09	.38**	.05	.17	-.25**	1.00

**. p <.01 *. p <.05

a. Male = 1, Female = 0

Appendix 5 – Regression Analysis

Regression Table

Regression Results

	B	SE	t	B	SE	t	B	SE	t	B	SE	t	B	SE	t
(Constant)	2.77	0.09	32.07	2.77	0.09	32.41	2.77	0.09	31.97	2.77	0.08	34.50	2.76	0.09	31.61
Extraversion	0.00	0.06	0.07												
Agreeableness				-0.10	0.10	-1.03									
Conscientiousness							-0.07	0.08	-0.86						
Neuroticism										0.22	0.06	3.54			
Openness													0.04	0.10	0.40
Condition_Mindfulness	0.25	0.17	1.46	0.26	0.17	1.51	0.26	0.17	1.50	0.24	0.16	1.50	0.25	0.18	1.40
Personality × Mindfulness	0.14	0.11	1.22	-0.29	0.19	-1.51	-0.06	0.15	-0.39	-0.01	0.13	-0.10	0.11	0.20	0.57

*** p < .001 **p < .01 *p < .05

Appendix 6. Study for Nicholas Beccon de Oliveira Master's Thesis

Title of Research Study: Study for Master Thesis of Nicholas Beccon de Oliveira
Principle Investigators: Professor Samantha Sim, Nicholas Beccon de Oliveira

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Purpose of Research Study:
The purpose of conducting this research study is to understand the relationship between brief mental activities, perceptions of others and stress.

Study Procedures and Duration:
To participate in the study, you must be above 18 and already signed up on Moodle for the study. For this study, you will complete a 9-minute audio-guided mental task, then complete short questionnaires and demographic questions.
The experiment takes no more than 30 minutes.

We ask that you have a pair of headphones ready to listen to the audio.

Benefits of Study:
You will receive 0.2 class credit for having signed up on Moodle and successful completion of this study. AT THE END YOU WILL BE REDIRECTED TO A SEPARATE SURVEY TO FILL IN YOUR NAME AND STUDENT NUMBER. THIS WILL CONSTITUTE PROOF OF PARTICIPATION! Your participation is totally voluntary, and your refusal to participate or your withdrawal from this study will involve no penalty. You may discontinue participation at any time.

PLEASE NOTE:
It would be fully appreciated and help the purpose of the study if you complete the survey by giving your fullest attention, reading all instructions and statements carefully and then responding accordingly to all the items. This helps us get an accurate picture of your experience.
Possible Risks of Study:
There are no anticipated risks or adverse effects in this study beyond what one would typically experience in daily life.

Confidentiality and Privacy of Research Data:
The information provided by all respondents will be anonymous and confidential and will be used for research purposes only. The survey responses contain no identifying information. Also, no one will have access to your completed survey except for the Principal Investigators (PI) and the research team. As such, please answer all questions as honestly and accurately as possible.

Please set up your headphones and be in a quiet place where you can remain without distraction for the next 30 minutes. If you are unable to do so, please return to this page later when you can!

TASK 1: TELL US ABOUT YOURSELF
Ten Item Personality Inventory – TIPI

Instructions: Here are a number of descriptions that may or may not apply to you. Please indicate the extent to which you agree or disagree with that statement. You should rate the extent to which the pair of descriptions applies to you, even if one characteristic applies more strongly than the other.

Statements:
I see myself as ...

1. Extraverted, enthusiastic.
2. Critical, quarrelsome.
3. Dependable, self-disciplined.
4. Anxious, easily upset
5. Open to new experiences, complex.
6. Reserved, quiet.
7. Sympathetic, warm.
8. Disorganized, careless.
9. Calm, emotionally stable.
10. Conventional, uncreative.

Scale points:
1. Disagree strongly; 2. Disagree moderately; 3. Disagree a little; 4. Neither agree nor disagree; 5. Agree a little; 6. Agree moderately; 7. Agree strongly.

Audio Test
Now please follow the instructions below to do an audio check. Please put your headphones on. Test if the sound is audible by playing the audio clip below.

To continue, select the option that best represents what you heard in the audio clip:

1."Shh", 2."Meow", 3."Ding", 4."Haha", 5."Boom", 6."Oink".

Start of Block: Mindfulness - Breath Awareness

TASK 2: AUDIO GUIDED MENTAL TASK

Please keep your headphones on. In the next section, an audio will be played.
Feel free to close your eyes if that helps you to pay attention.
Please do not do anything else during this time.

In the next page, the 9-minute audio will start playing automatically and you will not be able to skip the audio.

Breath Awareness Video

AUDIO GUIDED MENTAL TASK

Start of Block: Control Condition - Count verbs

TASK 2: AUDIO GUIDED MENTAL TASK

Please keep your headphones on. In the next section, an audio will be played. You will listen to a guided audio giving instructions. **Please do not follow the speaker's instructions but count the number of verbs* occurring in the recording.**

Feel free to close your eyes if that helps you to pay attention.
Please do not do anything else during this time.

In the next page, the 9-minute audio will start playing automatically and you will not be able to skip the audio.

*A verb is a word used to describe an action or a state. Examples of verbs you will hear in the audio are "are going to do", "may not have done", where the underlined are examples of verbs.

Number of verbs at the end of the audio, please enter the total number of verbs you counted. (Enter only a number.)

The Mindful Attention Awareness Scale- State (SMAAS)

Instructions: Using the 1-7 scale shown, please indicate to what degree were you having each experience described below during the audio guided task.

Please answer according to what really reflects your experience rather than what you think

your experience should be. Please treat each item separately from every other item.

Statements:
During the audio guided task, I...

1. Found it difficult to stay focused on what was happening.
2. Was doing something without paying attention.
3. Was preoccupied with the future or the past.
4. Was doing things automatically, without being aware of what I was doing.
5. Rushed through something without being really attentive to it.

Scale points:
1. Not at all; 4. Somewhat; 7. Very much.

Ego Dissolution

Instructions: The following are some statements that describe how you feel right now. Please indicate the extent to which you agree with these statements.

Statements:
Right now,

1. I experience a **dissolution of my "self" or ego**.
2. I feel at **one with the universe**.
3. I feel a sense of **union with others**.
4. I experience a **decrease in my sense of self-importance**.
5. I experience a **disintegration of my "self" or ego**.
6. I feel **far less absorbed by my own issues and concerns**.
7. I feel like I am **losing all sense of ego**.
8. All notion of **self and identity are dissolved away**.

Scale points:
1. Strongly disagree; 2. Disagree; 3. Somewhat disagree; 4. Neither disagree nor agree; 5. Somewhat agree; 6. Agree; 7. Strongly agree.

PSS4 Stress Scale

Instructions: How do you feel right now? Please respond to the statements below.

Statements:
Right now, I feel ...

1.That I am unable to control the important things in my life that have been impacted by the coronavirus (COVID-19) situation.

2. Confident about my ability to handle my personal problems that have arisen due to the coronavirus (COVID-19) situation.

3. That things are going my way during the present coronavirus (COVID-19) situation.

4. That difficulties are piling up so high that I can not even overcome them due to the coronavirus (COVID-19) situation.

Scale points:

1. Strongly disagree; 2. Disagree; 3. Neither disagree nor agree; 4. Agree; 5. Strongly agree.

Prosocial Values Questionnaire

Instructions: Below are some statements regarding how you feel about other people. Please tell us to what extent you agree to these items.

Statements:

1. I am able to empathize with people from other countries.

2. It is easy for me to put myself in someone else's shoes regardless of what country they are from.

3. Those countries that are well off should help people in countries who are less fortunate.

4. Basic services such as health care, clean water, food, and legal assistance should be available to everyone, regardless of what country they live in.

5. If I had the opportunity, I would help others who are in need regardless of their nationality.

6. If I could, I would dedicate my life to helping others no matter what country they are from.

7. Being actively involved in global issues is my responsibility.

8. It is my responsibility to understand and respect cultural differences across the globe to the best of my abilities.

9. I would like to join groups that emphasize getting to know people from different countries.

10. I am interested in learning about the many cultures that have existed in this world.

11. People have a responsibility to conserve natural resources to foster a sustainable environment.

12. Natural resources should be used primarily to provide for basic needs rather than material wealth.

Scale points:

1. strongly disagree; 2. Disagree; 3. Neither disagree nor agree; 4. Agree; 5. Strongly agree.

Final Task:

This and the following page are the final sections of the survey. Please fill out the following demographic questions.

Gender

1.Male; 2. Female; 3. Do not identify with either.

Age

▼ 18 ... Older than 80

What is your **nationality**?

▼ Afghanistan (1) ... Zimbabwe (1357)

Meditation Frequency - How often do you meditate through meditation exercises?

1.Never; 2. Once a Month; 3. 2-3 Times a Month; 4. Once a Week; 5. 2-3 Times a Week; 6. Daily.

Meditation experience - How much meditation training have you had (e.g. meditation exercises, meditation retreats)?

1.None; 2. Hours; 3. Days; 4. Weeks; 5. Months; 6. Years.

What is your **field of study**?

1.Finance; 2. Economics; 3. Management; 4. Other.

Bonus point or not I am participating...

1.via Nova Behavioral Lab for bonus course credit.

2. **not** via Nova Behavioral Lab / **not** for bonus course credit.

The following questions do not affect the answers you have given so far, nor your participation bonus if you are participating via Nova Behavioral Lab. It allows us to have better understanding during the data analysis stage. So, please answer as honestly as possible!

Breaks- Did you manage to complete the survey without any breaks?

1.No (please explain briefly); 2. Yes.

Distraction- Did you manage to complete the survey without any distractions?

1.No (please explain briefly); 2. Yes.

Audio issues- Were there any issues with the audio or other aspects of the survey?

1.No; 2. Yes (please briefly explain); 3. There was no page with an audio.

Debrief

The rest of this page is a debrief form with information about this study if you are interested in knowing more. **Please do not discuss any details about the study you just completed with your colleagues, as we are still collecting data. Your discussion could contaminate the results of our study. If you are asked about the study, please tell your colleagues that it was interesting and that they should participate!**

Remember to submit your answers at the end of this page.

Explanation of the general research field of study

This research is about mindfulness meditation and its relationship with stress levels. In this study, you listened to a mindfulness induction audio. Some participants were asked to meditate according to the audio, but some others were asked to count the verbs in the mindfulness induction audio instead. After the audio, everyone had to report their stress level, how mindful they were, and completed an assessment of stress.

It is hypothesized that a brief mindfulness session (9-minutes) is positively related to reduction of stress levels, especially during this difficult time. Your participation helps us collect data to determine whether this might or might not be the case.

You can find more information about the mindfulness here:

---Arch, J. J., & Craske, M. G. (2006). Mechanisms of mindfulness: Emotion regulation following a focused breathing induction. *Behaviour Research and Therapy*, *44*(12), 1849-1858.

---Hafenbrack, A. C., Kinias, Z., & Barsade, S. G. (2014). Debiasing the Mind Through Meditation Mindfulness and the Sunk-Cost Bias. *Psychological Science*, *25*(2), 369-376.

If you would like to listen to a mindfulness meditation record:

https://soundcloud.com/ucsdmindfulness/10-min-awareness-of-breath-by-christy-cassisa?in=ucsdmindfulness/sets/short-meditation-sessions